Chapter 2: SCHOOL OF ENGINEERING AND TECHNOLOGY

2.1 Mission

In line with the mission of the Institute, the mission of the School of Engineering and Technology is:

To develop highly qualified engineers and technologists who play leading roles in promoting the region’s industrial competitiveness in its integration into the global economy.

2.2 Thematic Groups, Fields of Study, and Multidisciplinary Programs

Information and Communications Group

Information and communications reflect the essential importance of access, connectivity and sharing. This collaboration on the creation of relevant knowledge provides economic opportunity and empowerment for all peoples of the region.

- Computer Science (CS)
- Information Management (IM)
- Remote Sensing and Geographic Information Systems (RS-GIS)
- Telecommunications (TC)
- Information and Communications Technologies (ICT)*

Industrial System Engineering Group

For several decades, AIT has served the development of the region by equipping young engineers with high-tech knowledge required for working in a complex industrial environment. Since its inception, the Industrial Systems Engineering (ISE) program at AIT has contributed to this mission by focusing on industrial competitiveness and innovation for sustainable growth of the region. ISE program acts as an umbrella for four fields of study:

- Design and Manufacturing Engineering (DME)
- Industrial Engineering and Management (IEM)
- Mechatronics (MEC)
- Microelectronics (MIC)
- Automotive Design and Manufacturing (ADM)*

Civil and Infrastructure Engineering Group

Since the start of AIT, civil engineering fields have acted as a catalyst in advancing modern methodologies, emerging technologies and innovative materials for the design and construction of safe and economical infrastructure in the region.

- Construction, Engineering and Infrastructure Management (CEIM)
- Geotechnical and Geoenvironmental Engineering (GTE)
- Structural Engineering (STE)
- Transportation Engineering (TRE)
- Water Engineering and Management (WEM)
- Geosystem Exploration and Petroleum Geoengineering (GEPG)*

* Interdisciplinary Areas

2.3 Strategic Signature Areas

The changing landscape of engineering requires graduates to have not only the traditional technical knowledge of their predecessors, but also a new set of broader skills that will meet the demands of fast-moving, global and multidisciplinary environments. Engineers must now learn to understand and apply several disciplines to solve complex problems, adapt to new technology and rapidly changing situations, combine ideas to synthesize creative solutions, and learn to work in teams using excellent communication skills.

Although all fields of study at the School of Engineering and Technology cut across traditional disciplines, in order to better serve the present needs of the region, the school has identified several “Strategic Signature Areas” to further enhance the multidisciplinary offerings. The education, research and outreach activities across the disciplinary walls of traditional fields of knowledge of our faculty will drive these offerings. These courses build on several new and existing disciplines without focusing on one of the traditional fields that are already offered at AIT. A number of strategic multidisciplinary areas have been planned to help the sustainable economic and societal developments in the region as well as for its long-term industrial competitiveness. The two
existing areas already under operation are:

- Information and Communications Technologies (ICT)
- Geosystem Exploration and Petroleum Geoengineering (GEPG)

New strategic multidisciplinary areas to be launched in 2006-2007:

- Advanced and Nano Material Technologies (ANM)
- Automotive Manufacturing Engineering (AME)
- Disaster Engineering and Management (DEM)
- Offshore Technology and Management (OTM)
- Supply Chain Management and Logistics (SCL)
- Technology Venture and Entrepreneurship (TVE)
- Integrated Water Resources Development (IWRD)

2.4 Academic Outreach Centers

The School of Engineering and Technology has a wealth of innovative and untapped knowledge database from its masters and doctoral research activities. Many academic outreach centers are set up to transform the knowledge to serve industrial and societal needs. These academic outreach centers will also serve to tab the practical aspects and the society impacts of the knowledge and technology back to the classroom, as well as connect the school with the world, outside the academe. The academic outreach centers in the School of Engineering and Technology are:

**Asian Center of Engineering Computations & Software (ACECOMS)**

ACECOMS carries out research in engineering computations, develops and promotes computer software tools for engineering applications, and conducts training in the effective use of latest computing technology. With 29 satellite centers in 21 cities in Asia and other regions, ACECOMS carries out research in engineering computations, develops computer software tools for engineering applications and conducts training in the effective use of latest computing technology. Visit ACECOMS: http://www.acecoms.ait.ac.th/

**Asian Center for Soil Improvement and Geosynthetics (ACSIG)**

Most capital cities in Southeast Asia are located in lowland areas with associated soft ground problems. ACSIG provides a strategic location for advanced technological education, researches and outreach activities on the application and effective utilization of ground improvement techniques. Visit ACSIG: http://www.set.ait.ac.th/acsig/

**Asian Center for Transportation Studies (ACTS)**

The need to address pressing problems in transportation-related issues in Asian cities, and anticipated trends brought about by modernization underscores the importance of the Asian Center for Transportation Studies. ACTS activities include modules on intelligent transportation systems, traffic simulation, freight transport, urban road safety and road safety audit. Visit ACTS: http://www.set.ait.ac.th/acts/

**Geoinformatic Center**

Geoinformatic Center is dedicated to development and promotion of remote sensing research and activities in Asia-Pacific. Its mandate is to share satellite data, research results and experiences with researchers in the region. Various research facilities are established especially, NOAA AVHRR receiving station and Terra/Aqua MODIS receiving station to support research on global environmental study. Visit Geoinformatic Center: http://www.geoinfo.ait.ac.th/

**Habitech Center (HABITECH)**

The Habitech System is an innovative construction process implemented widely for housing, institutional and commercial building projects in the region. Its activities include research and outreach activities such as training in production and construction, provision of services associated with projects implemented by various organizations, agencies or the private sector.

Habitech International installs building material production facilities of prefabricated modular interlocking concrete blocks worldwide for residential, institutional and commercial building construction. Visit Habitech: http://www.habitech-
IFIC coordinates the activities of the International Ferrocement Society (IFS) including publication of an in-house Journal of Ferrocement, conducting continuing education courses, and sponsored research projects. Its members include engineers, architects, students, researchers and all those interested in low-cost construction materials. Visit IFIC: http://www.sce.aist.ac.th/ific/

Regional Network Office for Urban Safety (RNUS)

The Regional Network Office for Urban Safety (RNUS) is a collaborative center jointly operated by the AIT and the University of Tokyo. Its priority task is the promotion of urban safety engineering utilizing advanced engineering technologies including remote sensing and GIS. Visit RNUS: http://www.set.aist.ac.th/mus/

Thailand Accident Research Center (TARC)

The Accident Research Center is an offspring of MOTC’s Road Safety Master Plan acknowledging the lack of information on accidents in Thailand and the need to establish TARC. The support of TARC comes jointly from Department of Highways, Volvo Car Corporation and AIT. TARC provides academic back up and a base for road safety research. Visit TARC: http://www.tarc.aist.ac.th

AIT Center of Excellence in Nanotechnology (COE)

The Center of Excellence in Nanotechnology is jointly supported by Thailand’s Nanotechnology Center (NANOTEC) and AIT to cultivate and foster multidisciplinary activities including research and education in the applications of nanotechnology in the developing world. Visit COE: http://www.nano.aist.ac.th/

2.5 School Governance

Dean of School

WORSAK KANOK-NUKULCHAI, BEng (Hon), Chulalongkorn Univ, Thailand; MEng, AIT, Thailand; PhD, Univ of California (Berkeley), USA.

Professor

(Computational Mechanics; Finite Element Methods; Tall Building Static and Seismic Analysis; Bridge Engineering; Microcomputer Software for Structural Engineering; Genetic Algorithms; Nonlinear Analysis of Structures and Continua; Plate/Shell Structures; Engineering Education; Nanomechanics)

Associate Dean

JOYDEEP DUTTA, PhD, IACS, Calcutta Univ, India; BSc (Hon), MSc, North Eastern Hill Univ, India.

Associate Professor

Functional materials, nanomaterials, Nanoparticles, self-organisation, Biomimetic processes, Polyelectrolyte deposition, Gas sensors, Bio-sensors, optoelectronic devices]
Chapter 3: SET - COMPUTER SCIENCE and INFORMATION MANAGEMENT FIELDS OF STUDY

3.1 Introduction

**Computer Science**

This field of study fosters high level teaching and research in computer science and aims to meet the growing regional demand for persons skilled in various aspects of computing. One focus is on educating educators who can, in turn, effectively disseminate knowledge and skills to more people.

The core curriculum in computer science covers all aspects of computing, with the faculty particularly active in artificial intelligence, software engineering, networking and information systems. The field of study also endeavors to enhance teaching and research activities in computer architectures, object orientation, neural networks, multimedia and other rapidly-evolving areas in computer science.

The courses and research topics range from those addressing the practical problems of applications development, to those dealing with the abstract and theoretical issues of computer science and advanced computing. Students are also encouraged to take courses and conduct research in areas of Computer Science which interact with Information Management, Industrial Engineering, Manufacturing Systems Engineering, Telecommunications, Mechatronics and other fields of study covered at the Institute.

**Information Management**

This field of study is a strategic response to society’s changing needs. It will continue to evolve as organizations cope with the proliferation and complexity of new information technologies and services. It is the first of its kind in Southeast Asia.

Information is an essential resource for academic excellence, competitiveness in business and industry, scientific progress, and national development. Like any other resource, information must be managed. High-quality sources must be located, and arrangements must be made for access to timely, accurate, appropriate, and cost-effective information. Technological advances in telecommunications and the hardware and software of computing can be utilized to provide the optimum access to information.

The need for information management skills in government and private organizations is increasingly recognized. People knowledgeable in methods of facilitating information collection, dissemination, and use are in demand. Such persons should also be skilled in identifying information needs and in accessing, repackaging, and presenting information in such a way that it can be utilized in support of the objectives of the users.

The Information Management curriculum is designed to prepare students to respond to four basic challenges confronting organizations today:

- Planning the effective use of information and communication technologies within organizations;
- Developing corporate and government policies to maximize the benefits resulting from the widespread use of these technologies;
- Improving the strategic management of information resources in business, government, and non-profit organizations; and
- Increasing the productivity and creativity of managers and executives who work with information resources.

3.2 Research Facilities and Laboratories

Organized around ten Unix servers, some of them being multiprocessors, CSIM network comprise about 60 micro-computers, running desktop and engineering applications, scientific and research software and programming languages, with full access to the Internet. Through A13 project, a broadband satellite link is available to Japan and other countries in the region. This link is primarily dedicated for research activities in the field of internetworking, like the new generation of Internet IPv6, distributed education, video conferencing, and unidirectional routing. Dedicated laboratories are set-up with specialized equipments. Full wireless coverage in the building allows students to conveniently work with their personal notebook computers.

3.3 Faculty and Research Staff

**Full-time Faculty**

MATTHEW N. DAILEY, BSc, MSc, North Carolina State University, PhD, University of California, San Diego.  
Assistant Professor (Machine learning, Machine vision, Robotics, Systems security.)

PHAN MINH DUNG, MSc, PhD, University of Technology, Dresden, Germany.  
Professor (Computer and Network Security, Autonomous Computing, Logic Programming, Artificial Intelligence)

VATCHARAPORN ESICHAIKUL, BAcc, Chulalongkorn Univ, Thailand; MBA, Oklahoma
SUMANTA GUHA, MS, PhD, University of Michigan, Ann Arbor, USA; PhD, Indian Statistical Institute, Calcutta, India; BSc, MSc, University of Calcutta, India.

KANCHANA KANCHANASUT, PhD, US Military Academy; Ms, PhD, Univ of Illinois, Urbana, USA.

PAUL JANECEK, BSEE, US Military Academy; MSc, PhD, Univ of London, UK; PhD, Swiss Federal Inst of Tech, Switzerland.

PETER HADDawy, BA, Pomona College, Claremont, USA; MSc, PhD, Univ of Illinois, Urbana, USA.


Professor and Vice President for Academic Affairs (Decision-Theoretic Problem Solving, Probabilities Reasoning, Modeling of User Preferences, Electronic Commerce, Medical Decision Making).

PAUL JANECEK, BSEE, US Military Academy; MSc, PhD, Univ of London, UK; PhD, Swiss Federal Inst of Tech, Switzerland.

Assistant Professor (Human-Computer Interaction; Analysis and Design of Information Visualization Systems, Semantic Fisheye Views, Software Engineering and Open-source Software Development, and Information System Development)

KANCHANA KANCHANASUT, PhD, MSc, Computer Science, University of Melbourne, Australia; Graduate Diploma, Computer Science, BSc Mathematics, University of Queensland, Australia.

Professor, and InterLab Director (Networking and Distributed Computing, Algorithms, Programming Languages).

VILAS WUWONGSE, DEng Systems Science, MEng Control Engineering, BEng Control Engineering, Tokyo Institute of Engineering, Japan.

Associate Professor (Electronic Commerce/Electronic Business, Web-based Information Systems, Hypermedia, Electronic Government)

4.3 Completed Grants

4.3.1 Building an Integrated leading Euro-Asian higher education and research community in the field of the Semantic Web

4.3.2 Ministry of Science and Technology Virtual Library

4.3.3 Statistical Approaches to Tlocinular Stereo Robot Vision

4.3.4 Refereed Journals


3.4 Grants and Sponsored Research Completed in 2006

Computer-Aided Learning Program for Health Professional Students in Diabetes Patient History Taking

A Collaborative Intelligent Tutoring System for Medical Problem-Based Learning

Ubiquitous Network Societies for Knowledge Based Economies

3.5 On-going Grants and Sponsored Research

Argumentation as Foundation for Semantic Grid

Database Systems for Advanced Applications

3.6 Publications


480,000

Total Project Budget:

2006.

2006.

2006.

2006.

2006.

2006.

2006.

2006.

2006.

2006.

2006.

Refereed Books / Chapters


Conference Proceedings

Simulaneous localization and mapping with stereo vision 

3.5 Doctoral Students’ Dissertation

Information Management

An Integrated Internet Geographic Information System for Crime Control By: Roongrassamee Boondao
Supervisor: Dr. Vatcharapom Esichaikul/Dr. Nith Kumr Tipathi
Electronic Government Service Model By: Wanchai Varavithya
Supervisor: Dr. Vatcharapom Esichaikul

3.6 Masters Students’ Theses and Research Studies

Computer Science

A Grid Based System to Support E-Migration By: Phan Thuong Cang
Supervisor: Prof. Phan Minh Dung
Research Study: The Use of OPENGL in Chiang Mai’s Tourism Industry By: Somsanit Chatiket
Supervisor: Dr. Sumanta Guha
Research Study: OPENGL-based Solar System Simulation: Planetary Events By: Prasit Chuaykue
Supervisor: Dr. Sumanta Guha
Peerto Peergroup Formation and Collaboration in a Remote Laboratory By: Pithula Dhungel
Supervisor: Prof. Kanchana Kanchanasut
P2P Resource Discovery for an Interactive Architecture in Mobile Ad Hoc Network By: Long Jiaoyan

Information Management

A Decision Support System for Load Forecasting in the Electricity Market By: Phan Sy Bach
Supervisor: Dr. Vatcharapom Esichaikul
<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Supervisor</th>
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<td>Implementing Faceted Classification within a Content Management System</td>
<td>Mohammad Nasir Uddin</td>
<td>Dr. Paul Janecek</td>
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<td>Research Study: Use of the UMLS Ontology to Support Medical Tutoring</td>
<td>Thanapoom Veeranitunt</td>
<td>Prof. Peter Haddawy</td>
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<td>A New Approach to XML Access Control</td>
<td>Tanit Chaiyasit</td>
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<td>Optimizing Barter Trade under a Realistic Purchase Behavior Model</td>
<td>Kant Tangkathach</td>
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<td>Analysis of Financial Statements through Web Services</td>
<td>Kulachet Chollasap</td>
<td>Prof. Vilas Wuwongse</td>
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<td>Linking Ontologies with a Document Collection</td>
<td>Umar Memon</td>
<td>Dr. Paul Janecek</td>
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<td>Mobile Commerce for Providing Telecommunication Services</td>
<td>Poquat Wibulathien</td>
<td>Dr. Paul Janecek</td>
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<td>A Data Mining Model for Universities: Case Studies of AIT and Can Tho University</td>
<td>Nguyen Thai Nghe</td>
<td>Dr. Paul Janecek</td>
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<tr>
<td>Research Study: A Comparison of Multidimensional Scaling Layouts for an E-Catalog</td>
<td>Nattakan Praputdee</td>
<td>Dr. Paul Janecek</td>
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<td>Bargain Hunting Using an Interactive Spatial View</td>
<td>Monrawee Chainchainirattisai</td>
<td>Dr. Paul Janecek</td>
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<td>Web Based Spatial Decision Support System for Avian Influenza Control</td>
<td>Ha Thi Thanh Nga</td>
<td>Dr. Paul Janecek</td>
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<td>Research Study: Assessment of Internet Banking Performance through Usage and Customers Satisfaction: A Case Study of Thai Banks</td>
<td>Marie Francoise Gaelle Vitby Audiber Tierz</td>
<td>Dr. Vatcharapom Esichaikul</td>
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<tr>
<td>Web-based Decision Support System for Project Investment Selection: Case Study of Petrovietnam</td>
<td>Duong Van Dat</td>
<td>Dr. Vatcharapom Esichaikul</td>
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<td>Introducing Knowledge Management in Results-based Management Framework</td>
<td>Tjerah Leonardo</td>
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<td>Research Study: A Prediction of the Bidding Price in the Electricity Market</td>
<td>Luong The Ngoc</td>
<td>Dr. Vatcharapom Esichaikul</td>
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<td>XML Document Generation Approach to Automatic Semantic Web Services Composition</td>
<td>Luong Viet Phong</td>
<td>Prof. Vilas Wuwongse</td>
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<tr>
<td>Sketch Understanding for Medical Tutoring: Integration of the UNAS System into COMET</td>
<td>Hemani Shringi</td>
<td>Prof. Peter Haddawy</td>
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<td>E-Auction for Personnel Recruitment</td>
<td>Roma Basnet</td>
<td>Dr. Vatcharapom Esichaikul</td>
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<td>Chat Recognition for Medical Problem-based Learning</td>
<td>Narumol Charoenkijapaboon</td>
<td>Prof. Peter Haddawy/Dr. Paul Janecek</td>
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<td>Analysis of Relationships among Thai Web Communities</td>
<td>Lapho Deeroop</td>
<td>Prof. Vilas Wuwongse</td>
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<td>An E-Learning System using Semantic Web Technology</td>
<td>Vo Ha Quang Dinh</td>
<td>Prof. Vilas Wuwongse</td>
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<td>An Approach to XPath Optimization</td>
<td>Le Thi Bich Hang</td>
<td>Prof. Vilas Wuwongse</td>
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<td>Visual Tool for the Strategic Use of Alumni Knowledge</td>
<td>Mi Mi Hnaung</td>
<td>Prof. Vilas Wuwongse</td>
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<td>A Framework for Home Stay Business Websites</td>
<td>Lerluck Kuerklung</td>
<td>Prof. Vilas Wuwongse</td>
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<td>An Ontology-based E-Learning Management System</td>
<td>Nguyen Thi Nhu</td>
<td>Prof. Vilas Wuwongse</td>
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<td>Research Study: Identification of Critical Success Factors and Barriers of E-Negotiations in B2B</td>
<td>Sandhya Sharma</td>
<td>Dr. Vatcharapom Esichaikul</td>
</tr>
<tr>
<td>Development of Communicative VLOG for E-learning</td>
<td>Myat Thander Tin</td>
<td>Dr. Vatcharapom Esichaikul</td>
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Annual Report on Research 2006
Chapter 4: SET - CONSTRUCTION, ENGINEERING AND INFRASTRUCTURE MANAGEMENT FIELD OF STUDY

4.1 Introduction

The Construction, Engineering and Infrastructure Management field trains professionals to play leading roles in the international construction industry and in infrastructure development and management. It offers courses in four levels - operations, project, strategic issues and corporate issues. It prepares students to become effective managers and decision-makers familiar with modern techniques of construction management, engineering management and infrastructure management.

The field’s courses are delivered based on a hierarchical knowledge scale that considers principles and fundamentals, applications (tools and techniques), and emerging issues. In offering courses spanning fundamental to advanced, the emphasis is on shifting from classical to innovative knowledge.

4.2 Faculty and Research Staff

Full-time Faculty

STEPHEN O OGINLANA, BSc, MSc, Uniof Ife, Nigeria; PhD, Loughborough, Univ of Tech, UK. Professor (Construction Economics; Project Management; Productivity Improvement, Dynamic Modeling and Simulation, Human Resources Management)

CHOTCHAI CHAROENNGAM, BEng, King Mongkut’s Inst of Tech, Thonburi, Thailand; MS, Univ of Kansas; PhD, Univ of Texas at Austin, USA Associate Professor (Project Planning, Scheduling, and Controls; Construction Productivity Improvement; Information Technology in Construction Management; Construction Disputes and Litigation)

BONAVENTURA H W HADIKUSUMO, BEng, Univ of Diponegoro, Indonesia; MEng, AIT; PhD, Univ of Hong Kong. Assistant Professor (Construction Information Technology; Construction Site Safety, Virtual Reality application in construction; Web-based project design and management; Design for X-ability; Construction simulation; Construction site safety; Cost control)

PANNAPA HERABAT, BS, MS, PhD, Carnegie Mellon Univ, USA. Assistant Professor [Asset Management System; Pavement Management System; Bridge Management System (BMS); Infrastructure Economics; and Computer-Aided Engineering Management]

4.3 Grants and Sponsored Research Completed in 2006

Consistency of Safety and Health Management System Implementation

Project Description: This study investigates the consistency of safety and health management system of Bovis Lend Lease (BLL). The performance to be investigated includes labor productivity and stakeholders’ satisfaction. The performance of BLL projects is benchmarked with projects managed by other companies in order to study the strength and weakness of BLL safety and health management systems.

Duration: May 2005 to December 2006
Investigator: Dr B H W Hadikusumo
Sponsor: Bovis Lend Lease
Total Contracted Amount: Baht 88,500.00

Safety Culture Under Bovis Lend Lease Safety and Health Management System

Project Description: This study investigates the safety culture performance under Safety and Health Management System of Bovis Lend Lease (BLL). The performance to be investigated includes labor productivity and stakeholders’ satisfaction. The performance of BLL projects is benchmarked with projects managed by other companies in order to study the strength and weakness of BLL safety and health management systems.

Duration: December 2006 to Dec 2008
Investigator: Dr B H W Hadikusumo
Sponsor: Bovis Lend Lease (Thailand) Ltd

4.4 Ongoing / In Progress Grant and Sponsored Research

Inspection Manuals and Procedures for Expressway Transit Authority of Thailand

Project Description: Development of Inspection Manuals for Expressway Rapid Transit Authority of Thailand. Detailed inspection procedures and manuals are developed in this project to assist the Expressway Rapid Transit Authority to visually inspect the structural components of their existing expressways. Systematic inspection results are valuable data for maintenance management. In addition, this project will link the developed inspection procedures and manuals with the maintenance management system used by ETA.

Duration: December 2005 to June 2006
Investigator: Dr Pannapa Herabat
Sponsor: Expressway Transit Authority of Thailand
Total Contracted Amount: Baht 600,000.00

Strategic Budgeting System II

Project Description: The performance-based budgeting system has been developed and applied in parts of the Royal Thai Government reform. This project is to assist in system development in collaboration with Chulalongkorn University at the Bureau of Budget, RTG.

Duration: October 2004 to March 2006
Investigator: Dr Chotchai Charoenngam
Sponsor: Chulalongkorn University
Total Contracted Amount: Baht 1,000,000.00

Construction Work Performance Under Bovis Lend Lease Safety and Health Management System

Project Description: This study investigates the construction work performance under Safety and Health Management System of Bovis Lend Lease (BLL). The performance to be investigated includes labor productivity and stakeholders’ satisfaction. The performance of BLL projects is benchmarked with projects managed by other companies in order to study the strength and
Project Description: An International Network on Public Private Partnerships: Researching into PPPs and developing teaching curriculum for PPPs. The Network members are Bauhaus Universität Weimar, University of Manchester Institute of Science and Technology, Indian Institute of Technology, Madras, Asian Institute of Technology, and Tsinghua University. The three-year EU funded research started in April 2004.

**EU-Asia Network of Competence Enhancement on Public-Private Partnerships (PPPs) in Infrastructure Development.**

**Project Description:** An International Network on Public Private Partnerships: Researching into PPPs and developing teaching curriculum for PPPs. The Network members are Bauhaus Universität Weimar, University of Manchester Institute of Science and Technology, Indian Institute of Technology, Madras, Asian Institute of Technology, and Tsinghua University. The three-year EU funded research started in April 2004.

Duration: April 2004 to April 2007

Investigator: Prof. Stephen O. Ogunlana

Sponsor: The European Union

Total Contracted Amount: Euro 400,000.00

**The Strategic Portfolio Program Management.**

**Project Description:** To assist the Ministry of Foreign Affairs, RTG, in designing and developing strategic program and management system that can be used to coordinate portfolio of initiatives arising from different government agencies under the National Foreign Affairs Strategy set forth by the 4-year National Strategy Framework.

Duration: October 2005 to March 2007

Investigators: Dr Chotchai Charoenngam and Dr B H W Hadikusumo

Sponsor: Ministry of Foreign Affairs

Total Contracted Amount: Baht 4,978,000

**4.4 Publications**

**Refereed Journals**


Dey P K, C Charoenngam, S O Ogunlana and D Kajomkiet, “Multi-party risk management helps manage cement plant construction”, International Journal of Services Technology Management, Accepted for publication.

**Conference Proceedings**


4.5 Doctoral Students' Dissertation

Project Performance Improvement in the Public Sector: The Case of Thailand
By: Mr. Suphachoke Meeampol
Supervisor: Prof. Stephen O. Ogunlana

An Assessment of the Performance of Public Hearing as Vehicle of Public Participation in Infrastructure Development Project in Thailand
By: Mr. Ektewan Manowong
Supervisor: Prof. Stephen O. Ogunlana

Strategic Project Selection in Public Sector: Construction Projects in the Ministry of Defence in Thailand
By: Mr. Surapon Puthamont
Supervisor: Dr. Chotchai Charoenngam

4.6 Masters Students' Theses and Research Studies

Assessment of Critical Infrastructures: December 2004 Tsunami in the Southern Region of Thailand
By: Mr. Bunpot Luttakoon
Supervisor: Dr. Pannapa Herabat

By: Mr. Warut Neamnoi
Supervisor: Dr. Chotchai Charoenngam

IT Application for Construction Safety Management: Planning, Monitoring and Trending
By: Mr. Bhaskar Jyoti Das

Implementation: A System Dynamics Approach
By: Mr. Niraj Baidya
Supervisor: Dr. B.H.W. Hadikusumo

Cost Variances During Construction Period: A Case Study of Indonesian Contractors
By: Mr. Ariono Dhanisworo Indra Budhi
Supervisor: Dr. Chotchai Charoenngam

Constraints-Based Scheduling of Precast Housing Project: A Case Study of Preuksa Village III
By: Mr. Prawat Tuptone
Supervisor: Prof. Stephen O. Ogunlana

By: Miss Yessie Agustina
Supervisor: Dr. Chotchai Charoenngam

Subcontractor Management Strategy: An Approach to Manage Subcontractor in Construction Project
By: Mr. Allan Janwar Tannaya
Supervisor: Dr. B.H.W. Hadikusumo

Case Studies on Risk Allocation in Highway Projects Under Bot Scheme in Vietnam
By: Mr. Nguyen Tuan Nghia
Supervisor: Prof. Stephen O. Ogunlana

Profiling a Truly World-Class Construction and Engineering Company
By: Mr. Muhammad Afzal
Supervisor: Prof. Stephen O. Ogunlana

Strategic Financial Modeling for Capital Investment Program
By: Mr. Aung Khin Tun
Supervisor: Dr. Chotchai Charoenngam

A study of safety budgets process in Thai Construction projects
By: Mr. Swachon Limpakomkul
Supervisor: Dr. B.H.W. Hadikusumo

Consistency of Safety Management System...
Chapter 5: SET - DESIGN & MANUFACTURING ENGINEERING AND INDUSTRIAL ENGINEERING & MANAGEMENT FIELDS OF STUDY

5.1 Introduction

Design and Manufacturing Engineering

Design and Manufacturing Engineering field of study prepares students to manage advanced manufacturing technologies, focusing on the selection, use, control, design and integration of computer controlled manufacturing systems. The Design and Manufacturing Engineering curriculum reflects the objective of imparting fundamental knowledge to develop the ability to address the complex interaction between manufacturing, computers and industry.

Industrial Engineering and Management

Industrial Engineering and Management field of study prepares students for manufacturing management and decision support positions in industry and public sector, by equipping them with a broad range of decision making skills for a variety of applications. The IEM curriculum reflects the objective of imparting fundamental knowledge to develop the ability to address complex industrial issues, emphasizing on how to design, run, control, and optimize the production systems.

5.2 Research Facilities and Laboratories

IEM and DME fields share all the laboratory facilities with Mechatronics and Microelectronics fields of study. There are several well equipped laboratories with the primary function of supporting the students and faculty for teaching and research and to conduct outreach programs.

Computer Integrated Manufacturing (CIM) Laboratory

The Computer Integrated Manufacturing (CIM) laboratory was officially inaugurated on September 23, 1991. It provides the hardware and software support for Industrial Systems Engineering. Many research activities have been undertaken in close collaboration with industry and government sectors in the area of Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Computer Numerical Control (CNC), Rapid Prototyping (RP) and Medical Technology. The CIM laboratory also provides specialized training and consultancy services in CAD, CAM, CNC Machining, Reverse Engineering, Rapid Prototyping, Packaging Technology, Flexible Manufacturing Systems (FMS), and Development of Postprocessor for 5-axis CNC.

The CIM Laboratory is equipped with production and training CNC machines including EMCO TURN 242 industrial production CNC lathe, EMCO VMC 200 CNC vertical machining center for universal production, MAHO MH 6002 E2 5-axis universal milling and boring machine, an EMCO compact 5 CNC, an EMCO F1 CNC, a LVD CNC press brake, a LVD water-jet cutting CNC, 3D Laser tool presetting system, and a Mondiale Gallic G-420 Industrial CNC lathe, EMCO CNC training system. The available CAD/CAM software includes UNIGRAPHICS SNX4, MasterCAM 9.1, Mechanical Desktop 6, AutoCAD Inventor Series, SolidWorks 2005, CAM 2000, Mimics 6.3 & Magic 5.4.

Metrology Laboratory

Metrology Laboratory provides the hardware and software support for Industrial Systems Engineering. Metrology Laboratory is equipped with Measuring Instruments (Zeiss CMM, Mitutoyo Profile Projector, Taylor Hobson Surface Roughness Tester, Lab View Hardware & Software).

Mechatronics and Automation Laboratory

The Mechatronics and Automation laboratory is well-equipped with many PLC systems (SS, S7-200/300/400, INDRAMAT, BOSCH), distributed control systems (PC S7), operator panels (OP5, OP17/DP, OP35), PC-based human machine interface package (WINCC), and networked fieldbuses (PROFIBUS, INTER-BUS, SERCOS).

The lab has mobile robots (NOMAD, PIONEER 2), Robot arms (CRS), Industrial Robot (KUKA KR15), a self-made Open Architecture CNC machine, CNC control systems (MTC 200, SINUMERIK 810D/840D), image processing systems (DVT, MATLAB), and FPGAs (XILINX, VIRTEX PRO, ALTERA). Software packages such as SYNOPSYS Design, ANSYS, ANSYS, ADAMS, and many types of special sensors and actuators are also available for the research use.

Many research activities have been undertaken in close collaboration with industry and government sectors in the area of industrial automation, robotics, control, system design and integration. Some examples of the research are: medical tele-analyzer, automated visual inspection systems, MEMS design, autonomous flying robot, automating centrifuge machines, autonomous underwater robot, automating crystalization process, etc.

Simulation Laboratory

This lab is equipped with networks of Pentium PC for general applications and internet access, high end CAD/CAM & Simulation software such as ARENA and AutoMOD. In addition, a high performance computer facility with parallel cluster is also available for research use.

Annual Report on Research 2006
5.3 Faculty and Research Staff

Full-time Faculty

MARIO TRABUCANO, BSEE, BMHE, Cebu Inst of Tech, Philippines; MEng, DEng, AIT, Thailand. 

Professor (Multiple 
Criteria Decision Making; 
Operations and 
Production Management; 
Operations Research; 
Project Management; 
Systems Modeling)

ERIK L J BOHEZ, Burgerlijk 
Werknijkgindig Electro-
Technisch Ingenieur, Rijks 
Universiteit Gent (State 
University Ghent, Belgium); 
Kandidatuur Burgerlijk 
Ingenieur, Rijks Universiteit 
Gent (State University 
Ghent, Belgium); Technisch 
Ingenieur Electro-
Mechanica, Hoger 
Technisch Instituut Sint 
Antonius Gent. (High 
Technical Institute Saint 
Antonius Ghent; Belgium).

Associate Professor 
(Computer Aided Design; 
Computer Aided 
Manufacturing; Computer 
Graphics; Computer 
Numerical Control; Five 
Axis Machining; Fractal 
and Holistic 
Manufacturing; Robust 
Control; Simulation of 
Metal Removal; Virtual Axis 
Machine) 
[CNC/CAD/CAM; Five Axis 
Machining; Holonic and 
Fractal Manufacturing; 
Mold and Die Design; Eco-
Design]

PISUT KOOOMSAP, BEng, Thammasat Univ, Thailand; MSc, Univ of Louisville; PhD, Pennsylvania State Univ, USA 

Assistant Professor (Sensing 
and Control for 
Manufacturing Processes 
and Systems; Laser 
Applications in 
Manufacturing; Rapid 
Prototyping; Condition-
Based Maintenance; 
Continuous Improvement) 
[Rapid Prototyping; Sensing 
and Control for 
Manufacturing Processes 
and Systems; Laser 
Applications in 
Manufacturing; Condition-
Based Maintenance; 
Continuous Improvement]

HUYNH TRUNG LUONG, BEng, Ho Chi Minh City Univ of Tech, Vietnam; MEng; DEng, AIT, Thailand. 

Assistant Professor 
[Emergency inventory 
policies and inventory 
policies for perishable 
products; Supply chain 
design; Measures of 
bullwhip effect in supply 
chains; Availability-based 
and reliability-based 
maintenance; Fuzzy quality 
control charts; Statistical 
design of experiments; 
Network flows related 
problems]

5.4 Ongoing / In立方根投 Grant and Sponsored Research

Biodegradable Polylactide and Natural Rubber for Multicolor Articles Rapid Prototyping

Project Description: Rapid Prototyping (RP) is a method to manufacture products without mold and die. Three-dimensional CAD solid models are translated into stacks of 2D cross-sections, used to generate commands to fabricate physical prototypes layer by layer. Several of RP systems are commercially available in the market today, and many techniques are in research. The trend of new RP techniques is
towards low cost systems that are compatible with various types of materials, and capable of making multicolor articles. This research proposes to develop a process to produce multicolor articles from two economically significant raw materials of Thailand: the environmentally-friendly polyolactide and natural rubber to strengthen the feasibility of Selective Vacuum Manufacturing (SVM), a new RP technique being developed at AIT. In this proposed process, four process-colored pigments are mixed with base materials according to the input color from the design, and transferred to feeder of SVM system, where the material is filled layer-by-layer to manufacture multicolor parts. The outcome of this research will provide a capability of producing multicolor articles from environmentally-friendly materials with inexpensive RP technique, affordable to middle and small companies.

**Duration:** December 2005-2007

**Investigator:** Dr Pisut Koomsap

**Sponsor:** Royal Thai Government

**Total Contracted Amount:** Baht 785,000

### Evaluation of the Modernization of Technical Education in Production Technology

**Project Description:** The purpose of the project is to evaluate the results of the Project “Modernization of Technical Education in Industrial Production Technology” Phase I, implemented between 1994 and 1998 by EMCO under contract with Rajamangala Institute of Technology (RIT). The study was limited to 10 sites, which were the object of the Phase I of the Project. The result of the evaluation is that the project was highly successful. A plan for further development is provided and suggestions to link to the Thai industry are given. Investments in new sites campuses and CNC Technology Center are given. Curriculum and required training for RT faculty and staff are suggested.

**Duration:** July 2003-Dec 2007

**Investigator:** Assoc Prof Erik Bohez

**Sponsor:** EMCO/RIT

**Total Contracted Amount:** Baht 450,000

### 5.5 Completed Sponsored Research

**Organization** The 7th Asia Pacific Industrial Engineering & Management Systems Conference, and The 9th Asia Pacific Division Meeting of the International Foundation for Production Research in Thailand

**Duration:** 17-20 December 2006

**Organizer:** Dr Voratas Kachitvichyanukul, Chair

**Sponsors:** NSIDIA; MTEC; Commission of Higher Education-Thailand; EMP-Kasetsart Univ.; Center for Logistics & Management-Mahidol Univ.; Thai Airways Int. Public Co., Ltd.; The Bangkokchak Petroleum Public Co., Ltd.; Toyota Motor Thailand Co., Ltd.; Thai Acrylic Fibre Co., Ltd.-Thailand

**Total Contracted Amount:** Baht 3,000,000

### 5.6 Publications

#### Refereed Journals


**Refereed Books / Chapters**


### Conference Proceedings


5.7 Doctoral Students’ Dissertation

Industrial Engineering & Management

GA-decomposition Methods for Power Generation Expansion Planning with Emission Controls
By: Jiraporn Sirikum
Supervisors: Dr. Voratas Kachitvichyanukul/Dr. Anulark Tchantitwisad

Multiple Colony Ant Algorithm with Two-Way Scheduling Approach for Solving the Job-shop Scheduling Problem
By: Apinanthana Udomsakdigool
Supervisor: Dr. Voratas Kachitvichyanukul

5.8 Masters’ Theses and Research Studies

Industrial Engineering & Management

An Integrated Framework of MRP II and JIT Using Optimal Juction Point Approach
By: Lala Anil Kumar Maheshwari
Supervisor: Assoc. Prof. Erik L.J. Bohez

Particle Swarm Optimization for Vehicle Routing Problems
By: Komsan Raviwan
Supervisor: Dr. Voratas Kachitvichyanukul

A Two-Stage Genetic Algorithm for Multi-Objective Job Shop Scheduling Problems
By: Sirwan Sithitham
Supervisor: Dr. Voratas Kachitvichyanukul

Preventive Maintenance Policy with Two Failure Modes
By: Thach Bao An
Supervisor: Dr. Huynh ThungLuong

Simulation Study of Order Release Policies for Double Bottleneck Systems
By: Kanyanat Arunvipas
Supervisor: Dr. Voratas Kachitvichyanukul

Optimal Preventive Maintenance Policy for a Warranted System
By: Nguyen Thanh Binh
Supervisor: Dr. Huynh ThungLuong

Development of a Simulation Tool for Generic Job-shop Operations
By: Do Tri Dung
Supervisor: Dr. Voratas Kachitvichyanukul

An Integrated Production-Inventory Policy for Perishable Products with Stock Dependent Demand Rate and Partial Backlogging
By: Hoang Van Hien
Supervisor: Dr. Huynh ThungLuong

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A Continuous Review Model for Emergency Inventory Policy with Order Expediting
By: Ngo Sy Hieu
Supervisor: Dr. Huynh Trung Luong

Selective Maintenance Policy with Time-Window Constraint
By: Mai Thanh Hoai
Supervisor: Dr. Huynh Trung Luong

A Genetic Algorithm for Strip Packing Problem
By: Tran Doan Hong Ngoc
Supervisor: Dr. Huynh Trung Luong

Particle Swarm Algorithm for Job Shop Scheduling Problems
By: Luksamee Rookkapibal
Supervisor: Dr. Voratas Kachitvichyanukul

A Multicommodity Distribution Network Design in Supply Chain Management
By: Manavit Vinaipant
Supervisor: Dr. Voratas Kachitvichyanukul

Measure of Bullwhip Effect in Supply Chains: The Case of Arma Demand Process
By: Nguyen Duc Vu
Supervisor: Dr. Huynh Trung Luong

Decision Support System for Emergency Medical Services
By: Dennis Ziemer
Supervisor: Dr. Voratas Kachitvichyanukul

Design and Manufacturing Engineering

Investigation on Difference in 3-axis and 5-axis Machining of Stamping Die Insert
By: Maharaj Singh
Supervisor: Assoc. Prof. Erik L.J. Bohez

Filament Winding Emulation on 5-Axis Milling Machine
By: Poramade Dhananun
Supervisor: Assoc. Prof. Erik L.J. Bohez

Modeling and Performance Evaluation of a FMS by Colored Petri Nets
By: Phan Thi Huyen Chau
Supervisor: Assoc. Prof. Erik L.J. Bohez

A Geometric Algorithm for Optimal Flat End Mill to Improve Surface Quality
By: Polpat Chuinklin
Supervisor: Assoc. Prof. Erik L.J. Bohez

Computer Aided Parametric Modeling and 5-Axis Milling of a Marine Propeller
By: Aldrin Cantor Munar
Supervisor: Assoc. Prof. Erik L.J. Bohez
Chapter 6: SET - GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING FIELD OF STUDY

6.1 Introduction

Beside the traditional areas of foundation engineering, earth structures, underground excavations, land subsidence, and landslide mitigations, geotechnical engineers and researchers are increasingly involved in new and dynamic areas of ground improvement, geosynthetic engineering, land reclamation, lightweight materials, forensic engineering and the effective recycling of waste materials.

Furthermore, geotechnical engineers are increasingly challenged to solve environmental problems related to the reduction of construction wastes, provision of efficient waste disposal facilities, clean-up of contaminated sites as well as geological related hazards such as landslides and soil erosion. The Geotechnical and Geoenvironmental Laboratory (GTE) has facilities and equipment for testing and research on the engineering behavior and fundamental properties of soil and rock; geologic mapping; environmental geophysical surveys; and testing of geosynthetic materials conducted by ACSIG, consists of five (5) sections - Soil Mechanics, Rock Mechanics, Engineering Geology, Geophysics, and Geoenvironmental Engineering.

**Soil Mechanics Laboratory**

The Soil Mechanics Laboratory has facilities for testing and research on the engineering behavior and fundamental properties of soil. It is equipped to test compaction, seepage, compressibility, deformation and shear strength, soil dynamics, and ground improvement. Among other equipment, it has an automatic central data acquisition system (CDAS) and two temperature-controlled rooms that house triaxial and consolidation equipment. Its field operation unit has a full range of tools for sampling soils and rocks and field test equipments for vane tests, Dutch cone tests, piezocone tests, pressuremeter tests, screw plate tests, electric logging, and vibration measurements.

**Rock Mechanics Laboratory**

The Rock Mechanics Laboratory has facilities to determine a variety of the physical and mechanical properties of rocks and rock aggregates required for research and practice. Moreover, the laboratory is capable of determining hardness, swelling and slake durability index properties of weak rocks. The laboratory has provided testing services to a large number of infrastructure projects in the region.

**Geophysical Laboratory**

The Geophysical Laboratory is being developed for training and researches in Geosystem Exploration and Petroleum Geoengineering. It has a number of seismic, electric, magnetic and radiometric instruments, including some of the most advanced equipment such as DAS-1 (OYO), a multi-purpose hi-performance seismic data acquisition system, or SYSCAL R1 Plus (IRIS Instruments), an all-in-one multi-electrode resistivity and induced polarization (IP) imaging system. The laboratory is capable of conducting and assisting in geophysical field surveys for engineering, environmental, mineral resources, oil and gas exploration as well as in performing analysis, interpretation and visualization of geophysical data acquired.

**Geoenvironmental Laboratory**

The Geoenvironmental Laboratory provides a variety of equipment for geoenvironmental engineering research. It has equipment for geotechnical and chemical analysis that supports research in fundamental processes related to soil, water and chemical interactions that are applied to site and risk assessment, waste containment systems, and remedial technology. The chemical analysis equipment, spectrophotometer, from which the ion concentration can be determined with good accuracy and precision, enables research on soil-contaminant interaction. Flexible wall permeameter, rigid
6.3 Faculty and Research Staff

Full-time Faculty

DENNIS BERGADO, BSCE, Mindanao State Univ, Philippines; MEng, AIT, Thailand; PhD, Utah State Univ, USA
Professor (Soil/Geotechnical Engineering; Rock Mechanics; Environmental Geophysics; Geotechnical Engineering for Mitigation of Natural Hazards; Ground improvement techniques and geosynthetics; In-situ testing, Geotechnical and Geoenvironmental Engineering)

ULRICH GLAWE, Dipl-Geol, Univ of Erlangen-Nuremberg, Germany; MSc, Imperial College, UK; PhD, Univ of Erlangen-Nuremberg, Germany.
Associate Professor (Geotechnical and Geoenvironmental Engineering; Geodynamics; Geophysical Hazards; Geotechnical Geophysics; Geological and Structural Geology; Geotechnical Engineering; Geophysics; Geotechnical Engineering for Mitigation of Natural Hazards; Ground improvement techniques and geosynthetics; In-situ testing, Geotechnical and Geoenvironmental Engineering)

NOPPADOL PHIEN-WEJ, BEng, Chulalongkorn Univ, Thailand; MS, PhD, Illinois at Urbana-Champaign, USA.
Associate Professor (Tunnelling and other underground excavations in rocks and soils; Slope stability and retaining structures; Landslides; Earth structures and dams; Pile foundations; Buried pipes and culverts; Soft ground tunnelling; Underground excavations in rock; Deep excavations; Land subsidence from deep well pumping; Rock properties)

Research Staff

PHAM HUY GIAO, DEng, MEng, Asian Institute of Technology, Thailand; Dipl Ing (MSc), Bucharest University, Romania
Senior Research Engineer (Exploration and Engineering Geophysics; Geotechnical Engineering; Computer-Aided Analysis in Geoenvironmental Engineering)

KYUNG-HO PARK, BEng, MEng, Korea Univ; DEng, SUNY at Buffalo, USA
Assistant Professor (Geotechnical Engineering; Geomechanics; Computational Mechanics; Boundary Element Methods)

6.4 Completed Grant and Sponsored Research

Development of System for Tunneling-induced Damage Risk Assessment Using Analytical Methods
Project Description: The project aims at developing the design manual for evaluating the tunneling-induced building damage risk assessment using analytical methods. The project will be utilized for development of design procedure and design criteria for MSE construction with lightweight fill and high strength geogrid reinforcement. As a result, the project will provide a comprehensive design method for tunneling-induced building damage risk assessment.
Duration: 1 Sep-04 to 31 Dec-06
Project Investigator: Dr Kyung Ho Park
Sponsor: NOWENG Co. Ltd
Total Contracted Amount (Baht) 3,154,927.00

Characterization of Soft Soil in Mekong Delta, a Collaboration Project
Project Description: The project aims at identifying the characteristics of soft soil in the Mekong Delta. The research will be completed after one year.
Duration: 2004 to 2006
Research Team Member: Dr Pham Huy Giao
Investigator: Geotechnical Group
Sponsor: Japanese Government

Sustainable Coastal Development
Project Description: The project aims at developing the design manual for developing the coastal areas in Thailand. The parameters obtained in this project will be utilized for development of design procedure and design criteria for MSE construction with lightweight fill and high strength geogrid reinforcement as well as geotechnical design methods.
Duration: 1 Sep-04 to 30 Dec-06
Project Investigator: Dr Kyung Ho Park
Sponsor: NOWENG Co. Ltd
Total Contracted Amount (Baht) 837,972.00

Post Tsunami Reconstruction for Sustainable Coastal Development
Investigator: USAID/ SERD/ Dr Aamir Bari
Participant: Prof D T Bergado
Total Contracted Amount: US $5.0 M

Rubber Tire Chips Mixed with Sand Reinforced with Geogrid
Project Description: The aim of this research is to study the behavior of high strength geogrid with lightweight rubber tire chip-sand fill. The parameters obtained in this project will be utilized for development of design procedure and design criteria for MSE construction with lightweight fill and high strength geogrid reinforcement as well as compare the design procedure and criteria obtained from this project with other design methods.
Duration: 1 Sep-04 to 30 Jun-06
Project Investigator: Prof Dennes Bergado
Sponsor: Department of National Local Affairs
Total Contracted Amount (Baht) 500,000

Soft Bangkok Clay Improvement by Thermal Consolidation with Prefabricated Vertical Drains (PVD)
Project Description: The project aims at developing the design manual for soft Bangkok clay improvement using thermal consolidation with prefabricated vertical drains. The parameters obtained in this project will be utilized for development of design procedure and design criteria for MSE construction with lightweight fill and high strength geogrid reinforcement.
Duration: 30 Sep-04 to 31 Jul-06
Project Investigator: Prof. Dennes Bergado
Sponsor: Royal Thai Government (RTG)
Total Contracted Amount (Baht) 950,000

Seismic Hazard Assessment and Mitigation of Seismic Risk in Thailand (Phase I): Sub-projects 3 and 4
Project Description: The project aims at developing the design manual for evaluating the seismic hazard assessment and mitigation of seismic risk in Thailand. The parameters obtained in this project will be utilized for development of design procedure and design criteria for MSE construction with lightweight fill and high strength geogrid reinforcement.
Duration: 1 Sep-02 to 31 Dec-06
Project Investigator: Dr Wannachai and Dr Noppadol Phienwej
Sponsors: Thailand Research Fund
Total Contracted Amount (Baht) 3,154,000
Thermal Stabilization of Soft Bangkok (Phase 2)

Project Description: The significant characteristics of Bangkok clay, thick deposited soft clay, are low permeability, low strength, high compressibility, and high water content. These properties create problems in foundation and infrastructure engineering such as low bearing capacity, unstable slope, large settlement by consolidation when loaded and taking a long time to achieve the primary consolidation settlement. In order to reduce the future settlement contributed by the primary consolidation of the clay layers of low permeability foundation soil, improvement in the soil drainage system is deemed necessary. This research work studied the new innovation technique to hasten the consolidation rate of soft Bangkok clay by using the combination of prefabricated vertical drain (PVD) and thermal method. Both laboratory and field works have been done. The results show that raising the clay temperature up to 90°C increases its permeability about 3 to 4 times. Therefore, this technique accelerates the rate of consolidation because the permeability and the pore pressures increase with temperature. Moreover, elevated temperature tend to increase the shear strength of clays at drained condition.

Duration: January 2005 to March 2006

Investigator: Prof Dennes T Bergado

Project Investigator: Dr. Noppadol Phien-wej

Sponsors: Royal Thai Government (RTG)

Total Contracted Amount: B4,674,126.00

Research on the Damages on the North East Reef of Male, The Maldives

Duration: 1 May 2006 to 30 April 2009

Project Description: The project involves laboratory investigations, development of failure criteria for highly porous rocks (reef limestone) and numerical modeling through the engagement of a doctoral student.

Project Investigator: Dr. Ullrich Glaue

Sponsors: Environment Research Center Male, MV

Total Contracted Amount (Baht) 1,563,109

Technology Transfer of Geotechnical and Geophysical Field Testing Techniques

Duration: 15 March 2006 to 30 April 2006

Project Description: The project is concerned with the transfer of technology in geotechnical and geophysical field testing techniques.

Project Investigator: Dr. Pham Huy Giao

Sponsors: Hanoi University of Mining and Geology, Vietnam

Total Contracted Amount (Baht) 90,000

6.5 Ongoing / In Progress Grant and Sponsored Research

Bridge-Development of Human Resources in Development of Academic Programmes in Sustainable Geosystem Exploration and Engineering (BRIDGE)

Project Description: Considering the growing demand for an international training and education in geo-system engineering and exploration in the Mekong region countries, this 3-year project aims to help develop human resources at Vietnam National University (VNU) and National University of Laos (NUOL). Project partners are VNU, NUOL, AIT, ITC (The Netherlands) and Stockholm University (SU). Overall objectives of the action is to develop human resources in the Mekong Region in the integrated field of Geosystem Engineering and Exploration. The main scopes and activities include: (i) Training and upgrading of teaching staff at VNU and NUOL in Geosystem engineering and exploration; (ii) Training and upgrading of administrative and managerial staff in international graduate educational management; (iii) Exchange of new teaching materials and new teaching tools; and (iv) Provide support to development of course modules that will be integrated in the international programs in geo-system engineering and exploration under development at NUOL and VN.

Duration: 1 Nov. 2005 to 30 Nov. 2008

Investigator: Dr. Pham Huy Giao

Sponsors: ITC (The Netherlands), European Commission

Total Contracted Amount: B4,674,126.00

Geotechnical and Geoenvironmental Engineering Field of Study

Investigation of the Hutqui Hydropower project in Myanmar in the Feasibility Study Stage for purpose of dam type selection and foundation design. It also aims to evaluate the investigation data and provide recommendations on the foundation treatment of the dam and other appurtenances structures. A training workshop on numerical analysis for dam and tunnel design will be emphasized on the use of the computer program “Phase 2” will also be given to EGAT’s engineers/project staff.

Project Investigator: Dr. Noppadol Phien-wej

Sponsors: EGATPublic Co., Ltd., Thailand

Total Contracted Amount (Baht) 749,000
**Geotechnical and Geoenvironmental Engineering Field of Study**

**Activity, 28-29 July 2006, Phuket, Thailand**


**Other Publications**


**6.8 Masters Students’ Theses and Research Studies**

- Laboratory Investigation of Stiffened Deep Cement Mixed Pile
  By Anil Bhandan
  Supervisor: Prof. Dennes T. Bergado

- Seismic Design and Analysis for Tunnel Lining in Seoul Subways
  By Kim Woo Jin
  Supervisor: Dr. Kyung-Ho Park

- Anistropic Behaviour of Bangkok Clay in Vane Shearing Mode
  By Norawat Rattanaranusarn
  Supervisor: Dr. Noppadol Phienwej

- Removal of Disturbed Zone around Prefabricated Vertical Drain (PVD) using Thermal Method
  By Nyo Mar Than
  Supervisor: Prof. Dennes T. Bergado

- Three Dimensional Analysis of Ground Movement in EPB Shield in Bangkok Soils
  By Parin Muenatsutom
  Supervisor: Dr. Noppadol Phienwej
  Dr. Kyung-Ho Park (Co-chair)

**6.7 Doctoral Student Dissertation**

- Thermo-Mechanical Behavior of Soft Bangkok Clay: Experimental Results and Constitutive Modeling
  By Hossam M.A. Naga
  Supervisor: Prof. Dennes T. Bergado

- Prediction and Performance of Reinforced Rubber Tire-Sand Test Embankment
  By Taweewit Kanjananak
  Supervisor: Prof. Dennes T. Bergado

- Heavy Metal Diffusion under High Gradients and Diffusion Anisotropy in the Soft Bangkok Clay
  By Zaheer Ahmed Almani
  Supervisor: Dr. Ulrich Glawe

- Characterization of Recent Tsunami Deposits at the Andaman Coast of Thailand
  By Sadul Alam
  Supervisor: Dr. Ulrich Glawe

- Heavy Metal Diffusion under High Gradients and Diffusion Anisotropy in the Soft Bangkok Clay
  By Zaheer Ahmed Almani
  Supervisor: Dr. Ulrich Glawe

- Tunnel Risk Analysis Evaluation in the Bhumi Bol Reservoir Inflow Augmentation Project
  By Nunthani Wongvatana
  Supervisor: Dr. Noppadol Phienwej

- Investigation of Thermo-Mechanical Behavior of Normally Consolidated Soft Bangkok Clay
  By Laricar Dominic Ortega Traní
  Supervisor: Prof. Dennes T. Bergado

- Development of a Geophysical Test Site in AIT Campus
  By Chanarop Vichai
  Supervisor: Dr. Pham Huy Giao (Co-chair)

- Geotechnical Geophysical Study of the Red River Delta Clay with Reference to Highway Network Upgrading
  By Doan Huy Hen
  Supervisor: Dr. Noppadol Phienwej
  Dr. Pham Huy Giao (Co-chair)

- Geophysical Investigation of Sinkholes in the Tsunami-affected Area in Southern Thailand
  By Nanatp Prechavit
  Supervisor: Dr. Noppadol Phienwej
  Dr. Pham Huy Giao (Co-chair)

- A Study on Horizontal Well Efficiency with Reference to Improved Oil Recovery of the South-East Dragon Oil Field, Vietnam
  By Nguyen Minh Quy
  Supervisor: Dr. Noppadol Phienwej
  Dr. Pham Huy Giao (Co-chair)

- Visualization of Bangkok Subsurface
  By Somchak Apibamponlatham
  Supervisor: Dr. Noppadol Phienwej
  Dr. Pham Huy Giao (Co-chair)

- An Experimental Study on Ultrasonic and Microtremor Signal with Reference to Hydrocarbon Exploration
  By Wong-Jing T.
  Supervisor: Dr. Noppadol Phienwej
  Dr. Pham Huy Giao (Co-chair)

**Thematic Area**

- Geotechnical and Geoenvironmental Engineering

**Thesis Title**

- Laboratory Investigation of Stiffened Deep Cement Mixed Pile
  By Anil Bhandan
  Supervisor: Prof. Dennes T. Bergado

- Seismic Design and Analysis for Tunnel Lining in Seoul Subways
  By Kim Woo Jin
  Supervisor: Dr. Kyung-Ho Park

- Anistropic Behaviour of Bangkok Clay in Vane Shearing Mode
  By Norawat Rattanaranusarn
  Supervisor: Dr. Noppadol Phienwej

- Removal of Disturbed Zone around Prefabricated Vertical Drain (PVD) using Thermal Method
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- Three Dimensional Analysis of Ground Movement in EPB Shield in Bangkok Soils
  By Parin Muenatsutom
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  Dr. Kyung-Ho Park (Co-chair)

- Characterization of Recent Tsunami Deposits at the Andaman Coast of Thailand
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- Prediction and Performance of Reinforced Rubber Tire-Sand Test Embankment
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- Heavy Metal Diffusion under High Gradients and Diffusion Anisotropy in the Soft Bangkok Clay
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  Supervisor: Dr. Ulrich Glawe

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- Geotechnical Geophysical Study of the Red River Delta Clay with Reference to Highway Network Upgrading
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- Visualization of Bangkok Subsurface
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- An Experimental Study on Ultrasonic and Microtremor Signal with Reference to Hydrocarbon Exploration
  By Wong-Jing T.
  Supervisor: Dr. Noppadol Phienwej
  Dr. Pham Huy Giao (Co-chair)
Chapter 7: SET - MECHATRONICS AND MICROELECTRONICS

7.1 Introduction

**Mechatronics**

At present, most academic institutions and industries in the Asian region are only system integrators. Components are procured from more developed countries (e.g., computer numerically controlled machines, robots, and automated guided vehicles) and are integrated as a system (e.g., flexible manufacturing systems). To support the growth of the region's economy, expertise not only as system integrators but also as builders of components of advanced technologies must be developed. The growing number of electronic devices and the strong interactions between mechanical and electronic parts no longer permit separate investigations of these components.

Mechatronics provides new insights through an integrated consideration of mechanics, electronics, and information technology. The curriculum is designed to provide multidisciplinary knowledge and to develop the ability to design mechatronics systems.

**Microelectronics**

The region's growing industrial sector and the increasing demand for high technologies have brought the need for expertise in microelectronics to a critical level. The students are prepared to cope with the needs of the electronics industry in the region. The curriculum is equally balanced between the analog and digital design of circuits as well as the processing related topics including failure analysis, suitable for this electronics industrial sector in the region. The curriculum has been designed and constantly adapted in partnership with microelectronics industries and collaborating universities overseas. Miniaturisation of IC fabrication, MEMS, micro-actuators and micro-sensors design, computational electronics, and so on. Fabrication facilities are available through the National Electronics Technology Center and the National Science and Technology Development Administration located in nearby Science Park. Mechatronics faculty and students work in close collaboration with industry and government sectors in the areas of industrial automation, robotics, control, system design and integration. Some examples of ongoing projects include a medical tele-analyzer, automated visual inspection systems, MEMS design, an autonomous flying robot, automating centrifuge machines, an autonomous underwater robot and automating crystallization processes.

7.2 Research Facilities and Laboratories

Mechatronics and Microelectronics fields of study share all the laboratory facilities with IEM and DME fields of study. There are several well equipped laboratories with the primary function of supporting the students and faculty for teaching and research and to conduct outreach programs.

**Mechatronics and Automation Laboratory**

The Mechatronics and Automation laboratory is well equipped with many PLC systems (S5, S7200/300/400, INDRAMAT, BOSCH), distributed control systems (PCS7), operator panels (OP5, OP17/DP and OP35), a PC-based human machine interface package (WINCC) and networked field buses (PROFIBUS, INTER-BUS and SERCOS). The lab has mobile robots (NOMAD, PIONEER 2), robot arms (CRS), an industrial robot (KUKA-KR15), a self-made open architecture CNC machine, CNC control systems (MTC 200, SIMUMERIK 8100/8400), image processing systems (DVT, MATROX) and FPGA’s (XILINX-1i VIRTEX PRO, ALTERA). Software such as SYNOPSYS IC Design, ANYSIM, ANSYS, ADAMS and many types of special sensors and actuators are also available for research use.

The Integrated Circuit Design laboratory gives students access to a wide variety of professional software applications including ANSYS, Orcad, ModelSim SE, Xilinx ISE, Synopsys, Leonardo Spectrum LS and Tanner (S-Edit for Schematic Capture, T-Spice and W-Edit for Simulation and L-Edit for Physical Layout). The laboratory’s facilities are used for analog and digital circuit design, microchip design and fabrication, MEMS, micro-actuators and micro-sensors design, computational electronics, and so on. Fabrication facilities are available through the National Electronics Technology Center and the National Science and Technology Development Administration located in nearby Science Park.

**Simulation Laboratory**

This lab is equipped with networks of Pentium PC for general applications and internet access, high end CAD/CAM & Simulation software such as ARENA and AutoMOD. In addition, a high performance computer facility with parallel cluster is also available for research use.

**Microelectronics Laboratory**

The microelectronics facilities consist of two main laboratories:

1. IC Design Lab
2. Nanotechnology

The Integrated Circuit Design laboratory gives students access to a wide variety of professional software applications including ANSYS, Orcad, ModelSim SE, Xilinx ISE, Synopsys, Leonardo Spectrum LS and Tanner (S-Edit for Schematic Capture, T-Spice and W-Edit for Simulation and L-Edit for Physical Layout). The laboratory’s facilities are used for analog and digital circuit design, microchip design and
**Mechatronics and Microelectronics**

<table>
<thead>
<tr>
<th>Fields of Study</th>
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<tbody>
<tr>
<td>microchip design and fabrication, MEMS, micro-actuators and micro-sensors design, computational electronics, and so on.</td>
</tr>
<tr>
<td>Fabrication facilities are available through the National Electronics Technology Center and the National Science and Technology Development Administration located in nearby Science Park.</td>
</tr>
<tr>
<td>The Nanotechnology laboratory consists of a chemistry lab, an instrumentation room and an electronics laboratory. The chemistry laboratory is equipped with standard chemical tables and hoods for carrying out wet-chemical processing. The instrumentation room consists of equipment such as optical spectrophotometers and microscopes. The electronics laboratory is equipped with digital oscilloscopes, signal generators, power supplies and standard meters, and it is stocked with a variety of discrete devices for testing and research.</td>
</tr>
</tbody>
</table>

**Computer Integrated Manufacturing (CIM) Laboratory**

The Computer Integrated Manufacturing (CIM) laboratory provides hardware and software support for Industrial Systems Engineering. Many research activities have been undertaken in close collaboration with industry and government sectors in the area of Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Computer Numerical Control (CNC), Rapid Prototyping (RP) and Medical Technology. The CIM laboratory also provides specialized training and consultancy services in CAD, CAM, CNC machining, reverse engineering, rapid prototyping, packaging technology, flexible manufacturing systems (FMS), and development of a postprocessor for 5-axis CNC. The CIM laboratory is equipped with production and training CNC machines including an EMCO TURN242 industrial production CNC lathe, an EMCO VMC 200 CNC vertical machining center for universal production, a MAHO MH600EZ 5-axis universal milling and boring machine, an EMCO compact 5 CNC, an EMCO F1 CNC, a LVD CNC press brake, a LVD water-jet cutting CNC, a 3D LLER tool presetting system, a Mondiale Gallic G-420 Industrial CNC lathe and an EMCO CNC training system. The available CAD/CAM software includes UNIGRAPHICS NX4, Master CAM 9.1, Mechanical Desktop 6, AutoCAD Inventor Series, SolidWorks 2005, CAM 2000, Mimics 6.3 and Magic 5.4.

**Metrology Laboratory**

The Metrology laboratory also provides hardware and software support for Industrial Systems Engineering. The Metrology Laboratory is equipped with measuring instruments including Zeiss CMM, Mitutoyo Profile Projector and a Taylor Hobson surface roughness tester, as well as LabVIEW hardware and software.

**7.3 Faculty and Research Staff**

**Full-time Faculty**

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree and Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>NITIN V AFZULPURKAR, BEng, Univ of Poona, India; PhD, Univ of Canterbury, New Zealand</td>
<td>Associate Professor [Computer vision (pattern recognition and image processing); MEMS design, fabrication for electronic and bio medical applications; Soft computing algorithms for robotics and automation applications; Mechatronics applications for industrial use]</td>
</tr>
<tr>
<td>JOYDEEP DUTTA, BSc (Hons), St Edmund's College; MSc (Physics), North Eastern Hill Univ; PhD, IACS, Calcutta Univ, India.</td>
<td>Associate Professor [Functional materials, nanomaterials, Nanoparticles, self-organization, Biomimetic processes, Polyelectrolyte deposition, Gas sensors, Bio-sensors, optoelectronic devices]</td>
</tr>
<tr>
<td>MANUKID PARNICHKUN, BEng, Chulalongkorn Univ, Thailand; MEng, PhD, Univ of Tokyo, Japan</td>
<td>Associate Professor [Robotics, control, and measurement (involves with design and development of hardware and software of mechatronics devices); New robot mechanism, novel control algorithm, and innovative measurement concept are investigated]</td>
</tr>
<tr>
<td>UDUPI SRIPATI, B.Eng., Mangalore University; M.Tech.; NITK Surathkal; and Ph.D., Indian Institute of Science.</td>
<td>Visiting Senior Lecturer [Linear Ics and applications; antennas and propagation; advanced digital communications, signal detection and estimation, error control coding, information theory, transmission lines and wave-guides, RF circuit techniques]</td>
</tr>
</tbody>
</table>

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7.4 Completed Grant and Sponsored Research

Development of a Systemic-Error-Compensate CNC Controller Project

Project Description: Nowadays, accuracy of products is one of the most critical considerations for manufacturers. Since many workpieces are produced by Computer Numeric Control Machine (CNC Machine), thus, workpieces’ accuracy depends directly on accuracy of the CNC Machine. Actually, CNC machine is able to produce work-piece accurately up to the level of 1 mm. However, in reality, it is very difficult to control the machine at this level since the CNC machine always includes the following inaccuracies in the system; (1) inaccuracy in CNC machine assembly, especially with movable components, (2) thermal distortion of CNC machine and workpieces during manufacturing, (3) inaccuracy induced by cutting forces, (4) cutting tool wear, (5) fixture errors, etc. Inaccuracies from (1), (2), and (3) are the main factors of manufacturing errors in CNC machines. Mostly, manufacturing error is time-variant (not constant with time), it depends on many factors including machine condition, environment temperature, work-pieces material and weight, and so on at the instant of operation.

In this research, the researchers will develop a systematic-error-compensate CNC controller. The developed controller collects necessary information, e.g., position and displacement, temperature, forces, etc., from CNC machine and uses this information in the error compensate algorithm to compensate error in real time. Output from the error compensation is applied to correct command to the CNC machine.

Duration: 1 Jan-02 to 31 Dec-06
Investigator: Dr. Manukid Parnichkun
Sponsor: Mitutoyo Association for Science and Technology
Total Contracted Amount: Baht 1,200,000

A Study of Development of an Intelligent Vehicle Project

Project Description: The project is to develop an intelligent vehicle for use to improve highway safety and fuel consumption. The intelligent vehicle can also be employed by handicapped and elderly persons who are normally unable to effectively and safely travel around by themselves, which can translate into some significant savings for the nation. The project main objective is to develop an intelligent vehicle which is able to move from one place to another autonomously, without help from human. Operator only need to provide information about his/her destination to the vehicle. The vehicle receives intelligence from various sensors installed on board. These sensors are used to determine the position of the vehicle, the directions of other vehicles in the vicinity, static and dynamic obstacles, traffic lines, symbols, signs, inter-vehicle distances, etc. It also receives intelligence from the Global Positioning Satellites (GPS) to help in navigation, control, and avoidance of accidents.

Duration: March 2005 to December 2006
Investigator: Dr. Manukid Parnichkun
Sponsor: National Electronics and Computer Technology Center
Total Contracted Amount: Baht 1,000,000

Conjugated Semiconductor Nanoparticles as Fluorophores for Rapid Detection of Bacteria’s

Project Description: This project will study the assembly of fluorescent inorganic nanoparticles (nanophosphor), 2H5Mn2+ and biomimetic polymers and its subsequent attachment to bacteria’s sand will try to address the two major challenges for the rapid detection of a single bacterium are the achievement of (i) short to real-time detection and (ii) ultrasensitivity in bioanalysis. Here, we propose a bioconjugated nanophosphor (2H5Mn2+4)-based bioassay for in situ pathogen quantification. The bioconjugated nanoparticle would provide the fluorescent signal for bioanalysis that can be easily incorporated with biorecognition molecules, such as an antibody.

Duration: Dec 2005 to Dec 2006
Investigator: Dr. Joydeep Dutta
Sponsor: NANO TECH NSTDA
Total Contracted Amount: Baht 1,498,992


Project Description: To develop a prototype of Automated visual inspection system which can identify significant defects in computer hard disk drive during the assembly process. The developed system will consists of hardware (camera and jigs) and customized image processing software.

Duration: Nov 2004 to Dec 2006
Investigator: Dr. Nithin Afzulpurkar
Sponsors: Consortium of Seagate, Hitachi, Western Digital and NEC TEC
Total Contracted Amount: Baht 1,500,000

Development of an Automatic Tide Sensing Unit for Tsunami Early Warning System

Project Description: The main objective of this project is to study and develop an automatic tide-sensing unit for tsunami early warning system. The sensing unit will have a capability to detect automatically tide information, including tide height, wave amplitude, wave length, and wave speed. All the information will be transmitted to a ground station to analyze possibility of tsunami, its magnitude and arrival time at each coastal location for proper action and warning to the concerned parties.

Duration: Dec 2005 to Dec 2006
Investigator: Dr. Manukid Parnichkun
Sponsor: Royal Thai Government Joint Research Fund
Total Contracted Amount: Baht 1,000,000

7.5 Ongoing / In Progress Grant and Sponsored Research

Brain-Machine Interface for Robo-Animal Control Project

Project Description: It is widely known that robots are very useful in the applications beyond human limitation, e.g., a small and narrow area where human cannot access. Small robots accompanied with various kinds of moving mechanism; serpentine, belt, legs, for instances, are being developed to enhance the moving efficiency. However there are also some limitations of using these robots, for examples, difficulty in self decision making in an unknown environment, long time consuming in remote control operation, the operator has to instruct the robot to work in detail for every step, difficulty of moving in an environment obstructed by obstacles. From the above reasons, if we are able to control actions and motions of animals or small lives, the above limitations will disappear. The animal under control will act as a robo-animal. The operator just sends a high level command to the robo-animal, and then lets the animal solve a low level problem by itself, for examples, avoiding catching obstacles, stepping over the obstructed objects. There are plenty of potential applications of using robo-animal; for examples in rescue, demining, agricultural pest control, surveillance, and searching purposes. Brain-machine interface concept will be applied to control the robo-animal. An array of electrodes will be implanted into the animal’s brain. Commands which are in the form of electrical signal will then be used to stimulate the animal’s brain. This concept has potential to be used in medical treatment of Parkinson, and abnormal of sensory and neuron system in human.

Duration: 31 July 2006 to 30 July 2009
Investigator: Dr. Manukid Parnichkun
Sponsor: Thailand Research Fund
Total Contracted Amount: Baht 1,200,000

Development of an Exoskeleton Robot for Handicapped People Project

Project Description: There are many arm or leg handicapped people in Thailand. These people rely on supporters and becoming family and social expenses. Wheel chairs are used to facilitate leg handicapped people. However, slope ways are not installed properly in many places in Thailand, supporters are still required at the stairs. Arm prosthesis are used for arm handicapped people. However, only light weight load is still the limitation. The main objective of the project is to develop an exoskeleton for handicapped people. The leg exo-skeleton would help the leg handicapped people to move on flat floors by themselves. The arm exo-skeleton would help the arm
Development of a Medical Tele-Analyzer by force-Displacement-Hybrid Tactile Sensor and Actuator for Abdominal Mass Analysis (Phase 2) Project

Project Description: Presently, expert medical doctors in abdominal mass analysis are insufficient in Thailand. Patients staying far away from the hospitals, where the expert doctors are working, have to be brought cured at near hospitals without any expert assistance. Some patients might choose to move to the expert hospitals but they have to spend a lot of money and time. It is too late for many times. Furthermore, in the case of heavy infection patients, doctors cannot approach the patients directly. This problem needs urgent solution.

From the above reasons, our research group has an idea to develop a medical tele-analysis system. The developed system consists of two subsystems: doctor-side subsystem and patient-side subsystem. In the doctor-side subsystem, an array of displacement sensor is equipped to detect movement of doctor's hand and fingers. The detected information is transmitted to the patient side to be used in medical diagnosis. On the other hand, the patient-side subsystem consists of an array of displacement actuators which is used to follow displacement of doctor's hand and fingers. An array of force sensors is used to detect forces between patient and the equipment.

Since the above mentioned analysis and control need real-time operation, the desired communication channel has to be direct-line or interface-type. Telephone line, satellite, or other coming media is the choice of selection.

Automatic database system, which helps doctors to analyzer disease, will be implemented on the developed tele-analyzer. This database system collects data in the previous analysis to help the system to learn and record the data automatically. Supervised teaching by expert medical doctors in necessary to help medical students or less experienced doctors in analyzing disease and also in self-learning.

Not only using in medical tele-analysis, the proposed system can also be used in any tele-force-displacement control processes.

Duration: August 2004 to December 2008

Investigator: Dr Manukid Parnichkun

Sponsor: National Electronics and Computer Technology Center

Total Contracted Amount: Baht 1,674,200

Printed Electronics Using Direct Writing Technology

Project Description: This project evaluates the performance of piezoelectric print-head for printing simple passive electronic components like resistors, capacitors, and inductors employing novel colloidal nanoparticle-based conducting inks. Among the advantages of this concept is the ink-jet printing is additive, reducing waste and processing steps compared to subtractive fabrication methods. It is data-driven, requiring no masks, reducing turnaround time over lithographic processes. Ink-jet printing is less limited by substrate composition and morphology, and can accommodate a greater number of layers and range of materials than can lithography and subsequent semiconductor-based batch processing. Ink-jet printing thus presents a number of advantages as a fabrication technology. Coupled with the novel use of nanoparticles as the building material, the process enables a practical route to a desktop fabrication system for electronic circuitry or MEMS.

Duration: 2006-2009

Collaborator: Dr. Apyinunt Thanachayanont, King Mongkut's Institute of Technology Ladkrabang, Thailand

Investigator: Dr. Joydeep Dutta

Sponsor: National Electronics and Computer Technology Development Agency, Thailand

Total Contracted Amount: Baht 2,498,776

Nanocomposite Polymer-metal Plasmon Sensors

Project Description: This project aims on the development of nanotechnology activities among the partners making use of the cross-disciplinary competence of the principal investigators of this project. The nanotechnology synthesis will be carried out in AIIT in close co-operation with the Polymers group who will advice on the functionalisation of these particular. Simultaneously the group in Uppsala will develop the polymers to be used in this project. Nanocomposites will then be fabricated for specific sensor applications. In order to successfully build any meaningful project, it is thus necessary to have cross-disciplinary competence that will lead to innovation, which can profoundly influence the lives of ordinary people.

The researcher in Thailand will benefit from this project by getting world-class support from the Angstrom Laboratory and the researcher in Sweden would benefit from a decade old experience in inorganic nanoparticles of the group in Thailand and also the support of interfacing and automation of any devices that come out of the project, due to the existing competence at AIIT for such purposes.

Duration: May 2005 to April 2008

Investigator: Dr Joydeep Dutta

Sponsor: Sida Research Grant, Sweden

Total Contracted Amount: 367,000

Swedish Kroner

Photocatalytic Thin Film Coating Technology Program Research

Project Description: Photocatalytic coating is a basic technological subject of great importance to industrial development. One part of the project utilizes solution processing methods, such as sol-gel, dip-coating and spray pyrolysis techniques to fabricate e.g. TiO2 films on glass and hard plastics, with an aim for applications in food and agricultural industry. The other part explores the method of plasma sputtering deposition, mainly of TiO2 on glass, which is applicable in optical component industry. In addition, the project will attempt to investigate new novel methods for photocatalytic coatings, for example, sputtering processing with substrates at room temperature, coating on other type of surface, and development of novel photocatalytic materials.

Duration: 2006-2008

Investigator: Dr. Joydeep Dutta

Sponsor: National Electronics and Computer Technology Center, Thailand

Total Contracted Amount: Baht 3,402,000

Fabrication and Properties of Nanoparticles Array

Project Description: The aim of this project is to study the growth process of multilayer thin film based on Layer by Layer (LBL) deposition of Nanoparticles. The LBL thin films will be conducted with 2HS capped with a polyelectrolyte and another oppositely charged polymer or nanoparticles.

Duration: 11-Jan-06 to 31-Dec-07

Investigator: Dr Joydeep Dutta

Sponsor: KIST

Total Contracted Amount: 8,150,000

Nanotechnology based Pressure Sensors for ‘Tsunami’ Detection

Project Description: The main objective of this project is to study and develop a ‘stand alone pressure sensing device’ for ‘Tsunami’ early warning system. The device will be fabricated using a demonstrated multilayered thin film deposition technique that has been developed at AIIT, comprising of alternate layer stacks of gold nanoparticles and doped or undoped ZnS nanoparticles by a novel layer-by-layer modified polyelectrolyte deposition process.

Duration: Dec 2005 to Dec 2006

Investigator: Dr Joydeep Dutta

Sponsor: AIT-TRG Joint Research Project

Total Contracted Amount: Baht 875,000

Nanotechnology Center of Excellence (CoEN):

The Center of Excellence in Nanotechnology addresses the creation of knowledge in areas relevant to Thailand, its industries and its people. Activities include joint research with other local and international universities and institutes, education and training personnel in the field of nanotechnology, technology transfer and promotion of public and
Development of Generic smart MEMS based Control Systems

Project Description: In this research, a microprocessor (8051) and DC servomotor with a couplings are interfaced to achieve control and monitoring of a micropump and micro valve system are designed and fabricated. The possible applications areas are smart devices for HDD, medical and automotive applications.

Duration: Feb 2004 to Dec 2006
Investigator: Dr. Nitin Afzulpurkar
Sponsor: Department of Engineering Science and Technology, Thailand
Total Contracted Amount: Bht 3,880,800

Automated Pick and Place of Concrete Roof Tile at the Pressing Machine Operation

Project Description: The project aims to study the concept of using industrial pick and place mechanisms for automated pressing line by utilizing the collected data. The design may include: pick and place mechanism design, conveyor modification to suit the automation process, and communication. A prototype mechanism will be made and tested.

Duration: 1 June 2006 to 30 June 2007
Investigator: Dr. Nitin Afzulpurkar
Sponsor: CPAC Roof Tile Co., Ltd., Thailand
Total Contracted Amount: Bht 1,350,000

7.6 Publications

Referred Journals


7.6 Publications

Impact Factor 0.679 referred from http://www.sciencegateway.org/impact/0021.html


Referred Books / Chapters


Conference Proceedings


N.D. Thanh, and N.V. Afzulpurkar, “Page Decomposition for Document Images with Complex Layout”, 4th International Conference on Computer Science and Applications (ICCSA-2006), 27-29 June 2006, San Diego, California, USA. (Accepted for publication)


S. Puntunan, and M. Parnichkun, “Hybrid
Mechatronics and Microelectronics Fields of Study
2007 Fully Automatic Flying
M.N. Dailey, and M. Parnichkun,
M. Parnichkun, and K. Sangpetchsong,
J. Hilborn, T. Bowden, F. Nederberg, A.
Sugunan, and J. Dutta, “Synthesis of
Dots for Fluorescent Labeling” (Oral),
C. Widmer and J. Dutta, Method for
Manufacturing an In-the-ear Hearing
Device, Int. CI. HORE 25 00
(06.04.2006); AU-B-2000272654-A
(Examined on 06.04.2006)
C. Widmer and J. Dutta, Method and
Apparatus for Manufacturing an Ear
Device Shell, Int. CI. HORE 25/00
(2006.01); AU-B-2000272654
(Examined on 12.01.2006).
C. Widmer and J. Dutta, Method for
Manufacturing an In-the-ear Hearing
Device, and an In-the-Ear Hearing
Device, Int. CI. HORE 25/00
(06.04.2006); AU-B-2000253848
(Examined on 06.04.2006)

7.7 Doctoral Students’ Dissertation
Mechatronics
Disturbance Observer-based Hybrid
Control of Force and Displacement in a
Medical Tele-Analyzer
By: Anan Suebsomran
Supervisor: Dr. Manukid Parnichkun

Development and Control of an
Autonomous Underwater Mobile Robot
By: Theerayuth Chatananyuenyong
Supervisor: Dr. Manukid Parnichkun

8.7 Masters Students’ Theses
Mechatronics
Vision based Steering Control System for
an Intelligent Vehicle
By: Ngo Hoang Anh
Supervisor: Dr. Manukid Parnichkun

FPGA Based Image Processing for
Autonomous Vacuum Cleaning Robot
By: Geethanari Annugum
Supervisor: Dr. Nitin V. Afzulpurkar

Speech Recognition based on Hidden
Markov Model
By: Nguyen Viet Dung
Supervisor: Dr. Manukid Parnichkun

a Robot’s Assistive Walking Device for
Hemiplegic People
By: Pham Bach Duong
Supervisor: Dr. Nitin V. Afzulpurkar

Adaptive Reverse Engineering for Layered
Manufacturing
By: Dang Phi Van Hai
Supervisor: Dr. Piut Koomsap

Machine Vision based Speed Control of
an Intelligent Vehicle
By: Dinh Cong Huan
Supervisor: Dr. Manukid Parnichkun

Design of Revolution Adjustable Wheel
Module for Electric Vehicles
By: Vu Thang Long
Supervisor: Dr. Piut Koomsap

Embedded Finger Motion based Spelling
Recognition System using ASIC
By: Tinh Huu Phuc
Supervisor: Dr. Nitin V. Afzulpurkar

Traffic Control System for Hochiminh City
in Vietnam
By: Huynh Huu Phuong
Supervisor: Dr. Nitin V. Afzulpurkar

The Development of Leg Exoskeleton for
Walking Disabilities AIDS
By: Rattapon Plaisawat
Supervisor: Dr. Manukid Parnichkun

Development of Power Enhancement Arm
by Fuzzy and PID Controllers
By: Suprapto
Supervisor: Dr. Manukid Parnichkun

Fully Automated and Integrated Hot
Stamp and Barbell Assembly Machine
By: Kadlaskar Vikram Sanjeve
Supervisor: Dr. Nitin V. Afzulpurkar

Adaptive Geometry Track Design and
Implementation for an All Terrain Mobile
Robot
By: Wayanthy Sanghai
Supervisor: Dr. Nitin V. Afzulpurkar

PLC Based Motion Control for a Flexible
Packaging Machine
By: Kablan Santanam
Supervisors: Dr. Nitin V. Afzulpurkar/Assoc.
Prof. Erik Bohez

Development of a Gyrocopic Unmanned
Bicycle
By: Suprapto
Supervisor: Dr. Manukid Parnichkun

A Human-following Robot
By: Tran Minh Thuan
Supervisor: Dr. Nitin V. Afzulpurkar
Development of Profibus Interface for Intelligent Automation Devices using Technology
By: Nguyen Huy Thuy
Supervisor: Dr. Nitin V. Afzulpurkar

Balancing Analysis and Control of a Rotating Machine
By: Nguyen Anh Tuan
Supervisor: Dr. Manukid Parnichkun

Driver Based Rear-end Collision Avoidance Algorithm
By: Nguyen Le Tuong
Supervisor: Dr. Pisut Koomsap

Finding and Safe Storage Objects in Hazardous Environments using Mobile Robots
By: Nguyen Thi Thanh Van
Supervisor: Dr. Nitin V. Afzulpurkar

Implementation of Speech Recognition on a Microcontroller for Controlling Wheelchair
By: Thiang
Supervisor: Dr. Manukid Parnichkun

**Microelectronics**

A 12-Bit Low Voltage Continuous-Time Delta-Sigma Modulator
By: Awinash Anand
Supervisors: Dr. Nitin V. Afzulpurkar/Dr. Apisak Worapishet

Quantum Tunneling Based Electronics Pressure Sensor using Nanotechnology
By: Syed Hassan Mujtaba Jafri
Supervisor: Dr. Joydeep Dutta

Electrical Characterization of Series Resistance for 0.8 Micron CMOS Technology
By: Anand Padmanabhan
Supervisor: Dr. Lertsak Lekawat

Photocatalytic Activities of Metal Oxide Nanoparticles
By: Ruh Ullah
Supervisor: Dr. Joydeep Dutta

Design and Simulation of Microactuator for Magnetic Recording Head
By: Kajohn Choobthaisong
Supervisor: Dr. Nitin V. Afzulpurkar

Implementation of Low Delay, Low Bit-Rate Audio Compression for Wireless Digital Audio System
By: Jessada Kamjana
Supervisors: Dr. Nitin V. Afzulpurkar/Dr. Pasin Isarasena

Study of RF MEMS and Optimization of Transceiver Design
By: Karthik Ramamurthy
Supervisor: Dr. Nitin V. Afzulpurkar
Chapter 8: SET - REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS FIELD OF STUDY

8.1 Introduction

Geoinformatics comprising Remote Sensing (RS), Geographic Information System (GIS) and Global Positioning System (GPS) provides extremely useful tools for environmental and natural resource management. They are widely recognized as supporting tools for planning, monitoring, and management of the appropriate utilization of resources at the country, regional and global levels.

While they represent multidisciplinary backgrounds, students in RS&GIS share a common interest, that is, to use remote sensing, GIS, GPS and other space technologies as tools in pursuing their academic work as well as in developing new technologies that are applicable to the region.

Because of the complexity of the technologies together with the heavy dependence on advanced computer skills, application specialists need to have a sound knowledge of the theoretical aspects and practical approaches to integrate many resources of information that address different applications.

Furthermore, scientists, planners or engineers interested in these technologies should be familiar with past, present and future satellite systems, their appropriate usage, data acquisition and handling and integration with other data sources.

The curriculum well covers the theoretical aspects and application of space technology, especially in Remote Sensing and GIS. It provides students ample time to gain application know-how through laboratory sessions. Students are free to use satellite data received by the NOAA, AVHRR and MODIS Satellite Receiving Stations for their theses or research studies.

The demand for RS&GIS graduates is very high as there is a lack of professionals in these disciplines, particularly those with a vast knowledge of the practical utilization of these technologies. Employment opportunities are available in a wide range of areas, including agriculture, forestry, coastal development and management, urban planning and development, medical technology, mapping and planning, disaster mitigation and environmental management.

Major areas covered in the coursework are fundamentals of remote sensing and GIS, earth-energy interaction, atmospheric correction, application potential in various disciplines, GIS data sources, map projection, geostatistics, spatial modeling, automated mapping, digital terrain model, GPS data acquisition, and integration of GIS, remote sensing and GPS.

8.2 Research Facilities and Laboratories

The RS&GIS field of study provides excellent facilities for teaching, research and projects which consists of the Digital Image Processing laboratory, Institute-wide GIS laboratory, Asia e-learning project experiment room, meeting rooms, and the Geoinformatics Center laboratory. The RS&GIS field of study has a policy of maintaining the best working environment for students, staff and faculty. Apart from the Institute-provided access to the Internet and electronic mail, each student of the RS&GIS field of study is allocated computer space for individual use of about 1-2 Gb (extendible). The space for personal web pages to be hosted on RS&GIS network, can also be provided upon request.

The RS&GIS LAN Network can also be monitored in real time.

Besides, it has a very good archive of over 600 scenes of satellite imagery of SPOT, Landsat-TM, NOAA, ADEOS, ERS-SAR, and JERS-SAR to serve the students in their research and thesis studies. Other data, such as topographic, landuse, soil, geology maps of Thailand and some aerial photographs, are also available.

The RS&GIS library also provides students with more specialized books, journals, and computer manuals.

Some equipment in its laboratory available for academic activities include: Trimble geoexplorer; Garmin GPS Series III and V; laptop computer; digital camera; wireless hub/switch; wireless USB; network switch; network hub; black/white and color laser printers; A4 and A0 scanners; table and personal stereoscopes; and an LCD projector.

8.3 Faculty and Research Staff

The Institute is deeply grateful that Her Royal Highness Princess Maha Chakri Sirindhorn has seen fit to share her expertise and experience with faculty, staff and students, as an Honorary Faculty Member. In this singular position, Her Royal Highness is associated with the Remote Sensing and Geographic Information Systems Field of Study.

Full-time Faculty

XIAOYONG CHEN, BS, MS, PhD, Wuhan Technical Univ of Survey and Mapping, People’s Republic of China.

Associate Professor
(Automated Mapping, GIS, Photogrammetry, Remote Sensing, Mathematical Morphology and Database Management System)
Remote Sensing and Geographic Information Systems Field of Study

[Remote sensing and geographic information system; particular emphasis on GIS theory, digital image analysis and real-time mapping; key research areas on theoretical framework of geo-spatial information science, digital photogrammetry, laser range data processing, multi-dimensional / multi-scale / multi-accuracy / multi-media geo-spatial data modeling; GIS application in urban planning, intelligent transportation system, environment monitoring, disaster mitigation, archaeology and tourism]

KYOSHI HONDA, BAgr, DEng, Tokyo Univ, Japan

Associate Professor, Image Processing, Erosion control, Terrain modeling

[Modeling and Simulation on Near Real Time Ubiquitous Geo-Infomatics; Web-GIS, including development of remote sensing and GIS server on Web Map Service (WMS) using Open Source Software such as Minnesota Map Server; Tsunami WMS development; Real time Mapping; volcano slope development; Crop/Plant Modeling; Debris Flow Simulation; Parallel computing]

NITIN KUMAR TRIPATHI, BTech, National Institute of Technology, Warangal, India; MTech, IIT, PhD, IIT, Kanpur, India

Associate Professor, (GIS, Remote Sensing, Environment, Socio-economic Impact, Agriculture, Health, Applications)

[Application of Geoinformatics in environment, marine, health and agriculture fields; Development of wireless GIS using the concept of Internet GIS and wireless devices such as wireless LAN, personal digital assistant (PDA) with mobile phone (GPRS) used for real-time spatial data logger and air-pollution monitoring]

Visiting Faculty

MICHIRO KUSANAGI, BS, MS, Univ of Tokyo, Japan; MS, PhD, Univ of California, USA.

Visiting Professor, (Aerospace System Engineering, Space System Engineering)

SEISHIRO KIBE, BEng, MEng, DEng, University of Tokyo, Japan

Visiting Professor, (Aerospace System Engineering, Space System Engineering)

[Dynamic and Control of the Tethered satellite System, as an application for the active removal of Space Debris from the orbit; Hypervelocity Impact Analysis, using the so-called Hydrocode, AUTODYN3D, the complex phenomena including three material phases, solid, liquid and gas, are analyzed and experimental study to simulate the space debris impact in space over 7 km/s is also conducted; Application of aerospace technology in the field of Remote Sensing and GIS, such as GPS and RS Satellites]

JUNICHI SUSAKI, BEng, MEng, DEng, Univ of Tokyo, Japan

Visiting Assistant Professor, Environmental Information Extraction and Validation, Social Environmental Change detection, Automatic Pattern Recognition, Remote Sensing and GIS development

[Satellite data processing from data receiving to application; field measurements of physical parameters on surface such as Bidirectional Reflectance Distribution Function (BRDF) and albedo, and used the data for model development and validation; Environmental change monitoring using on satellite and meteorological data based on data fusion techniques. One of such applications is early drought warning system targeting field measurement, model development and application]

Research Staff

MANZUL KUMAR HAZARKA, PhD, University of Tokyo, Japan; MEng, Asian Institute of Technology, Bangkok, Thailand; MTech, Indian Institute of Technology, Kharagpur; BTech, J N Kishi Vishwa Vidyalaya (J. N. Agriculture University), India

Senior Research and Training Specialist, (RS and GIS Applications to Global Environment, Terrestrial Carbon Cycle and NPP)

[Handling independent projects, conducting research and analysis, identifying issues, formulating options, and making conclusions and recommendations; Theories, concepts and applied approaches related to carbon cycle and ecosystem models, which require an integration of multiple, complementary and independent data and methods in a spatial domain for accurate estimation of carbon sequestrated in forests at a reasonable cost]

SURAT LERTLUM, BS, Norwich University; MS, The George Washington University, USA; DTechnology, Computer Science, Asian Institute of Technology, Thailand

Research Scientist, GIS, RS, Digital Image Processing, Surveying, Mapping

[Low-resolution (NOAA AVHRR) forest classification, High-resolution (Landsat TM), and Multi-resolution forest classification includes thermal band; Object-Oriented data model for multi-resolution / multi-temporal remote sensing and GIS data sets; related-research with NOAA AVHRR and MODIS data; related-
research on Real Time Kinematics Differential GPS and the development of mobile system utilizing open source software; related research on the archaeological remote sensing and GIS including the remote sensing and GIS for archaeology in Southeast Asia; related research on the archaeological Virtual Reality, including 3D modeling from digital photographs and from laser scanning.

LAL SAMARAKOON, PhD  
Visiting Senior Scientist  
Director, AC RoRS and GAC  
(GIS, RS, Digital Image Processing, Surveying, Mapping)

MARC SOURIS, PhD  
Université de La Rochelle, France  
Visiting Research Scientist  
(Remote Sensing and GIS development)

TARAVUDH TIPDECHO, BSc, MSc  
Chiangmai Univ, Thailand  
DTeCHSc, Remote Sensing & GIS, Asian Institute of Technology, Thailand  
Research Specialist  
(Advanced Mapping, Terrestrial Scanning)

8.4 Completed Grant and Sponsored Research

Analysis of Factors Influencing Rice Grain Quality cv. KDMIL 105 Using Geographic Information System  
Project Description: To investigate the effect of environment and management factors which could contribute to the grain quality of Khao Hom Mali and identification of potential growing areas.  
Duration: November 2005 to October 2006  
Investigator: Dr Xiaoyong Chen  
Co-Investigator: Dr Srisaang Kaojarern  
Sponsor: RTG-Budget Joint Research Project FY 2005  
Total Contracted Amount: Baht 1,000,000

Applying Parallel Computing on Cluster and Grid Systems for Agricultural Monitoring Based on Crop Model and

Remote Sensing (RTG-CLUSTER)  
Project Description: To implement SWAO-GA on cluster and grid computing system to make it possible to perform agriculture monitoring which is based on data assimilation on crop model and remote sensing.  
Duration: October 2004 to June 2006  
Investigator: Dr Honda Kiyoshi  
Sponsor: RTG-Budget Joint Research Project FY 2004  
Total Contracted Amount: Baht 975,000

Asian Highway GIS  
Technical Abstract: To design and develop an information system for the Asian Highway based on GIS utilizing remote sensing images. Master database which will provide public through Web Map Service will be developed. Also a stand alone system to provide good human interface without internet connection will be developed. The data includes Asian Highway data such as route, spec of road. Socio-economic data and remote sensing images and elevation data  
Duration: August 2003 to April 2006  
Investigator: Dr Honda Kiyoshi  
Sponsor: UN-ESCAP  
Total Contracted Amount: Baht 652,500

E3P Environmental Protection and Pig Production  
Project Description: To setup a GIS database to analyse nutritional status of Thai people: 1) to investigate the distribution and frequency of protein energy malnutrition (PEM) of preschool and school children using GIS technology, 2) to study the associations between nutritional/ environmental determinants and PEM in preschool and school children.  
Duration: Sept 2004 to Aug 2006  
Investigator: Prof Michiho Kusanagi  
Co-Investigator: Dr Srisaang Kaojarern  
Sponsor: RTG-Budget Joint Research Project FY 2004  
Total Contracted Amount: Baht 324,000

Geographic Information System and Nutritional Status of Lampoon Province People Thailand  
Project Description: To set up a GIS database to analyse nutritional status of Thai people: 1) to investigate the distribution and frequency of protein energy malnutrition (PEM) of preschool and school children using GIS technology, 2) to study the associations between nutritional/ environmental determinants and PEM in preschool and school children.  
Duration: September 2004 to October 2006  
Investigator: Dr Honda Kiyoshi  
Sponsor: JICA  
Total Contracted Amount: Baht 600,000

Human Network Project  
Project Description: Geoinformatics Center has trained more than 300 personnel, most of them belonged to various agencies of the Asian region since its inception in 1995. It was found that many of the trainees have moved from their original agencies to other agencies, while some of them have excelled to become leaders or experts. This project is aimed at re-establishing the link with the past trainees in order to promote JAXA and AIT activities in applications of space technologies in the region through them. Further, it is expected that it will help JAXA and AIT in finding new areas for applications and opportunities. During this project, 6 countries will be visited for holding 1-day seminar inviting past trainees. Their information will be compiled and posted in a website.  
Duration: January 2005 to June 2006  
Investigator: Dr Lal Samarakoon  
Sponsor: JAXA - Bangkok, Project FY 2005-2006  
Total Contracted Amount: Baht 774,810

JST Japan Science and Technology  
Project Description: This research grant was provided by the Japan Science and Technology Agency (JST). The Yasuoka Laboratory, Institute of Industrial Sciences, University of Tokyo facilitated the project for satellite data receiving and archiving. Geoinformatics Center was requested to receive, archive and distribute NOAA and MODIS data among the research centers in Japan and collect field data for validations. This research project is expected to continue for few more years.  
Duration: January 2005 to March 2006  
Investigator: Dr Lal Samarakoon  
Co-Investigator: Dr Junichi Susaki  
Sponsor: Japan Science Technology, Project FY 2005-2006  
Total Contracted Amount: Baht 2,242,270

Road Management Research  
Project Description: To set up a GIS database to analyse nutritional status of Thai people: 1) to investigate the distribution and frequency of protein energy malnutrition (PEM) of preschool and school children using GIS technology, 2) to study the associations between nutritional/ environmental determinants and PEM in preschool and school children.  
Duration: October 2006 to October 2006  
Investigator: Dr Honda Kiyoshi  
Sponsor: JICA  
Total Contracted Amount: Baht 1,111,968

Spatial Analysis of Malaria Risk to the Determination of Epidemiological Surveillance in an Endemic Region of Thailand and the Effectiveness of a New Control strategy  
Duration: October 2004 to October 2006  
Investigator: Dr Honda Kiyoshi  
Sponsor: JICA  
Total Contracted Amount: Baht 1,000,000

JAXA Mini Project (WSSD-2)  
Project Description: This project was awarded as a part of JAXA’s contribution to the Asia-Pacific region for capacity building. This project comprise of three parts Caravan Training Programs, Mini-Projects, and Workshops. Caravan Programs and Workshops are being conducted since 1997 with the help of JAXA sponsorship. Each year two countries are being selected. In 2005-06, trainings were conducted in Laos PDR and Sri Lanka and 9 Mini-Projects were supported in 6 countries. Two workshops were conducted in 2005-06 for information sharing, one as a parallel session during the Asian Conference of Remote Sensing (ACRS) and the other one at ASEAN Sub committee on Space Technology and Applications (SCOSA), both were held in Hanoi.
Remote Sensing and Geographic Information Systems Field of Study

Data and update GIS database, 3) to collect earthquake on line from Web and Email and update GIS database, 4) to publish Tsunami Sensor Information and Earthquake Information to concerted people over the Internet, 5) to carryout 3D Tsunami Simulation.

Project Investigator: Dr. Honda Kiyoshi
Sponsor: JAXA
Project FY: 2005
Total Contracted Amount: Baht 875,000

8.5 Ongoing / In Progress Grant and Sponsored Research

Asia e-learning Project Experiment by Multi-point Distant Learning Network System

Project Description: AIT have been conducting distant education pilot experiment via Superbird C since 2003 with Tsukuba University and Multimedia University. AIT's part is to provide RS & GIS contents as well as supporting fundamental experiment as Thai side counterpart. This will continue on as one of the WINS (6iga bit rate satellite) utilization program.

This project is to try to investigate about the status of health condition of school children utilizing GIS technology for their distributions. The study area is selected in Catanduanes Island in the Philippines.

Duration: Since 2003
Investigator: Prof. Michel Kusunagi
Sponsor: Japanese Space Exploration Agency JAXA

Digital Asia

Project Description: Keio University has established Digital Asia Research Center (DARC) and looking forward to establish a network in the region to collaborate with Node Agencies for data sharing. This network attempts to link all participating agencies and provide a place where they can obtain useful information for developing their own applications. During the five-year project period, attempt will be made to establish 30 Nodes in the region with high-end computer hardware and software necessary for data/information sharing over the Internet. GeoInformatics Center participates as a collaborator for developing browser software, promoting data sharing, teach/train Node Agencies and supporting the system.

Duration: April 2005 to March 2009
Investigator: Dr. Lal Samarakoon
Sponsor: Keio University, Project FY: 2005-2009
Total Contracted Amount: Baht 700,000 (Annually)

JST 2006-2007
Duration: 1 April 2006 to 31 March 2007

Project Description: The project deals with the development of network system for environment and disaster monitoring and prediction in Asia by integrating satellite observation and modeling.

Project Investigator: Dr. Lal Samarakoon
Sponsor: Japan Science and Technology Agency, Japan
Total Contracted Amount: Baht 831,750

JAXA Mini Project 2006-2007
Duration: 1 April 2006 to 1 May 2007
Project Description: In this project, the very advanced sensor data obtained from ALOS are used to carry out activities on calibration / validation in various application areas. This is done in collaboration with experts from EROC and JAXA.

Project Investigator: Dr. Lal Samarakoon
Sponsors: Japan Aerospace Exploration Agency, Japan
Total Contracted Amount: B12,308,800

Strengthening Capacity on multi-Hazard Risk Assessment in Tsunami

Project Investigator: Dr. Lal Samarakoon
Sponsors: USAID
Total Contracted Amount: Baht 3,604,702

Water Storage Development Planning for Flood Water Retention for Dry Season Requirements in Chi River Basin

Project Description: Northeast Thailand has always been subjected to floods and droughts problem and the problems are getting more severe with increasing water demands, land use change, deforestation, etc. The Chi river basin is one main river basin of this region that suffers flood during rainy season and drought during dry season. This research proposal aims to develop a methodology to alleviate the floods and droughts problems of the Chi river basin. A water budget model for the basin will be developed to find the water availability and demand. The scarcity of the water during the drought is the main issue that will be addressed by finding the locations for the rainwater harvesting structures using the digital terrain model and the remote sensing data. Planning the water retention structures will be modeled by integrating hydrologic model, hydraulic model, remote sensing and GIS and hierarchy optimization techniques.

Duration: October 2005 to October 2006
Remote Sensing Images Analysis around the Mesopotamia Marsh
Project Description: To carry out image processing, data analysis and preparation of a GIS database of remote sensing image around the Mesopotamia marsh.
Duration: January 2004 to June 2007
Investigator: Dr Honda Kiyoshi
Sponsor: Digital Service International Co, Ltd (DSI)
Total Contracted Amount: Baht 1,092,530

8.6 Publications

Refereed Journals


Yongping, Y, Chen, X, Jingnan, Y and Jie, D, “Urban construction land area demand prediction based on dynamic adaptive fuzzy neural networks” journal of Wuhan University, 2006 (accepted)

Refereed Books/Chapters


Conference Proceedings


Prathumchai, P and Samarakoon, L, “Application of Remote Sensing and GIS for Flood Vulnerability Area and Mitigation Planning in Munsigianj District of Bangladesh”, Proceedings of the International Conference on
Remote Sensing and Geographic Information Systems Field of Study

**Other Publications**


**8.7 Doctoral Students' Dissertation**

- **CROP SUBSTITUTION MODELING USING REMOTE SENSING AND GIS** by Subat Dananggoon
  Supervisor: Dr Nitin Kumar Tipathi

- **DEVELOPMENT OF A NEW APPROACH FOR IMPLEMENTING THE POSITIONAL ERROR MODEL USING MKWAKI WEIGHTED AVERAGE** by Chanin Tinnachote
  Supervisor: Dr Xiaoyong Chen

- **FUSION OF SPATIO-TEMPORAL REMOTELY SENSED EVAP TRANSPERSION BY DATA ASSIMILATION FOR IRRIGATION PERFORMANCE** by Yann H. Chemin
  Supervisor: Dr Kyoshi Honda

- **APPLICATION OF GIS & RS FOR FLOOD DISASTER RISK ASSESSMENT IN HEI LONG JIANG PROVINCE, CHINA** by Wang Lanzhong
  Supervisor: Dr Manzul Kumar Hazarika

- **THE APPLICATION OF MATHEMATICAL MORPHOLOGY IN GIS DATA INTERPOLATION PROCESSING** by Zhang Hongwen
  Supervisor: Dr Xiaoyong Chen

- **A COMPARISON BETWEEN REMOTE SENSING DATA AND METEOROLOGICAL DATA: A CASE STUDY OF EVAPOTRANSPIRATION OF JASMINE RICE IN NORTH-EAST OF THAILAND** by Tran Tung Kien
  Supervisor: Dr Xiaoyong Chen

- **EXPLORING GEOSPATIAL FACTORS CONTRIBUTING TO MALARIA INCIDENCE IN KANCHANABURI PROVINCE, THAILAND** by Phaisam J exofo
  Supervisor: Dr Nitin Kumar Tipathi

- **FOREST LAND COVER CHANGES DETECTION AND MAPPING AFORESTATION SUITABILITY IN SONG NAI RIVER BASIN OF VIETNAM** by Le Ngoc Lam
  Supervisor: Dr Nitin Kumar Tipathi

- **GIS BASED TELEPHONE OUTSIDE PLANT INFORMATION SYSTEM FOR SERVICE AND MANAGEMENT** by Le Van Thuan
  Supervisor: Dr Nitin Kumar Tipathi

- **GEOPHYSIOLOGY OF HIGHLY PATHOGENIC AVIAN INFLUENZA USING REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM** by JothigaheShanthmugaandaram
  Supervisor: Dr Nitin Kumar Tipathi

- **ZIP-ROMAL DATABASE DESIGN FOR CITPHONES NETWORK** by To Anh Hue
  Supervisor: Dr Xiaoyong Chen

- **AN INTEGRATED GIS AND REMOTE SENSING APPROACH FOR MONITORING URBAN GROWTH PATTERNS IN PATHUMTHANI, THAILAND** by Arthit Limpiyakorn
  Supervisor: Dr Nitin Kumar Tipathi

- **LAND COVER CHANGE AND SOIL EROSION IN TONLE SAP WATERSHED, CAMBODIA USING REMOTE SENSING AND GIS** by Kyaw Zaya Htun
  Supervisor: Dr Lai Samarakoon

- **MINERAL POTENTIAL MAPPING OF GOLD IN LOEI PROVINCE, NORTH EASTERN PART OF THAILAND USING GIS, REMOTE SENSING AND GEOPHYSICAL DATA** by Rittick Borah
  Supervisor: Dr Junichi Susaki

- **MODELING THE CHANGES OF SAL (SHOREA ROBUSTA) FORESTRY USING REMOTE SENSING DATA AND GIS: A CASE STUDY OF DHAKA FORESTDIVISION, BANGLADESH** by Md. Ali Haider Khan
  Supervisor: Dr Xiaoyong Chen

- **EVAPOTRANSPIRATION DATA ASSIMILATION IN SWAP: COMPARISON OF FIELD DATA AND REMOTE SENSING DATA** by Kamal Thapa
ONBOARD WEIGHT-IN-MOTION MEASUREMENT SYSTEM
by Jiang Fenghuan
Supervisor: Dr Xiaoyong Chen

PROBABILITY DISTRIBUTION OF CROPPING FACTORS IN THE RS-SWAP-GA DATA ASSIMILATION TECHNIQUE
by Rushikesh Prakashrao Kulkami
Supervisor: Dr Kiyoshi Honda

SPATIAL DIRECTION RELATION MODELS BETWEEN SPATIAL OBJECTS IN 2D GIS
by Lin Hai
Supervisor: Dr Xiaoyong Chen

SPATIAL DYNAMIC MODELING OF URBAN AREAS: A CASE STUDY OF THIMPHU, BHUTAN
by Yeshi Dorji
Supervisor: Dr Xiaoyong Chen

STUDY OF SPATIAL DISTRIBUTION OF DISASTER LOGISTICS BY GIS: CASE STUDY BANDA ACEH, INDONESIA
by Ko Ko Lat
Supervisor: Dr Junichi Susaki/Dr Shinya Hanaoka

3D MODELING FOR GENERATION OF VIRTUAL CAMPUS
by Fang Cao
Supervisor: Dr Xiaoyong Chen

WEB AND MOBILE GIS FOR TELEPHONE FAULT MANAGEMENT: A CASE STUDY OF HO CHI MINH CITY POST AND TELECOMMUNICATIONS
by Nguyen Cao Van
Supervisor: Dr Kiyoshi Honda

WETLAND LAND-COVER CLASSIFICATION USING LINEAR SPECTRAL MIXTURE ANALYSIS OF LANDSAT IMAGERY IN THE HAN RIVER ESTUARY, KOREA
by Lee MH Jung
Supervisor: Dr Xiaoyong Chen
Chapter 9: SET - STRUCTURAL ENGINEERING
FIELD OF STUDY

9.1 Introduction

Structural engineering has always been seen as one of the few fields of study where one can combine real technical skills with artistic flair. Structural engineers are known to be people who enjoy innovation, opportunities, responsibility and excitement, whilst working within a creative profession. Structural engineers plan and design various structures such as buildings, bridges, sport stadiums, towers, and underground structures.

The built environment which is designed and constructed by structural engineers has an enormous impact on our everyday lives. In order to design and construct safe and economic structures, they need to keep abreast with the latest methods of structural analysis, modeling concepts for computation, advanced design, material technology, and improved knowledge in structural loadings.

The field educates professionals who will be at the forefront of advanced research in Structural Engineering. They are trained to respond creatively to the industrial requirements of infrastructure development.

9.2 Faculty and Research Staff

Full-time Faculty

WORSAK KANOK-KULKULCHAI, PhD, Univ of California (Berkeley), USA; MEng, AIT, Thailand; BEng, Chulalongkorn Univ, Thailand.
Professor [Computational Mechanics; Finite Element Methods; Tall Building Static and Seismic Analysis; Bridge Engineering; Microcomputer Software for Structural Engineering; Genetic Algorithms; Nonlinear Analysis of Structures and Continua; Plate/Shell Structures; Engineering Education; Nanomechanics]

PICHAI NIMITYONGSKUL, DEng, MEng, AIT, Thailand; BEng, Chulalongkorn Univ, Thailand.
Associate Professor [Concrete Engineering; Building Design; Construction Materials; Prestressed Concrete Structures; Plate Structures; Advanced Reinforced Concrete; Advanced Concrete Technology; Materials and Products for Construction; Experimental Methods in Structural Engineering]

PENNUNG WARNITCHAI, DEng, MEng, University of Tokyo, Japan; BEng, Chulalongkorn Univ, Thailand.
Associate Professor [Structural Dynamics; Earthquake Engineering; Wind Effects of Structures; Bridge Engineering and Control of Structural Vibration]

EMERITUS PROFESSOR

PISIDHI KARASUDHI, PhD, Northwestern Univ., USA; MEng, AIT, Thailand; BEng, Chulalongkorn Univ, Thailand. [Solid Mechanics]

Visiting Faculty

YOSHITAKA KATO, DEng, MEng, BEng, University of Tokyo, Japan.
Visiting Assistant Professor [Concrete material and maintenance management, specifically in maintenance management of concrete structures based on risk evaluation, evaluating environmental impacts on concrete structures; estimating concrete quality of existing structures using multiple NDT(Non-Destructive Test) and modeling of diffusion of substances in concrete]

Adjunct/Affiliated Faculty

THANAKORN PHEERAPHAN, PhD and MSc, Massachusetts Institute of Technology, USA, BSc., Virginia Military Institute, USA.
Adjunct Assistant Professor [Concrete Technology; Structural Analysis; Engineering Materials; Composite Materials; Advanced Concrete Technology; Mechanics of Materials]

RAKITPONG SAHAMITMONGKOL, DEng, MEng, University of Tokyo, Japan; BEng, Sirindhorn International Institute of Technology, Thailand.
Adjunct Instructor [Cracking Resistance of Expansive Concrete; Chemically Prestressed Concrete; Inspection on Concrete Structures & Performance Based Design; Non-Destructive Testings for Concrete Structures; Tension Stiffening Effect and Bonding Characteristic of Reinforced Concrete]

PRUETTHA NANAKORN, DEng, University of Tokyo, Japan; MEng, AIT, Thailand; BEng, Chulalongkorn Univ, Thailand.
Adjunct Faculty [Computational Mechanics; Finite Element Analysis; Meshless Methods; Structural Optimization]

NAVEED ANWAR, DEng, MEng, AIT, Pakistan.
Affiliated Faculty [Structural Analysis and Design; Computational Mechanics; Computer Application; Bridge]
9.3 Completed Grant and Sponsored Research

Natural Rubber Composites for Railway Sleepers: A Feasibility Study

**Project Description:** In this proposal, different natural rubber composites will be studied with the aim to be utilized as railway sleepers. Natural rubber is proposed as the primary raw material because Thailand is currently the largest producer of rubber in the world. If the project finds a successful composite of natural rubber that fits for railway sleepers, the country will benefit from being able to exploit the large stock of natural rubber she over-produces every year. This in turn will stabilize the market price of natural rubber. Prototype railway sleepers will be made from different composites of natural rubber, and will be tested based on the functional requirements of railway sleepers in cooperation with the State Railway of Thailand. As railway tracks can be installed by regular spikes as in the case of wooden sleepers, Thailand will not need to import special fasteners. In addition, once the technology is well proven, Thailand can export this technology oversea.

**Duration:** 16 May 2003 to December 2006

Investigator: Prof. Worsak Kanok-Nukulchai
Collaborators: Dr. Pennung Warnitchai, Dr. Noppadon Phienwej
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 996,000

Seismic Behavior of Steel Beam-Column Connection with Knee Brace (Knee Braced Frame)

**Project Description:** The research proposed herein will involve an experimental study of a new structural system to resist seismic forces called moment frames with knee brace. The research work involves a quasi-static testing and numerical simulations of the frame assemblies.

**Duration:** Nov 2005 to Nov 2006

Investigator: Dr. Penngarn Wamitchai
Collaborators: Dr. Subt. Leelateawit, King Mongkut's Univ. of Technology, Thonburi
Dr. Amon Wongkaew, Burapha University, Chonburi
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 996,000

Seismic Hazard Assessment and Mitigation of Seismic Risk in Thailand (Phase 1): Sub-Projects 3 and 4

**Project Description:** In Sub-project 3, ambient vibrations of fifty (50) buildings with height varying from 20 to 210 meters and number of stories from 5 to 54 were measured, and several key dynamic properties of the buildings were identified. These key dynamic properties are: natural periods, vibration mode shapes, and critical damping ratios. Approximate empirical relations between natural periods and building height were derived by regression analyses. Finite-element models of six (6) selected buildings were formulated, and their dynamic properties were derived from the models and compared with those obtained from the ambient vibration measurements. A reasonably fair agreement was obtained. The Sub-project 4 focused on the evaluation of actual seismic capacity of typical reinforced concrete (RC) buildings in Bangkok, most of which were designed and constructed without any consideration on seismic loading. The research works were divided into two main parts: (1) seismic performance of critical RC components and (2) seismic capacity of the whole building structures. In the first part, seven RC column specimens, four beam-column sub-assemblies, and one post-tensioned flat slab-column connection were tested under quasi-static cyclic loading to study their seismic behavior. In the second part, the seismic capacity of the whole building structures was determined by a non-linear pushover analysis procedure following the guidelines of the ATC-40 and FEMA-273 documents. Six existing buildings were selected to represent typical RC buildings in Bangkok. Many measures to improve the seismic performance of buildings were also investigated. Among these, seismic detailing of some critical members and adding shear walls were found to be very effective measures.

**Duration:** 1 Sept 2002 - 31 Dec 2006

Investigator: Prof. Worsak Kanok-Nukulchai
Sponsor: Royal Thai Government (RTG) Joint Research Fund
Total Contracted Amount: B 996,000.00

Chemical Modification of Natural Rubber Composites for Structural Application

**Project Description:** Natural rubber (NR) is naturally soft and highly deformable at room temperature. After crosslinking (or vulcanization), rubber becomes more elastic but still possesses low compressive modulus. From our previous investigation, mechanical properties of NR were significantly enhanced by increasing crosslinking density of NR vulcanizes, and by adjusting types and amounts of reinforcing fillers. It was found that by increasing crosslinking density of NR vulcanizes, the rubber product becomes more stiff and elastic, whereas, by adjusting the type and amount of reinforcing fillers at low to moderate crosslinking density, the stiffness of the rubber is still low crosslinking density demands expensive chemicals and a large amount of reinforcing fillers to achieve desirable properties.

**Duration:** 30 Sept 2004 - 31 Dec 2006

Investigator: Prof. Worsak Kanok-Nukulchai
Sponsor: Royal Thai Government (RTG) Joint Research Fund
Total Contracted Amount: B 996,000.00

9.4 Ongoing / In Progress Grant and Sponsored Research

Reconstruction and Development in the Tsunami Hit Phangnga Province

**Project Description:** The project aims to contribute to the sustainable rehabilitation and development after the tsunami destruction in Thailand by designing, applying, evaluating and disseminating appropriate innovative technologies for energy-efficient housing and water management.

**Investigator:** Mr. Bernard Levebre
**Duration:** 1 Dec 2005 to 31 Dec 2008

Investigator: Dr. Phichai Nimityongskul
Sponsor: NTRB
Total Contracted Amount: Baht 3,021,700

Testing of Structural Integrity of Concrete Structure for Hopewell Column (Hopewell 2005)

**Project Description:** To study the structural integrity of Hopewell’s column and to observe and identify the extent of deterioration or damage of concrete structure and to determine the strength of concrete by using either non-destructive test for North Bound Train System in a Bangkok (Bang sue-Rangsit) and Bang Sue Train Station. This project aims to contribute to the sustainable rehabilitation and development after the tsunami destruction in Thailand. 

**Investigator:** Dr. Phichai Nimityongskul and Dr. Sun Sayamipuk
**Duration:** August 2005 to March 2007

Investigator: Mr. Bernard Levebre
Sponsor: NTRB
Total Contracted Amount: Baht 3,000,000

Mix Design of RCC for Nam Ngum 3 Dam

**Project Description:** Mix design of Roller Compacted Concrete (RCC) for Nam Ngum 3 Dam

**Investigator:** Dr. Phichai Nimityongskul and Dr. Sun Sayamipuk
**Duration:** Nov-06 to Sept-07

Sponsors: MDX Lao Co., Ltd.
Total Contracted Amount: (Baht) 395,328

Load Test for the Second Mekong International Bridge

**Project Description:** The second Mekong International Bridge is constructed completely in September 2006 by SVSK J V. The "SVSK J V" requested AIT...
thought SIE to carry out the load test of the bridge on the site. This is to ensure that the main bridge has been constructed in a manner that its loading capacity conforms to the design loads and the specification.

**Development of Energy Code**

**Investigator:** Dr. Pichai Nimityongskul

**Duration:** Nov-06 to Sept-07

**Investigator:** Dr. Pichai Nimityongskul and Dr. Sun Sayamjuk

**Sponsor:** Sumitomo Mitsui-Vichitbhan-Siam Syntech-Krung Thon J V (SVSK JV)

**Total Contracted Amount:** B 962,000.00

**Finite Element Modeling of Tsunami Propagation on the Coast of Thailand**

**Project Description:** On December 26, 2004, coastal regions of the Indian Ocean were devastated by large tsunami initiated by a large earthquake in the ocean near Indonesia’s province of Aceh. Much of tragic loss of lives and injuries could have been prevented if there were early warning systems in those countries surrounding the Indian Ocean, including Thailand. In order to set up a reliable warning system in Thailand, it is necessary to have good wave sensors in the ocean to detect potential tsunami, as well as good mathematical and numerical tools to predict behavior of tsunami. This study aims to establish a finite element model for simulating tsunami propagation on the coast of Thailand. The obtained model can be used in conjunction with wave sensors to form a tsunami warning system. The obtained software application will encourage Thailand to rely on its own strength in tsunami disaster prevention and mitigation.

**Duration:** 1 Nov 2005 to 31 Oct 2007

**Investigator:** Prof. Worsak Kanok-Nukulchai

**Sponsor:** Royal Thai Government (RIG) Joint Research Fund

**Total Contracted Amount (Baht):** 875,000

**Investigation of Structural Integrity of Eua Arthom Housing**

**Project Description:** AIT conduct an inspection to investigate the structural integrity of Eua Arthom Housing Authority.

To evaluate of structural integrity by comparison with standard design i.e. International organization for standard and Thai Industrial Standard Institute.

To certified and approve the construction methodologies.

To certified and approve the construction materials. Especially, the materials are used as joint of elements. The material testing is operated by the structural engineering laboratory of AIT, which is concerned strength of materials, durability and safety of structures.

**Duration:** 10 May 2004 to 31 Dec 2007

**Investigator:** Prof. Dr. Raktipong Sahamitmongkol

**Sponsor:** National Housing Authority

**Total Contracted Amount (Baht):** 3,750,000

**Adjustment to the Building Energy Code**

**Project Description:** Development of Energy Development and Promotion (DEDP) is implementing a project entitled “Adjustments of the Building Energy Code” with assistance from the Danish Cooperation for Environment and Development (DANEED). The main purpose of the Project is to update the Building Codes relate to energy. The existing codes and standards relates to energy will be adjusted or updated according to the latest available knowledge. Comprehensive and valuable knowledge on energy issues related to buildings already exists in Thailand. To emphasize the sustainability of the project it is obvious to utilize this national resource.

**Duration:** 27 June 2002 - 30 June 2008

**Investigator:** Prof. Worsak Kanok-Nukulchai

**Sponsor:** Danish Energy Management A/S

**Total Contracted Amount (Baht):** 14,040,000

**9.6 Publications**

**Refereed Journals**


**Conference Proceedings**


Sancharoen P., Kato Y., Uomoto T., "Life cycle repairing cost of RC structure
Structural Engineering Field of Study


Refereed Books/Chapters


9.7 Doctoral Students' Dissertation

Utilization of Vetiver Grass as Construction Materials.
Student: Thammanoon Hengsadeekul
Supervisor: Dr. Pichai Nimityongskul

Approximate Modal Decomposition of Inelastic Dynamic Responses of Wall Buildings.
Student: Chatan Sangarayakul
Supervisor: Dr. Pennung Warnitchai

Applications of Moving Kriging Interpolation for Element-Free Galerkin Method.
Student: Pathana Nongchon
Supervisor: Prof. Worak Kanok-Nukulchai

9.8 Masters Students' Theses

Title: Seismic Behavior of Steel Beam-Column Connections with Knee Brace.
Student: Siriluck Boonpao
Supervisor: Dr. Pennung Warnitchai

Title: Appropriate Technology Development of Aerated Lightweight Mortars using Pulverized Fly Ash and Bottom Ash.
Student: Andrian Gunawan
Supervisor: Dr. Pichai Nimityongskul

Title: Influence of Mix Proportion and Cover Depth on Dielectric Constant and Ultrasonic Wave Velocity of Concrete.
Student: Sharda Hoque
Supervisor: Dr. Yoshitaka Kato

Title: An Adaptive Mesh Generation for Kriging Element-Free Galerkin Method Based on Delaunay Triangulation.
Student: Zeeshan Masood
Supervisor: Prof. Worak Kanok-Nukulchai

Title: Effect of Mineral Admixture and Chloride Ion Content on the Quality of Concrete Evaluated by Non-Destructive Test.
Student: Laiza Amin Midde
Supervisor: Dr. Yoshitaka Kato

Title: Development of Fiber Reinforced Polymer Composite Tubs and Its Application to Bridge Decks.
Student: Subash Paudel
Supervisor: Dr. Pichai Nimityongskul

Title: Development of a Deformational Adaptive Mesh Generation Based on Kriging Interpolation.
Student: Danny Probyo
Supervisor: Prof. Worak Kanok-Nukulchai

Title: Three Dimensional Finite Element Model of Unconfined Rubber within a Concrete Structure.
Student: Pitch Roongsattham
Supervisor: Prof. Worak Kanok-Nukulchai
Supervisor: Dr. Sunil Munasinghe

Title: Seismic Performance of Concrete Framed Buildings with Soft and Weak Story in Low to Moderate Seismic Regions.
Student: Nooma Shrestha
Supervisor: Dr. Pennung Warnitchai

Student: Tanun Singlumpong
Supervisor: Dr. Pennung Warnitchai

Title: Explosive Testing of a Ferrocement Bomb Basket.
Student: Pitit Ruttanapornakul
Supervisor: Dr. Pichai Nimityongskul

Title: Chloride Permeability of Mortar Containing Metakaolin.
Student: Anit Si-Irannant
Supervisor: Dr. Pichai Nimityongskul

Title: Development of Rapid Testing of Iron Sulfide Inclusion in Aggregate.
Student: Prot Surawattananan
Supervisor: Dr. Pichai Nimityongskul

Title: Bleeding and Abrasion Resistance of Mortars Containing Different Pozzolans.
Student: Pattara Tongprakob
Supervisor: Dr. Pichai Nimityongskul

Title: Dynamic Analysis using Kriging-based Finite Element Methods.
Student: Citra Wicaksana
Supervisor: Prof. Worak Kanok-Nukulchai

Title: Investigation of an Isoparametric Element Based on Kriging Shape Functions.
Student: Sitla Windy
Supervisor: Prof. Worak Kanok-Nukulchai

Title: Global Flexibility Index Evaluation of a Steel Bridge Model under Accelerated Damages.
Student: Chalempol Wongkiattikun
Supervisor: Prof. Worak Kanok-Nukulchai

Title: Seismic Performance of Bonded Post-Tensioned Interior Flat Slab-Column Connections with Drop Panel.
Student: Chondro Hidayat Tandian
Supervisor: Dr. Pennung Warnitchai
Chapter 10: SET – TELECOMMUNICATIONS

FIELD OF STUDY

10.1 Introduction

The Telecommunications program offers areas of specialization in transmission systems; switching systems; telematics; network planning, and in collaboration with the School of Management, telecommunications management.

The courses offered emphasize modern telecommunications skills in systems planning and engineering, telecommunications software development, and administrative and financial aspects of telecommunications management.

Graduates from the master’s program form the nucleus for effective high-level technical planning and management operations at their employer organizations. Some of the graduates are engaged in planning, development, and service activities leading to the installation, commissioning, management, design etc. of value-added systems. Given the important role of our graduates in the development of the telecommunications sector, the learning is of significant benefit to the users of telecommunications services within the region.

Graduates of the doctoral program play key roles in enhancing the level of education and research in the national universities of the region, and promote and strengthen the R&D potential of emerging regional manufacturing industries.

Research covers a wide variety of topics at the cutting edge of research and development. Specific issues addressed in the broad fields of transmission and switching systems are, for example, coherent optical communications, multiple-access strategies for cellular-mobile and cabled networks, as well as questions of congestion control and new services in ISDN and future B-ISDN networks.

10.2 Research Facilities and Laboratories

Today’s fast-booming world of Telecommunications and Computer networking plays a significant leadership role. To support this achievement the Telecommunications field of study puts the effort to continue the development of Telecommunications technologies and systems. It covers a wide variety of research in telecommunications ranging from modeling, analysis wire line and wireless systems to application and protocol development.

Its research subjects are in coherent optical communications; congestion control, ATM, and B-ISDN networks; error correction and detection methods; mobile and Internet traffic studies; multiple-access strategies for cellular-mobile, satellite systems, and cable networks; network performance analysis; planning and design; and speech processing. Its research specialisations are in broadband systems; network planning; switching systems; telecommunications management in collaboration with the School of Management; telematics; and transmission systems.

Transmission and Switching Lab (TSL)

The Transmission and Switching lab is equipped with Nokia Digital Switching Exchange DX200 (DX220, DX210) that supports PSTN and ISDN. There are also several telephone switches, traffic simulators, protocol analyzer, PDH/SDH (STM1 & STM4) transmission systems, fiber optic line equipment, transmission line analyzer, error rate meter which are available for experiment in switching, transmission and internetworking. The switching and transmission systems are integrated as real telecommunications network. Among the applications whose study has been made possible by these systems are Operation and Maintenance, performance measurements of real narrowband and broadband telecommunication networks, as well as new services.

Network Planning Lab (NPL)

High performance computer aided network planning tools are supported by several workstations at the Network Planning lab. This lab provides hands-on experience design and optimization in radio network, fixed network and fiber optical network.

Wireless Lab (WL)

The main purpose of the Wireless laboratory is for measurement and performance analysis. It is equipped with Modulation and Error rate measurement meters, Simulation software like SATSIM, which was developed by the students, is a simulation package to calculate the subsatellite points of a LEO/ MEO/GEO and its orbital parameters. It also displays graphically on a two-dimensional earth map the instantaneous position and path traced by the satellite (Multi orbit and Multi satellite). Another is NMS/X, is a measurement system for GSM, DCS and NMT networks tracing, capable of measuring up to four networks simultaneously. The results are used for benchmarking service quality of operational cellular networks. These results can be analyzed and can be used for tuning the network parameters in NPS/X.
Communications Labs (CL)

The Communications lab is used to perform experiments courses under Signal and Systems, Communications Electronics, Digital Transmission Technology and Digital Signal Processing. Test bench equipment includes analog and digital oscilloscopes, function generators, analog and digital spectrum analyzers, digital sampling oscilloscopes and DSP cards and workstations which have simulation applications like MATLAB.

Computer Laboratory (PCL)

There are two Computer Laboratories in Telecommunications Program. One is for Senior students and one is for Junior Students. All computers are latest powerful computers.

TC Library

In Telecommunications Program, there is a small library, from where students can borrow telecommunication related journals, manuals and reference books.

10.3 Faculty and Research Staff

Full-time Faculty

KAZI MOHIUDDIN AHMED, MSc., Inst of Communications, Leningrad, USSR; PhD, Univ of Newcastle, Australia. Professor (Telecommunication Networks; Digital Modulation Techniques; Satellite Communications; Cellular Mobile Communications; Digital Transmission and Communications) [Wireless Systems and Networks; Disaster Warning and Post-disaster Communications; Applications of ICT in Sustainable Development; Propagation and Channel Modeling in Mobile Communications; Multiple Access Techniques & Protocols; Satellite Communications; Antenna Array Processing; Signal Processing]

R M A P RAJ ATHEVA, BSc., Moratuwa Univ, Sri Lanka; MSc, PhD, Univ of Manitoba, Canada. Associate Professor (Equalization Algorithms for Frequency Selective Channels) [Digital and Mobile Communications, Space Time Processing - MIMO Performance analysis, OFDM and Multicarrier Techniques, Multiuser Detection, Application of Channel Coding for Distributed Source/Video Coding, Architectures for Emergency Communication Systems, Security Issues]

TEERAPAT SANGUANKOTCHAKORN, BEng, Chulalongkorn Univ, Thailand; MEng, DEng, Tokyo Institute of Technology, Japan. Associate Professor (Data Communications; Broadband Integrated Services Digital Networks; Multimedia Communications and Systems; Network Quality of Service) [Digital Signal Processing, especially Image Compression for Moving and Still Image, the routing algorithm in the network such as IP and MPLS network, High Speed Network, IP-based multimedia applications; QoS provisioning in Networks]

POOMPAT SAENGUDOMLERT, BSE, Princeton Univ; MS, PhD, Massachusetts Inst of Tech, USA. Assistant Professor [Communication theory, optical networks, resource allocation problems, and array processing; Recent research activities have focused on optical network designs based on existing infrastructure networks and communications for disaster management]

Visiting Faculty

A B SHARMA, BSc, Univ of Newcastle-upon Tyne, UK; LicTech, DTech, Helsinki Univ of Tech, Finland. Visiting Professor (Fiber-Optic Systems; Digital Transmission Technologies; Signals and Systems; Modulation Techniques; Coding Theory) [High-speed all-optical networks (WDMA, TDMA, CDMA); Optical WDM local access using spectrally sliced ASE; Radio-over-fiber for future broadband cellular systems]

TAPIO JERKE, MSc, Helsinki Univ of Tech, Finland. Visiting Associate Professor [Traffic measurements, modeling, and performance in various telecommunication networks, PSTN, Cellular, Internet, ATM, and optical networks; Resource allocation for different services, network dimensioning and optimization, and switching structures]

Research Staff

MIKKO KOVALAINEN, PhD Visiting Senior Researcher [Knowledge management, Project management, HighTech management, Software business, Technology strategies]

10.4 Completed Grant and Sponsored Research

Algorithm and System Design of Signal Processing on Quantum Cryptography System: Simulations

Project Description: Experimental results and implementation of quantum key distribution (QKD) system which employs four polarization states encoding key bits in two non-orthogonal bases were reported. The transmitter uses four diode lasers with...
Telecommunications Field of Study

emission wavelength of 830 nm at 1 MHz repetition rate as weak coherent sources and passive optical components to assign individual photon polarization. The receiver comprises similarly passive optical components to analyze the polarization of arriving photons, and four silicon avalanche photodiodes operated in Geiger mode to detect single photons, and to optically synchronize the system. In a demonstration experiment the QKD system enabled to generate shifted-key about 5000 bit/s, at an average of about 0.06 photons per pulse at clock rates of 1 MHz. An average quantum bit error rate (QBER) was about 6.5 % for a 6.5 m free space transmission test range.

Duration: 15 Sept 2004 to 31 March 2006

Investigator: Dr Teerapat L.W. Chen,

Referred Journals

Total Contracted Amount: B 810,000.00

5.0 Publications

Refereed Journals


Conference Proceedings


10.6 Doctoral Students’ Dissertation

Mesh Based Coding of Low-Bit Rate Video Sequences
By: Preecha Kochanen
Supervisor: Prof. Kazi M. Ahmed

Analysis and Modeling of Voice over IP Traffic in Real Network
By: Padungkit Pragtong
Supervisors: Prof. Kazi M. Ahmed/Assoc. Prof. Tapio J. Erke

Embedded Image Compression Using High-Order Context Modeling for Wavelet Difference Reduction
By: Poonlap Lamsrichan
Supervisor: Dr. Teerapat Sanguankotchakom

10.7 Masters Students’ Theses and Research Studies

Research Study:
Security of VOIP Network in MPLS Supported DiffServ Environment
By: Souvik Basu
Supervisor: Prof. Kazi Mohiudin Ahmed

Research Study:
By: Thai Thanh Binh
Supervisor: Assoc. Prof. Tapio J. Erke

Research Study:
A Robust MIMO System using RCMC CDMA in a Frequency Selective Rayleigh Fading Channel
By: Sampurna Chakraborty
Supervisor: Prof. Kazi Mohiudin Ahmed

Research Study:
Performance of Cooperative Uplink MC-CDMA System Employing V-Blast in a Rich Scattering Wireless Channel
By: Surachai Cheioechan
Supervisor: Dr. R.M.A.P. Rajatheva

Research Study:
MLPP Traffic Measurement in a Metropolitan Area Network: A Case Study of Hochiminh City, Vietnam
By: Huynh Thanh Hoa
Supervisor: Assoc. Prof. Tapio J. Erke

Research Study:
Upstream Dynamic Bandwidth Allocation Algorithm for Different Service Classes in Ethernet Passive Optical Networks
By: Ronuechaj amfoong
Supervisor: Dr. Poompat Saengudomlert

Research Study:
Performance Evaluation of Wireless Multi Hop MAC Protocol for Disaster Management
By: Sehrish Khan
Supervisor: Dr. Poompat Saengudomlert

Research Study:
Optimal Provisioning of Light-Traffic for Optical Storage Area Networks
By: Phay Tiet Luin
Supervisor: Dr. Poompat Saengudomlert

Research Study:
CDMA2000-1X System Performance Improvement: A Case Study of EVNT’s Mobile System, Vietnam
By: Ngo Binh Minh
Supervisor: Prof. Kazi Mohiudin Ahmed

Research Study:
Resource Allocation for Wideband, Instantaneous Request and Overflow Calls
By: Saw Su Myat
Supervisor: Assoc. Prof. Tapio J. Erke

Research Study:
Performance Analysis of MIMO-OFDM Multiband UWB Systems in a Lognormal Fading Channel
By: Vien Hoai Nam
Supervisor: Dr. R.M.A.P. Rajatheva

Research Study:
Energy-efficient Hierarchical LEACH-based Multi-hop Routing for Wireless Sensor Networks
By: Maung Maung Phyoo
Supervisor: Dr. Poompat Saengudomlert

Research Study:
Performance Evaluation of the UWB-MIMO System with STC over IEEE Channel Model
By: Utsala Pradhan
Supervisor: Prof. Kazi Mohiudin Ahmed

High Speed Uplink Packet Access (HSUPA) Capacity Analysis for Universal Mobile Telecommunications System (UMTS)
By: Nura Lal Pradhan
Supervisor: Prof. Kazi Mohiudin Ahmed

Realistic Channel Model for Capacity Analysis of Multi-user MIMO System
By: Sivasothy Senthuran
Supervisor: Dr. R.M.A.P. Rajatheva

Multimode Source Modeling and its Implementation in GSM/GPRS Network
By: Chalgy Shova Shaky
Supervisor: Assoc. Prof. Tapio J. Erke

Research Study:
Code Acquisition in Optical CDMA Systems using a Novel Two-level Search Algorithm
By: Md. Sohel Mahmud Sher
Supervisor: Dr. Poompat Saengudomlert

Sub-Optimal Chip-level Equalizer Combined with Parallel Interference Canceller for MIMO CDMA Downlink Channels
By: Pham Anh Tran
Supervisor: Dr. R.M.A.P. Rajatheva

Research Study:
Traffic Measurement at the Interface between a Fixed-line Network and Mobile Networks: A Case Study in Ho Chi Minh City, Vietnam
By: Huynh Tien Quoc Viet
Supervisor: Assoc. Prof. Tapio J. Erke

Multiple Transmitters for Performance Improvement of Downlink Indoor Optical Wireless Communications through Dispersive Channels
By: Supreeya Pakpinetch
Supervisor: Dr. Poompat Saengudomlert
Chapter 11: SET - TRANSPORTATION ENGINEERING
FIELD OF STUDY

11.1 Introduction

Industrialization and population growth have tremendous impacts in the movement of people and goods. Everyday, movement is hampered by congestion, insufficiency of public transport facilities, traffic accidents, and other conditions. Moreover, as manufacturing expands globally, businesses want to reduce transportation costs by limiting the number of distribution nodes. Concerns over congestion on highways, increasing pollution and hazardous materials all emphasize the need to effectively maximize transportation systems. Thus, the issue of transportation is obviously crucial, not only now but in the future.

The Transportation Engineering field exposes students to the process of alleviating transportation problems. The coursework and research in the area provide advanced knowledge in transportation planning and economics, traffic engineering and safety, and the design of highways/pavements and other transportation facilities. Transportation Engineering students acquire advanced skills concerning the planning, design, operations, maintenance, rehabilitation, performance, and evaluation of transportation systems, including their economic and public policy aspects.

The field imbibes in each student the development of analytic, problem-solving, design, and management skills suitable for public and private sector professional work.

11.2 Faculty and Research Staff

Full-time Faculty

JOHN HUGH JONES, B.S., B.Eng., University of California, USA
Emeritus Professor
(Highway Engineering, Transportation Engineering)

YORDPHOLTANABORIBOOK, PhD, Virginia Polytechnic University, MS, BS, Oklahoma State University, USA
Professor (Transportation Planning, Traffic Engineering, Public Transportation Systems) [Road safety audit, accident investigation and reconstruction, application of data mining in road safety, road user behaviors, database development, disaster management, and sustainable development]

SHINYA HANAOKA, D Info Sc, M Info Sc, BEng, Tohoku University, Japan
Assistant Professor [Transport planning and logistics; air transport, which includes evaluation of the air traffic distribution policies in multiple-airport region and the activity of low-cost carriers in Asia; transport logistics, which includes city logistics, intermodal logistics, maritime transport, air cargo and so on; Public transport market and the environmental impact of transport, such as air pollution and noise]

KUNAWEE KANITPONG, PhD, University of Wisconsin-Madison; MS, University of Maryland at College Park, USA; BS, Chulalongkorn University, Thailand
Assistant Professor [Highway pavements with emphasis on several major aspects including: highway materials and construction, pavement design and analysis, pavement management system, asphalt rheology, and asphalt concrete mixture design]

Adjunct Faculty

TAKASHI NAKATSUJI, D. Eng., M. Eng., B. Eng., Hokkaido University, Japan
Associate Professor (Traffic Engineering, Traffic Flow Simulation, Winter Maintenance, Traffic Accident Reconstruction)

PRAPANSAK BURANAPRAPA, PhD, Oklahoma State University, USA, M. Eng., SEATO Graduate School of Engineering; B. Eng., Chulalongkorn University, Thailand
Adjunct Associate Professor (Road and Pavement Design; Highway and Pavement Engineering)

Kritsda Tangkavachiranon, D.Eng., M. Eng., Asian Institute of Technology, Thailand; B. Eng. (Civil Engineering), King Mongkut's Institute of Technology Thonburi, Thailand.
Assistant Manager (TARC Project)

MoInul HoSsain, M. Eng., Asian Institute of Technology, Thailand; B.Sc. Eng. (Civil), Bangladesh University of Engineering & Technology, Dhaka, Bangladesh.
Research Associate (TARC Project)

MouyIb Bin IsIam, M. Eng., Asian Institute of Technology, Thailand; B.Sc. Eng. (Civil), Bangladesh University of
11.3 Completed Grant and Sponsored Research

Road Safety Audit Along the Chalong Rat and Burapha Withi Expressways

Project Description: This project, financed by the Expressway and Rapid Transit Authority of Thailand (ERTA), is aimed at preventing the occurrence of accidents or reducing the severity of accidents taking place along the Chalong Rat and Burapha Withi Expressways by applying the concept of road safety audit, which is a proactive tool for solving road accident problems.

Duration: 22 Aug 2005 to 30 Nov 2006
Investigator: Prof. Yordphol Tanaboriboon, Dr. Shinya Hanaoka
Sponsor: The Expressway and Rapid Transit Authority of Thailand (ERTA)
Total Contracted Amount: Baht 1,000,000

Road Safety Training

Duration: 1 June 2006 to 31 August 2006
Project Description: A training course on road safety-related topics will be provided to 14 participants from the Road Safety Network of Ho Chi Minh City, Vietnam.

Project Investigator: Dr. Shinya Hanaoka
Sponsors: Handicap International in Vietnam
Total Contracted Amount (Baht): 302,974

Fatigue and Sleep Deprivation on Driving Performance

Duration: 1 April 2006 to 30 Nov 2006
Project Investigator: Prof. Yordphol Tanaboriboon, Dr. Kunawee Kanitpong
Sponsors: Department of Land Transport, Thailand
Total Contracted Amount (Baht): 600,000

11.4 Ongoing / In Progress Grant and Sponsored Research

Logistics Management at the Intermodal Terminals

Project Description: This project aims to find and determine the requirements for logistics management and to verify an optimum solution of performance at the intermodal freight terminal. It also intends to develop a framework for evaluating the logistics performance of mode choice. The research proposes fuzziness measurements which address the real situation of human judgment with mathematical formulation. Fuzzy set theory is applied to develop a set of performance as basic indicators. Once the patterns of freight mode choice are determined, optimization model can find the optimal solution to maximize the performance indicator. Sensitivity analysis shows the changes which can influence the shift of mode choice. The results give insight in the relation with constraints of various parameters.

Duration: 1 Nov 2005 to 28 Feb 2007
Investigator: Dr. Shinya Hanaoka
Sponsor: Royal Thai Government (RIG)
Total Contracted Amount: Baht 976,000

11.5 Publications

Refereed Journals


Conference Proceedings


Canitpong, K. and Bahia, H.U., “Evaluation and Correlation of Tensile Strength Ratio (TSR) and Performance of Asphalt Pavements in Wisconsin.” The 10th International Conference on Asphalt Pavements, Quebec City, Canada, August 2006

Transportation Engineering Field of Study


Mix Permeability and Density,” WHRP 0092-02-14C, Wisconsin Highway Research Program (WHRP), Wisconsin Department of Transportation

Kanitpong, K. and Bahia, H.U., “Evaluation of the Extent of HMA Moisture Damage in Wisconsin as it Relates to Pavement Performance,” WHRP 0092-01-03, Wisconsin Highway Research Program (WHRP), Wisconsin Department of Transportation

11.6 Doctoral Students’ Dissertations

Development of the GIS-based Traffic Accident Information System Integrating Police and Medical Data: A Case Study in Khon Kaen, Thailand
By: Wichuda Kowtanapanich
Supervisor: Prof. Yordphol Tanaboriboon

Computerized Work Zone Management System: A Decision Support Tool for Work Zone Planning and Safety Design in Thailand
By: Suebpong Paialawattana
Supervisor: Prof. Yordphol Tanaboriboon

Evacuation Behavioral Analysis for Tsunami Disaster: Transportation Disaster Response
By: Thai Chamkol
Supervisor: Dr. Shinya Hanaoka

11.7 Masters Students’ Theses

Evaluation of Rheological and Creep and Recovery Properties of AC 60/70 based Hydrated Lime and SBS Polymer Modified Asphalts to Rutting and Stripping
By: Sayyaz Mahmood Qadir
Supervisor: Prof. Yordphol Tanaboriboon

Application of Satellite Imagery Map for Black Spot Identification Along the Expressway Network in Bangkok
By: Yaowarat Jantakat
Supervisor: Prof. Yordphol Tanaboriboon

The Impact of Fatigue and Sleep Deprivation on Driving Performance
By: Nantawan Tippayanee
Supervisor: Prof. Yordphol Tanaboriboon

Development of Accident Database Management System for the Highway Police in Thailand
By: Suriyan Winijmontree

Other Publications


Technical Reports


Correlation of the Resistance of HMA to Moisture Damage Measured by using Ultrasonic Test and Performance Related Test
By: Md. Abu Hena Mostofa Kamal
Supervisor: Dr. Kunnawee Kanitpong

Development of User Interface for Employee Busing Problem in Bangkok
By: R.K. Jayanth Kumar
Supervisor: Dr. Shinya Hanaoka

An Approach of Environmental Awareness for Travel Behavior Change: A Case Study of the Bangkok Bus Rapid Transit System
By: Zerenara Najam
Supervisor: Dr. Shinya Hanaoka

Impact of Traffic Flow Control Policy on Air Quality: A System Dynamic Approach
By: Mohammad Solim Ullah
Supervisor: Prof. Yordphol Tanaboriboon

Analysis of Motorcycle Accidents in Khon Kaen
By: Sukanya Havichit
Supervisor: Prof. Yordphol Tanaboriboon

Application of Satellite Imagery Map for Black Spot Identification Along the Expressway Network in Bangkok
By: Yaowarat Jantakat
Supervisor: Prof. Yordphol Tanaboriboon

The Impact of Fatigue and Sleep Deprivation on Driving Performance
By: Nantawan Tippayanee
Supervisor: Prof. Yordphol Tanaboriboon

Development of Accident Database Management System for the Highway Police in Thailand
By: Suriyan Winijmontree

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Chapter 12: SET - WATER ENGINEERING AND MANAGEMENT
FIELD OF STUDY

12.1 Introduction

Today’s major challenges for water engineers and managers include securing water for people and for food production; protecting vital ecosystems; and dealing with variability and uncertainty of water in space and time.

The Water Engineering and Management (WEM) field imparts education and training toward an understanding of the complexity of water cycle utilization and management. It offers a balanced curriculum, covering both engineering and management aspects of water resources. Students are trained to acquire knowledge and hands-on practice in tools and techniques to come up with viable and sustainable solutions within the framework of the integrated water resources management at the river basin scale.

The WEM field of study covers five focal areas: Agricultural Water, Coastal Water, Urban Water, Water Resources, and Extreme Events and Risk Management. The courses are designed in such a way that students can specialize according to their interests. Courses on Watershed Hydrology, Hydrodynamics, Water Resources Systems, and Concepts in Water Modeling provide the solid foundation to the advanced courses. The curriculum emphasizes tools and techniques in water resources planning and management.

Agricultural Water courses impart knowledge and skills necessary for the development and management of water resources for agriculture. They address various multi-disciplinary issues in the planning, design, implementation, operation and maintenance of irrigation and drainage projects and land and water conservation programs. Current researches in the area include irrigation and drainage system management, cropping systems, erosion and water quality problems, soil conservation and land-use, and watershed management.

The management and design of sound engineering works for the control and effective use of coastal zones require in-depth knowledge of hydrodynamics and the understanding of coastal zone phenomena. Coursework and research in Coastal Water cover studies of wave characteristics and their action on beaches, coastal sedimentation, estuarine hydraulics and the applied aspects of coastal zone engineering and management.

Urban Water courses relate to water supply and sanitation, storm water, and domestic wastewater and urban drainage for sustainable management of urban areas. The research in relation to urban water focuses on application of state-of-the-art theory in water demand forecasting and management, design and management of water distribution systems in urban and rural areas, real-time hydrological information systems for urban flooding and drainage.

Given the ever-growing importance of water quality, an integrated water quality-quantity approach is essential. Courses in Water Resources focus on techniques to assess the occurrence and availability of surface and groundwater. Students acquire a sound understanding of basic principles in river engineering and modeling, water resources planning, conjunctive use of surface and groundwater, integrated water resources management and social and environmental impact assessment of water resources projects. In-depth knowledge and hands-on practice on mathematical modeling of water resources systems is provided.

Flooding is a natural phenomenon and various human activities as well as climatic changes have aggravated the problem causing economic losses. Students are exposed to an understanding of the behavior of rivers, and to design appropriate structural and non-structural alternatives for the effective management of rivers and waterways. Research in the area of Extreme Events and Risk Management includes river flow analysis, and flood control and mitigation, flood modeling and forecasting, flood plain development and management.

12.2 Faculty and Research Staff

Full-time Faculty

ASHIM DASGUPTA, BEng, Gauhati Univ, India; MEng, DEng, AIT, Thailand.
Professor (Integrated Water Resources Management; Groundwater Development and management; Modeling and monitoring)

TAWATCHAI TINGSANCHALI, BEng, Chulalongkorn Univ, Thailand; MEng, DEng, AIT, Thailand.
Professor (Flood Control Engineering and Management; Flood Forecasting, Warning and Flood Disaster Management; River Engineering and Hydropower; Water Resources Project System Optimization)

MUKAND S BABEL, BEng, Rajasthan Agr Univ, India; MEng, DEng, AIT.
Associate Professor (From hydrologic and water resources modeling to integrated water resources management; particularly in watershed modeling and management; drought
analysis, forecasting and management; water resources allocation and management at river basin level; and water resources and socio-economic development; Research related to groundwater resources management and water supply system and management]

ROBERTO CLEMENTE, BSAE, Univ of the Philippines at Los Baños; MSc, AIT, Thailand; PhD, McGill Univ, Canada.

Associate Professor
[Focal areas related to irrigation/ drainage, and land and water resource assessment and management: Studies on the impacts of fertigation on water quality, modeling surface/subsurface transport of water and solutes, performance evaluation of irrigation and drainage systems, and assessment of soil erosion hazard and soil quality dynamics in agricultural watersheds; Joint research on water harvesting and management and soil hydraulic characterization in sloping agricultural lands; Future research focuses on evaluation and optimization of soil, water, chemical and crop management schemes to enhance agricultural productivity without jeopardizing environmental quality]

Visiting Faculty

HIROKAZU IKEDA, BEng, Dibrugarh Univ, India; MEng, AIT, Thailand; PhD, Univ of Tokyo, Japan.

Visiting Associate Professor

Affiliated Faculty

SUTATWEESAKUL, DEng, MEng, Asian Institute of Technology; BEng, Chulalongkorn University, Thailand.

[Numerical computation in sea and coastal area including flood propagation using developed computer programs; Application in solving urban drainage problem using both engineering and management approaches; By collaboration with Dr. Ole Mark from DHI, the on-line urban flood warning system at Sukumvit, Bangkok, Thailand providing useful information in daily life during rainy season are disseminated in http://www.wap.aia.ac.th; Improvement of hydraulic design using physical hydraulic model test in hydropower; hydropower development projects in Lao and Myanmar and improvement in design of intake, diversion tunnel, riparian outlet, energy dissipator, spillway and head pond]

12.3 Completed Grant and Sponsored Research

12th Congress of the Asia and Pacific Division of IAHR

Project Description: The Water Engineering and Management (WEM) Field of Study of the School of Engineering and Technology (SET) serve as the secretariat of the APD-IAHR and from time to time organize congresses and conferences for the Asia and Pacific Region.

Duration: 13 Nov 2000 to 30 June 2006

Investigators: Prof Ashim Das Gupta
Dr Mukand Singh Babel

Sponsor: IAHR
Investigator: Prof Ashim Das Gupta

Total Contracted Amount: Baht 2,579,383

An Assessment of Groundwater Vulnerability to Contamination and Estimation of Potential Areas Contributing Risk and Hazard to Groundwater in Chao Phraya River Basin by Numerical Modeling

Project Description: The scientific purposes of the project are to identify areas vulnerable to groundwater contamination, estimation of areas contributing risk and hazard to identified vulnerable areas. Pilot study is carried out for land and groundwater planning and management using integrated numerical modeling, characterization of the Chao Phraya Basin geological system and its effects on contamination transport.

Duration: 1 Oct 2004 to 31 March 2006

Investigator: Prof Ashim Das Gupta
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 999,000

Collaborative Research in Water Resources and Environment Modeling

Project Description: The project involves the conduct of research activities in the area of water resources and environmental modeling by AIT in collaboration with UNU. The results of the research are disseminated through seminars and workshops. The specific areas for research involve: the development of methodologies and tools for water allocation in trans-boundary river basins; analyses of links between water resources management and socio-economic changes; development of appropriate methodologies for socio-economic vulnerability assessment for urban flood disaster risk management; and study of soil erosion and sediment transport in a large river basin. Under the project, UNU, through grants, supports a number of selected graduate students' research in above areas.

Duration: 1 Sept 2004 to 31 Aug 2006

Investigators: Dr Mukand Singh Babel
Prof Ashim Das Gupta

Sponsor: United Nation University, Tokyo, Japan

Total Contracted Amount: Baht 500,000

Hydraulic Model Study of Diversion Tunnel Nam Ngum 2 Hydrotec

Project Description: The scope of the services consists of furnishing labor, equipment and materials as well as technical expertise for the physical model construction and hydraulic model tests of the diversion tunnels. The Hydraulic Model Tests will focus on study of the hydraulic conditions in the tunnel for the sub-critical and supercritical flow alternatives, study of overall diversion operation with emphasis in investigating the occurrence of waves at the surface, occurrence of air pockets and the critical transient state between both operation modes, study of tunnel inlet for free surface flow and pressure flow modes including the introduction of sill at the inlet and study of tunnel outlet under submerged operation due to backwater of Nam Ngum 1 and the variation of discharge to cover the non-submergence case.

Duration: 1 Sept 2005 to 31 Dec 2006

Investigator: Dr Sutat Weesakul
Sponsor: Team Engineering Consulting and Management Co., Ltd.

Total Contracted Amount: B 3,132,193

Review and Investigation in Flood Drainage around Suwanna Bhumi Airport

Project Description: The research project involves the study on project feasibility study, design and implementation of flood drainage in the surrounding area of the Suwanna Bhumi International Airport (Second
**Project Description:**

**Consultant:** Dr. Roberto S. Clemente

**Contribution:**
- Bachelors and Masteral Degrees levels
- Management

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### Water Quality Modeling in Tachin River

**Project Description:** To review the present management of three river basins and to propose a new management tool using mathematical models and to investigate the index for WRE.

**Duration:** J an 2006 to Dec 2006

**Investigator:** Dr Sutat Weesakul

**Sponsor:** Hydro and Agro Informatics Institute

**Total Contracted Amount:** Baht 1,120,000

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### The Study of Water Resources Management Review

**Project Description:** To review the present management of three river basins and to propose a new management tool using mathematical models and to investigate the index for WRE.

**Duration:** 1 Sept 2003 to 30 Sept 2006

**Investigators:** Prof Tawatchai Tingsanchali, Dr Noppadol Phien-jeaw

**Sponsor:** Royal Irrigation Department, Thailand

**Total Contracted Amount:** B 2,727,250

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### Water Quality Modeling in Tachin River

**Project Description:** The object of the project is to carry out real-time water quality modeling of Tachin River and to have preliminary study of modeling of non-point source pollutant.

**Duration:** 1 june 2005 to May 2006

**Investigator:** Dr Sutat Weesakul

**Sponsor:** Hydro and Agro Informatics Institute

**Total Contracted Amount:** Baht 1,140,000

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### Sustainable Water Management Policy under the Freshwater Resources Management Project

**Project Description:** The objective of the project is to propose integrated policy designs for sustainable water resources management with emphasis on groundwater resources in Bangkok and its vicinity. Groundwater use trends are analyzed and policies/measures for the sustainable management of groundwater resources in the study area are developed based on analysis of relevant secondary data on groundwater availability and use, piezometric levels, and land subsidence, which are obtained from concerned government agencies and various past studies/project reports. The input from groundwater users and managers, especially with respect to the recommendations for suitable policies and measures for improved groundwater management is obtained through the meetings with the stakeholders.

**Duration:** 1 Sept 2004 to 30 Sept 2007

**Investigator:** Dr Mukand Singh Babel

**Sponsor:** Institute for Global Environmental Strategies, Japan

**Total Contracted Amount:** Baht 1,700,000

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### UNEP Water Vulnerability Assessment in South and South East Asia

**Project Description:**

- The objective of the project is to satisfy the needs of assessing water vulnerability to environmental change in key river and water basins in Asia, and to generate scientifically credible information to support sound decision and policy-making at local and national levels, with special attention to the needs of achieving relevant MDGs.
- The study will focus on water stress, water scarcity and water budget.

**Duration:** 1 January 2006 to 31 July 2007

**Investigator:** Prof Ashim Das Gupta

**Sponsors:** UNEP ROAP

**Total Contracted Amount (Baht):** 3,600,000

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### MTERM Conference

**Project Description:** MTERM (Modeling Tools for Environment and Resources Management) International Conference was organized by Water Engineering and Management (WEM) Field of Study of School Of Engineering and Technology at AIT. The conference activities

**Duration:** February 2006 to April 2007

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### Development of Operation Flood Forecasting System Case Study: Chao Phraya River Basin

**Project Description:** The objective of the project is to develop a mathematical model for flood forecasting including rainfall forecasting and decision support system. The study area is Chao Phraya River Basin. On line data communication system will be installed at 3 locations along the river and linked with server at AIT.

**Duration:** 1 june 2004 to 7 June 2007

**Investigator:** Dr Sutat Weesakul

**Sponsor:** National Electronic and Computer Technology Center (NECTEC)

**Total Contracted Amount:** Baht 5,027,400

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### Experimental Investigation of Hyper-Concentrated Tsunami Run-up

**Project Description:** The project will involve an experiment of a new study of hyper-concentrated tsunami run-up. The result of experiment at Khao Luk, Phang-ga will be used to investigate how Tsunami have impacted to infrastructure on land and determine the preliminary measure to alleviate its impact.

**Duration:** 1 Nov 2005 to 30 June 2007

**Investigator:** Dr Sutat Weesakul

**Sponsor:** Royal Thai Government

**Total Contracted Amount:** Baht 875,000

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### Hydraulic Model Study on overflow Spillway for Nam Ngum 2 Hydroelectric: Spillway

**Project Description:** The scope of the services consists of furnishing labor, equipment and materials as well as technical expertise for the physical model construction and hydraulic model tests of the overflow spillway. The Hydraulic Model Tests will focus on studying the hydraulic condition of the ogee crest, chute, flow over flip bucket and capacity of weir (unc controlled and controlled with the radial gates), suitability operation of both aeration and study downstream erosion in order to optimize the splitter design.

**Duration:** February 2006 to April 2007

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### MTERM Conference

**Project Description:** MTERM (Modeling Tools for Environment and Resources Management) International Conference was organized by Water Engineering and Management (WEM) Field of Study of School Of Engineering and Technology at AIT. The conference activities

**Duration:** February 2006 to April 2007
**Development of river basin flood management system by optimal reservoir operation and real time flood forecasting and warning: A case study of Pasak River basin**

**Project Description**

To develop a river basin flood management system by optimal reservoir operation and real time flood forecasting and warning. The Pasak river basin in Thailand is selected as a case study for implementation. The results of the study would provide an optimal guideline for real time reservoir operation given forecast of rainfall and forecast of inflow into the Pasak reservoir. The software of computer system for operation of the Pasak reservoir will be checked and upgraded, additional software will be added to increase the efficiency and accuracy of the reservoir operation.

**Duration:**
- 1 August 2006 to 31 October 2007
- Investigator: Prof. Tawatchai Tingsanchali

**Sponsors:**
- National Research Council of Thailand
- Total Contracted Amount: Baht 2,000,000

**Workshop on Sediment Management in South and Southeast Asia**

**Project Description**

The workshop is organized within the framework of the International Sediment Initiative (ISI), UNESCO’s International Hydrological Programme in association with AIT, IUCN Asia Water, UNESCO Jakarta Office, UNU, Mekong River Commission, and IRITCES. The discussions focus on watershed and channel processes and the socio-economic, environmental impacts of sedimentation in the region. The selected output of this workshop will be presented as a chapter on Sediment Management in Asia in the 3rd edition of the World Water Development Report (WWDR 3).

**Duration:**
- 1 April 2006 to 30 June 2007
- Investigator: Dr. Mukand Singh Babel

**Sponsors:**
- UNESCO
- Total Contracted Amount: Baht 1,002,000

**Hydraulic and Leakage Investigations in Pipe Networks for Water Supply Distribution in Bangkok**

**Project Description**

The research project involves the investigation of leakage of water flow in pipes and the ways to reduce the amount of leakage in the water supply distribution network of Metropolitan Waterworks Authority of Bangkok and its suburban areas. The study involves the determination of flow and pressure distribution in the pipe networks by using field measurement and simulation models. Locations of possible pipe leakage and causes are identified and measures to stop or minimize leakage are recommended. The project is working in collaboration with other contractors that are employed by MWA to install pressure meters, flow meters and to replace old or leaking pipes and their connectors. The project is expected to provide improvement in the water supply distribution of Bangkok with significant reduction in water leakages.

**Duration:**
- 1 April 2005 to 31 July 2007
- Investigator: Prof. Tawatchai Tingsanchali

**Sponsors:**
- ISONET Co., Ltd, Thailand
- Total Contracted Amount: B.1,400,002.71

**Regional Network for Center of Excellence for Integrated River Basin Management in Asian Monsoon Region**

**Project Description**

The regional network office is established in June 2005 at AIT in collaboration with other local partners such as the Thai Government agencies. The center will focus its collaboration on integrated river basin management in the Asian Monsoon Region. Other activities of the center include exchange of faculty, staff and students. The center also provides scholarships for higher studies for doctoral programs at University of Yamanashi. The regional network office starts in June 2005 for an initial period of 1 year and has been extended for a period of 3 years.

**Duration:**
- 15 June 2005 to 31 March 2008
- Investigator: Prof Tawatchai Tingsanchali

**Sponsors:**
- Yamanashi University
- Total Contracted Amount: Baht 347,500

**WWLC e-Learning Program on IWWM**

**Project Description**

The United Nations University Network on Water, Environment and Health (UNU-INWEH), in collaboration with the United Nations Department of Economic and Social Affairs (UNDESA) has developed a distance education programme on Integrated Water Resources Management (IWWM). A Regional Centre (RC) of The United Nations Water Virtual Learning Centre (WWLC) in South East Asia will be established at AIT under this programme. The principal purpose of WWLC RC is to improve water resource management and water services in developing countries and improve training and education in the water sector. The RC will offer the distance based curriculum in IWWM, identify regional and country needs in order to customize the curriculum, establish regional networks and train students, trainers and decision-makers. During the pilot phase, the WWLC RC will focus on the South East Asian region. The programme offers graduate an academic Diploma from the United Nations University.

**Duration:**
- January 2005 to October 2007
- Investigator: Prof Ashim Das Gupta

**Sponsors:**
- Short-term Consultant: Dr Roberto Clemente
- Total Contracted Amount: US$ 68,900

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**E-Learning Programme on Integrated Water Resource Management for Self Pay Student**

**Project Description**

The United Nations University Network on Water, Environment and Health (UNU-INWEH), in collaboration with the United Nations Department of Economic and Social Affairs (UNDESA) has developed a distance education programme on Integrated Water Resources Management (IWWM) field of study of AIT. Under this programme, the self-pay students interested in learning IWWM will sponsor the tuition fee of the programme. International travel, accommodation and other related expenses will be borne by the students.
12.5 Publications

Refereed Journals


Refereed Books/Chapters


water collecting system, Thailand. 7th International Conference on Urban Drainage Modeling and Water Sensitive Urban Design 2006, Melbourne, Australia, April, 8p.


R.S. Clemente and Wahid, S. Simulation of surface/subsurface transport of water and solutes under different agroecological conditions and practices. Paper accepted for PSEA Conference, Buban City, Philippines April 17-21, 2006

Hydraulic and Leakage Investigation in Pipe Network for Water Supply Distribution in Bangkok”, Progress Reports 1-6, Submitted to ISONET Co. Ltd., Bangkok Thailand.


Daily Forecasting of Flood Conditions in Pasak River Basin, Thailand By Nuttapon Sittikam

Optimizing Water Use and Benefit in Song Chua Irrigation Project, Vietnam By Nguyen Huu Ha

Effect of District Meeting Area on Residual Chlorine: A Case Study in Bangkok Noi Water Supply System

Application of Regionalization Method in Transferring Parameters from Gauged to Ungaged Basin, Vietnam By Nguyen Thi Phuong Mai
Assessment of Flood Control Alternatives for Dong Thap Muoi Region, South Vietnam
By Ngo Van Quang
Supervisor: Prof. Ashim Das Gupta
               Dr. Mukand Singh Babel

Application of a Local Area Model for Rainfall Forecasting in Bhutan
By Thinley Choden
Supervisor: Dr. Mukand Singh Babel
               Prof. Ashim Das Gupta

A Study on Flow Hydraulics and Sediment Transport of the Proposed Kra Navigation Canal Connecting the Andaman Sea and the Gulf of Thailand
By Chadin Chutachinadate
Supervisor: Prof. Tawatchai Tingsanchali

Analysis of Rainfall Pattern for Urban Drainage Design
By Wiwat Charoensukkruang
Supervisor: Dr. Roterto Clemente
               Dr. Sutat Weesakul

Environmental and Economic Perspective of Lower Chao Phraya River Basin
By Niranjan Man Tamrakar
Supervisor: Prof. Ashim Das Gupta
               Dr. Mukand Singh Babel

Analysis of the Flow Regime of The Mekong River and Its Environmental Consequences
By Mylevaganam Sivanjah
Supervisor: Prof. Ashim Das Gupta
               Dr. Mukand Singh Babel

Modeling and Management of Watershed Quality: Bangmati River Basin, Nepal
By Nisha Budhathoki
Supervisor: Dr. Mukand Singh Babel
               Prof. Ashim Das Gupta

Study of The Existing Water Supply System of Kathmandu Valley, Nepal
By Anil Acharya
Supervisor: Dr. Mukand Singh Babel
Chapter 13: SET—INFORMATION AND COMMUNICATIONS TECHNOLOGIES AREA OF STUDY

13.1 Introduction

Information and Communications Technologies field is a newly established area of study in response to the needs for the offering of a curriculum selectively drawn from the curricula of Telecommunications (TC), Computer Science, and Information Management (CSIM). With strong emphasis on communications aspects - rather than on the aggregation of hardware, software, networks, equipment and related industries - ICT recognizes the important role of information services and applications in the creation of a complete ICT infrastructure.

13.2 Research Facilities and Laboratories

There is a rapidly growing and constantly evolving interest in ICT throughout the academia and society. To support this, the evolution and the benefits of ICT in our lives, the ICT field of study at AIT continues to research and develop of ICT. The field of study covers a wide variety of research supported by the body of faculty consisting of a multi-professional team of international experts in telecommunication, computer science, educational technology and related fields.

The faculty has a strong academic background ranging from wireless and optical networks, through hardware and software, to web education and other e-services.

Research subjects include those on ICT applications (e-services such as e-learning, e-health, e-governance, rural development, knowledge creation and knowledge dissemination); on the information technologies (e.g. operating systems, programming languages, information storage and retrieval); on the communication infrastructure (e.g. networks, transmission technologies, switching and routing). Research specializations are in adaptive technologies, computer-supported collaboration; Home networking; ICT security; Online communities; and voice over IP.

The ICT area of study shares the research facilities and laboratories of the Telecommunications field of study.

13.3 Faculty and Research Staff

The ICT Field of Study draws from the faculty and research staff of the Computer Science, Information Management, Remote Sensing & Geographic Information Systems, and Telecommunications Fields of Study.

Faculty Members

From Telecommunications Field of Study

A B SHARMA
BSc, Univ of Newcastle-upon Tyne, UK; LicTech, DTech, Helsinki Univ of Tech, Finland.

KAZI MOHIUDDIN AHMED
Professor. MSc, Inst of Communications, Leningrad, USSR; PhD, Univ of Newcastle, Australia.

R M A P RAJ ATHENA
Associate Professor BSc, Moratuwa Univ, Sri Lanka; MSc, PhD, Univ of Manitoba, Canada; ICT Joint Coordinator.

From Telecommunications Field of Study

KATHARINA PHILIP
Associate Professor BSc, Chulalongkom Univ, Thailand; MEng, DEng, Tokyo Institute of Technology, Japan.

From Computer Science, Information Management Field of Study

POOMPATSAENGUDOMLERT
Assistant Professor, BSE, Princeton Univ; MS, PhD, Massachusetts Inst of Tech, USA

From ICT Field of Study

ERKE TAPIO
Associate Professor, M.Eng., Helsinki University of Technology, Finland

KURHILA JAAKO
Assistant Professor, Ph.D., M.Sc., Helsinki, Finland

KOVALAIHENI, MIKO
Ph.D., M.Econ., University of Jyväskylä, Finland

From Computer Science, Information Management Field of Study

DUNG, PHAN MINH
Professor, Ph.D., M.Sc., University of Technology, Germany

HADDAWY, PETER
Professor, Ph.D., M.Sc., University of Illinois-Urbana

KANCHANASUT, KANCHANA
Professor, Ph.D., M.Sc., University of Melbourne

WUWONGSE, VILAS
Professor, D.Eng., M.Eng., Tokyo Institute of Technology

GUHA, SUMANTA
Associate Professor & Joint Coordinator, Ph.D., Indian Statistical Institute, M.Sc., Ph.D., University of Michigan, M.Sc., University of Calcutta ICT Joint Coordinator

ESICHAIKUL, VATCHARAPORN
Associate Professor, Ph.D., Kent State University, M.B.A., Oklahoma State University

JANECECK, PAUL
Assistant Professor, Ph.D., Swiss Federal Institute of...
Research Staff

Manzul Kumar Hazarika, Senior Research and Training Specialist
Mikko Kovalainen, Visiting Senior Researcher
Surat Lertlum, Research Scientist
Lal Samarakoon, Visiting Senior Scientist
Marc Souris, Visiting Research Scientist

Masters Students' Theses and Research Studies

13.4 Masters Students' Theses and Research Studies

Developing an On-Line Community for ACCOLADE: Motivating Contribution and Participation
By: Valia Ganeste
Supervisor: Dr. Jaakko Kurhila

IPv4 & IPv6 Integration: Tunnel Broker
By: Thomas Riche
Supervisor: Prof. Kanchana Kanchanasut

Beamforming using Tapped Delay Line Filters for Broadband CDMA Systems
By: Md. Anwar Hossain
Supervisor: Dr. Poompat Saengudomlert

A Collaborative Intrusion Detection System for Mobile Ad Hoc Networks using Bayesian Method
By: Abul Hasanat Md. Rezaul Karim
Supervisor: Dr. R.M.A.P. Rajatheva

Group Management Mechanisms for the E-Learning Design using Peer-to-Peer Technologies
By: Suya Bahadur Kathayat
Supervisor: Dr. R.M.A.P. Rajatheva

From Remote Sensing & Geographic Information Systems Field of Study

NITIN KUMAR TRIPATHI
Assistant Professor, BTech, National Institute of Technology, Warangal, India; M Tech, IIT, PhD, IIT, Kanpur, India.

XIAOYONG CHEN
Associate Professor BS, MS, PhD, Wuhan Technical Univ of Survey and Mapping, People's Republic of China. IC T Joint Coordinator

Research Study:
Security System for Health Care Network Built on WiMAX Technology
By: Yadana Kyaw
Supervisor: Prof. Kazi Mohiudin Ahmed

Research Study:
Strategies for E-Learning Infrastructure in Developing Countries: A Case Study in Shan State Myanmar
By: Thazin Lwin
Supervisor: Prof. Kazi Mohiudin Ahmed

Research Study:
Cascade of Distributed and Cooperating Firewalls in Multiple Entry Environment
By: Mayank Mudgal
Supervisor: Dr. R.M.A.P. Rajatheva

Research Study:
Using Knowledge Structures to Analyze and Communicate Dynamic Web Contents
By: Cheryl Medianero Natividad
Supervisor: Dr. Paul Janecek

Research Study:
The Design and Implementation of QoS Aware Web Server
By: Wuttiphong Preechapunyakul
Supervisor: Prof. Kanchana Kanchanasut

Research Study:
A TD-SCDMA MAC Protocol for Wireless Sensor Network for Mitigation of Hazards in Riverine Transport System
By: Md. Abdur Rahman
Supervisor: Prof. Kazi Mohiudin Ahmed

Research Study:
A Framework for Learning Object Management using Semantic Blogs
By: Sachit Rajbhandari
Supervisor: Prof. Vilas Wuwongse

Research Study:
Integrating GIS Data and Documents in Plone CMS: A Case Study with APDIP Projects
By: Nipat Rojratanavanich
Supervisor: Dr. Paul Janecek

Research Study:
A Semantic Blogging Framework for Better Utilization of Information
By: Aman Shakya
Supervisor: Prof. Vilas Wuwongse

Research Study:
Interactive Graph Visualization for Accessing Web Content
By: Bhavana Sherchand
Supervisor: Dr. Paul Janecek

Research Study:
Wireless Sensor Network for Forest Resources Protection: A Case Study of Bago Yoma, Myanmar
By: Kyaw Kyaw Tun
Supervisor: Prof. Kazi Mohiudin Ahmed