TAIST TokyoTech

Premium Newsletter

December 2011 Vol.6

賛助会員の皆様への活動状況報告

Activity report for TAIST - Tokyo Tech Supporting Members

東京工業大学　TAIST 運営委員会

TAIST Steering Committee, Tokyo Institute of Technology

TAIST-Tokyo Tech Graduation Ceremony in 2010

TAIST Tokyo Tech 2010 年度修了式

The third annual TAIST-Tokyo Tech Graduation Ceremony was held 4 August 2011, Central Building, TSP with 18 graduates from the two programs, six from the AE (Automotive Engineering) and 12 from ICTES (Information and Communications Technology for Embedded Systems) programs.

2011 年 8 月 4 日、タイランドサイエンスパーク内 NSTDA セントラルビルディングで、第 3 回目となる TAIST Tokyo Tech 修了式が開催されました。今年度は、AE プログラム 6 名、ICTES プログラム 12 名、計 18 名の学生が修了しました。

Prof .Dr. Morakot Tanticharoen
Vice President, NSTDA

Prof. Dr. Ken Okazaki
Dean of Faculty of Engineering, Tokyo Tech

NSTDA Executive Vice President Prof. Dr. Morakot Tanticharoen and Prof. Dr. Ken Okazaki, Dean, Faculty of Engineering, Tokyo Institute of Technology, chairing for the two institutions, addressed the ceremony.

Administrators from the Thai institutions, Sirindhorn International Institute of Technology (SIIT), Kasetsart University (KU) and King Mongkut's Institute of Technology Ladkrabang (KMITL) spoke to the assembly and congratulated the graduates.

Assoc. Prof. Dr. Chongrak P.
Director of SIIT

Assoc. Prof. Dr. Prisan K.
Associate Dean of KU

Assoc. Prof. Dr. Supat K.
Associate Dean of KMITL

NSTDA 副長官・モラコット博士及び東工大工学部長・岡崎教授によるスピーチで式は始まり、続いて TAIST に参加しているタマサート大学シリントーン国際工学部（SIIT）、カセサート大学（KU）、キングモンクット工科大学ラカバン校（KMITL）の代表者からも修了生に向け祝辞が述べられました。

This year, TAIST lowerclassmen from both programs gave a surprise performance including recorded interviews of graduates. They also sang "Our Hearts are United" accompanied by guitar and violin, and read poems composed for the graduates.

The atmosphere was filled with happiness and smiles with lowerclassmen, friends, and family present to congratulate the graduates. We also expressed out sincere thanks to the researchers, Japanese professors from Tokyo Tech and Thai professors from SIIT, KU and KMITL, acting as advisors; their efforts underlie all our successes. The Graduate's posters were displayed outside the room.

各プログラムの後輩は送別記念として修了生にインタビューした VTR の上映や、"Heart is United" と呼ばれるオリジナル曲に修了生に向けた詞をつけ、ギターやバイオリンの演奏とともに合唱を行いました。

会場は和やかな空気に包まれ、修了生を祝うため、後輩、友人、家族が駆けつけました。また、会場の外では修了生の研究論文ポスター発表があり、研究成果を発表しました。

このプログラムに携わる研究者、教員その他全ての方々に対して、修了生を送り出すため頂いたご支援に感謝申し上げます。

A portion of the lyrics of “Our Hearts are United”:
“What was in the past, just want you to know that it's the same, and every time you listen to this song want you to know, that however how long it takes we'll have each other because our hearts are united”.

NECTEC laboratory visit

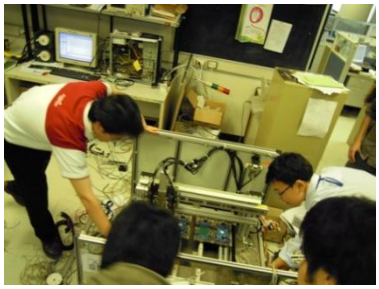
NECTEC laboratories welcomed TAIST students in the ICTES program to three laboratories on August 30:

1. Industrial Control and Automation (ICA) lab
   with Dr.Nattapon Chayopitak
2. Embedded System Technology (EST) lab
   with Dr.Kamol Kaemarungsi
3. Optical and Quantum Communications (OQC) lab
   with Dr.Keattisak Sripimanwat

NECTEC は 2011 年 8 月 30 日に上記３つの研究室で TAIST 学生、特に ICTES プログラム学生の見学を受け入れました。

Besides visiting the laboratories, ICTES students heard lectures by laboratory representatives and were able to try out the advanced technology in each lab.

研究室を見学するとともに、ICTES の学生たちは研究室代表者による説明を受け、またそれぞれの研究室において最先端技術を観察、体験することもできました。



New Students of 2011

The fifth Automotive Engineering (AE) class and the fourth Information and Communications Technology for Embedded Systems (ICTES) class have enrolled for the 2011 academic year.

2011 年 6 月から、AE プログラム第 5 期生及び ICTES プログラム第 4 期生が入学しました。

Fifth AE class

Fourth ICTES class

TAIST Welcoming Ceremonies, 2011

Each year, TAIST-Tokyo Tech hosts ceremonies to welcome new students to the AE and ICTES programs. This year's ceremonies were held June 15 in the NECTEC building.

例年、TAIST では新入生を迎える式典を行っており、2011 年も 6 月 15 日に NECTEC 会議場にて開講式を開催しました。

Prof. Dr. Morakot T.

Prof.Dr.Ken Okazaki

日本とリアルタイムで通信

The chair, Prof. Dr. Morakot Tanticharoen, NSTDA Executive Vice President, opened the ceremonies and Prof. Dr. Ken Okazaki, Dean, Graduate School of Engineering, Tokyo Tech, speaking via video conferencing from Japan, welcomed the new students.

モラコット NSTDA 副長官が司会を務め、岡崎東工大工学部長が日本からリアルタイム遠隔会議システムを通じ、新入生に向けた歓迎のスピーチを行いました。

Asst. Prof. Dr. Panya Kansuwan, AE Program Director, and Assoc. Prof. Dr. Thanaruk Theeramunkong, ICTES Program Director, gave an overview of the programs.

開講式では、AE プログラム長パンヤ助教授及び ICTES プログラム長タナラック准教授が各プログラムの概要等を説明。


Assist.Prof.Dr.Panya K.


Assoc.Prof.Dr.Thanaruk T.


Dr.Somnuk S.


Dr.Suthee P.

Dr. Somnuk Sirisoonthorn, TAIST-Tokyo Tech Director, was introduced the MTEC laboratories to the AE students and Dr. Suthee Phoojaruenchanachai, NECTEC Deputy Executive Director introduced NECTEC laboratories to the ICTES students.

ソムヌック TAIST-Tokyo Tech ディレクターが MTEC の研究室を AE 学生に説明し、スティーNECTEC 副ディレクターが NECTEC 研究室について ICTES 学生に説明を行いました。



New students meet upperclassmen

After providing information on each program the new students separated to meet with the upperclassmen, getting to know one another, and with the upperclassmen sharing important information with the new students.

新入生への各プログラム説明の後は、プログラム毎に先輩達とのミーティングです。これをきっかけとし、先輩後輩が互いに知り合い、先輩が後輩に重要なことなどを教えることとなります。

2011 年 8 月の TAIST- Tokyo Tech 卒業生

今年度、修了書を受け取った卒業生達。彼らの TAIST に対する想いや、TAIST での研究内容をまとめました。

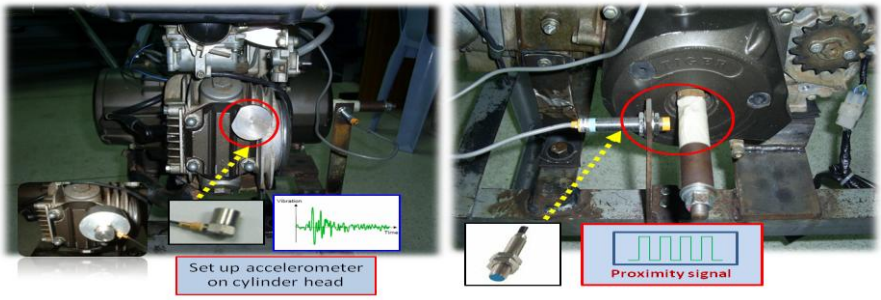
Name: Mr.Songpon Klinchaeam

Class: First entering AE class

Personal message: "I think, the best time for me was after examinations. We would go to Country Place in Future Park, Rangsit. We usually talked about our subjects for the week and told funny stories. You know, I think the relationships we developed were more important than the knowledge given in the courses."

Research topic: Condition monitoring of valve clearance faults in small four stroke petrol-engine using vibration signals.

Abstract: This research studies condition monitoring technique of a small four strokes, single cylinder petrol engine using vibration signal analysis based on time domain, crank angle domain, and signal energy. Vibration signals are acquired from the cylinder head of the engine and used to describe engine processes such as intake/exhaust valve operations, ignition process, and combustion process. In this study, vibration signals have been applied to monitor various fault conditions in the engine such as intake and exhaust valve clearance faults. Vibration signals acquired in time domain could be mapped onto crank angle domain using top dead center signal. Time domain techniques were used to analyze vibration signals so that the main events related to the engine operations could be described easily.



Using energy analysis technique, all fault conditions could be also identified. For future work, signal analysis techniques must be developed and the detected signals should be compared with other signals such as pressure signal in order to verify the accuracy of the results.

Keywords: condition monitoring, valve clearance, vibration signals, fault condition, time domain, signal energy

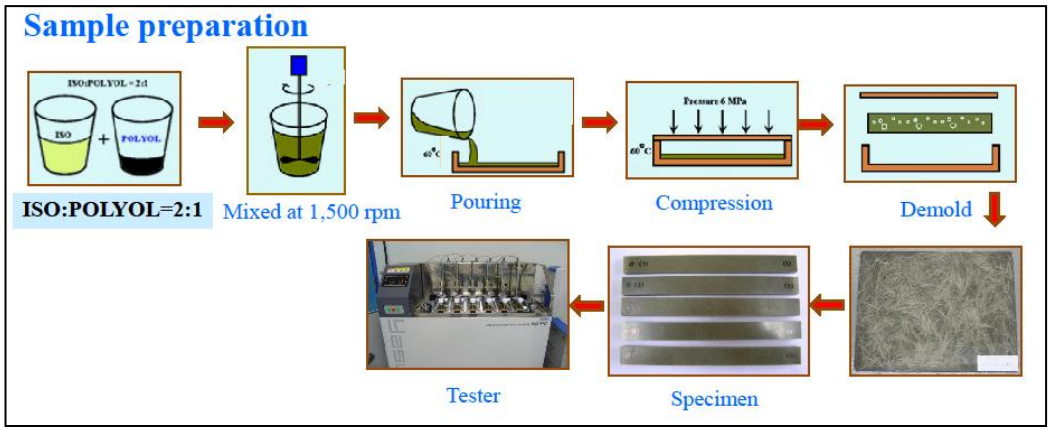
Name: Ms.Natcha Prakymoramas

Class: First entering AE class

Personal message: "I'm glad to have been a TAIST AE student. The Automotive engineering program is a great opportunity for Thai students to learn advanced technology from Japan. I would like to express my appreciation to my teachers, TAIST staff and AE undergraduates for their help and kindness."

Research topic: Improvement of Adhesion between Polyurethane composite and top coat by means of the in-mold coating with vinyl ester method

Background: Polyurethanes are versatile materials that can be used in many industries, for instance, automotive, furniture, construction, thermal insulation and footwear. Polyurethane results from the exothermic reaction between polyisocyanate and polyol by stepwise polymerization. Reaction injection molding, RIM, is one of the methods in producing polyurethane parts from monomer or oligomers. RIM was first developed in Germany from polyurethane rigid foam technology used to produce integral- skin, rigid urethane foam for automotive and furniture. Most commercial RIM products are filled with reinforcing materials such as mica, glass flakes, chopped glass and continuous fibers.



Methodology

The addition of reinforcing agents can improve dimensional stability and mechanical properties. However, the disadvantages of polyurethane composites are difficulties to get a "Class A" surface. In order to acquire a smooth surface and to reduce or eliminate porosities, In-mold coating (IMC) is implemented . This study is aimed to improve the adhesion between polyurethane composite and top coat by in-mold coating of vinyl ester onto the mold surface prior to the molding of polyurethane composite. Later this treated polyurethane composite is over coated with the top coat.

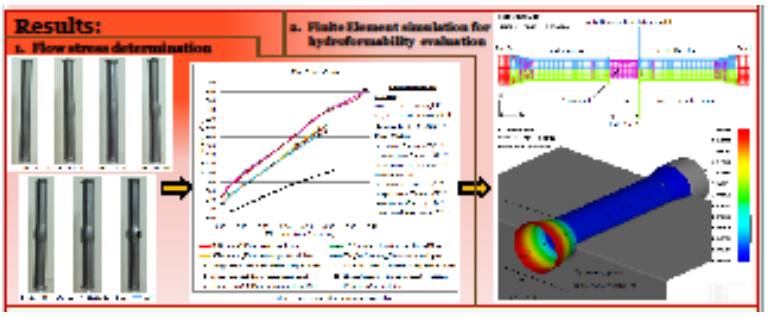
Name: Mr.Perawat Boonpuek

Class: Second entering AE class

Personal message: "Virtue and conscience are significant factors in developing human resources for a sustainably peaceful society. Educational opportunity and contributions in science and technology are also important to national development. I am a scholar who has gained that educational opportunity from the Thai Advanced Institute of Science and Technology (TAIST-Tokyo Tech), specially aimed at developing our country in science and technology. I am very impressed with the TAIST–Tokyo Tech, Automotive Engineering program (AE) and I sincerely thank and appreciate that program. I hope that TAIST-Tokyo Tech will forever remain a driving force for national development."

Research topic: Flow Stress Determination of Steel Tube for Hydroformability Evaluation.

Abstract: This research aims to determine flow stress of steel tube by using hydraulic bulge test. A developed SPB analytical model for analyzing bulge shapes of hydroformed tubes is postulated. Bulge test apparatus is specially designed by using FEA simulation of hydroformability evaluation, and then manufactured for use in the hydraulic bulge test. STKM 11A steel tube, outside diameter= 28.6 mm and thickness = 1.2 mm, is used for the free bulge test. Test tubes are deformed under a biaxial stress state. Bulge heights and internal pressures are continuously measured during experimentation. Tube thicknesses at vertex of the bulge shapes are measured by a dial caliper gauge. Bulge shape curvature and contact points are measured by taking digital photos of the bulge shapes combined with measurement methods in CAD software. Effective stress - strain relationships are obtained from the developed SPB analytical model using those measured values. Flow stress curves obtained from the effective stress – strain relationships are compared with those by YingYot's model, Hwang's model and a tensile test. FEA methods are used to conduct simulation of tube hydroforming using those flow stress curves obtained. The predicted internal pressures versus the bulge heights and the tube thicknesses are compared with the experimental results. The flow stress curve obtained from stress-strain relation at Neck Point of the hydroformed tube is determined.



Name: Mr.Ramil Kesvarakul

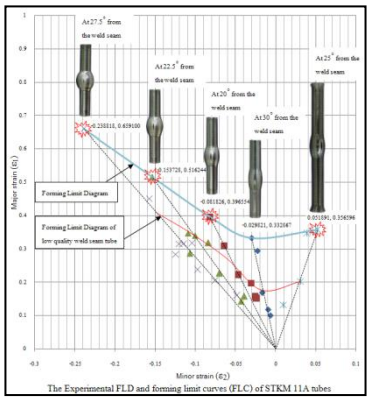
Class: Second entering AE class

Personal message: "Many impressive moments provided unforgettable memories giving me good feelings and reminding me to be happy, to smile and to laugh. They are my master's degree from TAIST-Tokyo Tech."

Research topic: Determination of forming limit curves of steel pipes for hydroformability evaluation of automotive parts

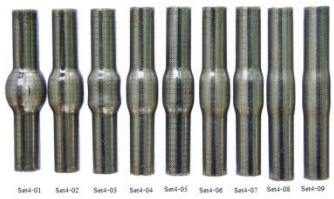
Abstract: The aims of this research are to establish the forming limit curve (FLC) of tubular material low carbon steels commonly used in Thai industry, verify these FLCs with real part forming experiments, and compare these experimentally obtained FLCs against analytical ones available in FEA software database. A self-designed bulge forming apparatus of fixed bulge length and a hydraulic test machine with axial feeding are used to carry out the bulge tests. Loading paths resulting to linear strain paths at the apex of the bulging tube are determined by FE simulations in conjunction with a self-compiled subroutine.

These loading paths are used to control the internal pressure and axial feeding punch of the test machine. In this work a common low carbon steel tubing grade STKM 11A, with 28.6 mm outer diameter and 1.2 mm thick is studied. Circular grids are electro chemically etched onto the surface of tube samples. Subsequently, the tube samples are bulge-formed. The forming process is stopped when a burst is observed on the forming sample. After conducting the bulge tests, major and minor strains of the grids located beside the bursting line on the tube surface are measured to construct the forming limit curve (FLC) of the tubes. The forming limit curves determined for these tubular materials are put to test in formability evaluations of test parts forming in real experiment.



The Experimental FLD and forming limit curves (FLC) of STKM 11A tubes

Results of the formed product of different deformed state-Set5



Results of the formed product of different deformed state-Set4

It was found that the tool geometry can keep the strain ratio constant is not dependent on the thickness but only on OD of the tube, as in equations $L = OD$ and $r_d = \frac{15 \times OD}{25.4}$.

The experimental FLDs have predicted failures in forming process consistently with the real experiments. The experimentally obtained forming limit curves (determined following STKM 11A) differ from empirical one (from FEA software) and analytical one by about 0.02339 and 0.15736 true strain respectively at FLD_0, the corresponding plane strain values.

Name: Ms.Gunniga Pornsopin

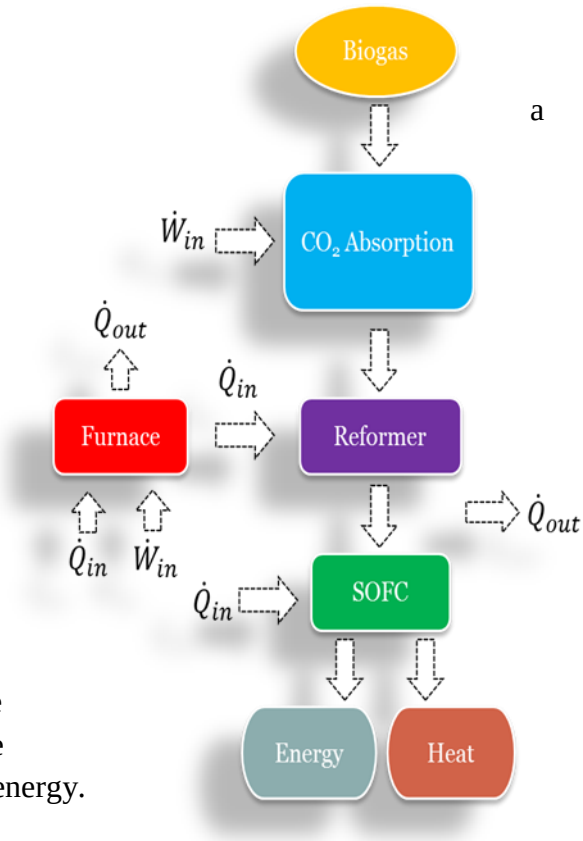
Class: Second entering AE class

Personal message: "TAIST gave the opportunity to study in the automotive engineering field. The knowledge I gained from lecturers provide advantages in both research and practical applications. Much more than that I gained friendship."

Research topic: Mathematical Modeling of solid oxide fuel cell system by using BIOGAS.

Abstract: A solid oxide fuel cell (SOFC) is an electrochemical device which converts chemical energy to electricity. It consumes hydrogen which can be converted from any sources of hydrocarbon fuel. A renewable fuel source such as biogas is an interesting alternative for SOFC. The feasibility in using biogas as a cheap energy resource is unexplored. This study uses biogas as fuel supply in the SOFC system. Biogas is a mixture of methane and carbon dioxide.

The system has a fuel processing unit for removing CO_2, the hydrogen production unit for converting methane to hydrogen and the SOFC unit for producing 1 kW electrical output. The SOFC system is investigated for the energy input and output by using computer program to make the empirical model of the sub-unit. The SOFC system consumed very high energy for 42% of the chemical reaction and 48% of the SOFC bundle heater. Mechanical energy input such as pump power consumed only 10%. Moreover, there is 98% waste energy due to the heat loss. When compared the energy consumption with the electrical output of the SOFC, it is only 2% of the overall system. The energy output is regarded as only a small amount of energy.

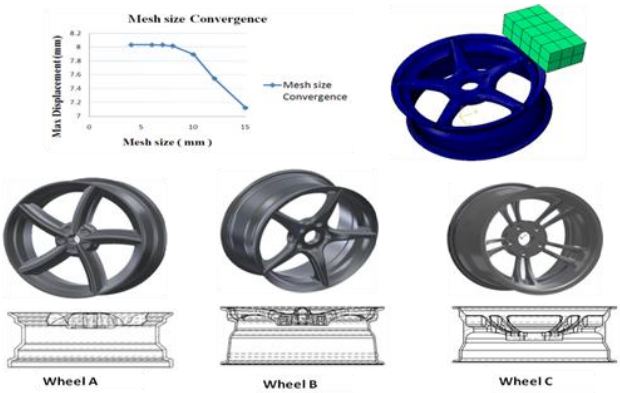


Keywords: Biogas, SOFC System, Reformer, CO_2 Removal, Mathematical Modelling.

Name: Mr.Bui Tuan Viet

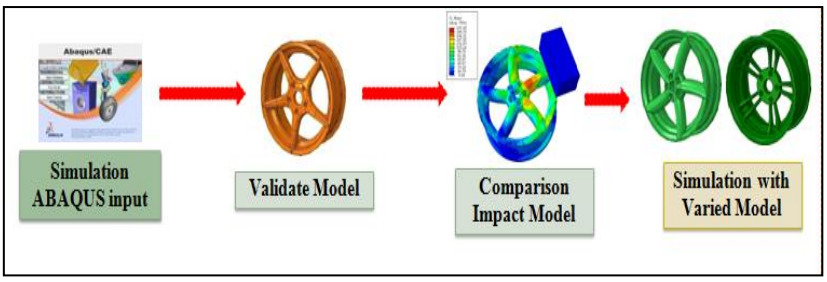
Class: Third entering AE class

Personal message: "Where there is a will, there is a way. Never give up, when one door closes another door opens"



Research topic: FEM Simulation of Impact Testing for Aluminum Alloy Wheel

Abstract: The method for this study was to use a commercial FEM code (ABAQUS) with nonlinear dynamic finite element algorithm to simulate a wheel impact test. Three structural designs of a wheel were examined against a strict requirement, where a striker is dropped from a specified height above the wheel. The wheel is mounted on an incline mounting, making 13° to the horizontal plane. The solid model of an aluminum wheel was meshed by tetrahedral element because of its irregular geometry. A mesh convergence study was carried out to ensure the convergence of the mesh model. Striker was assumed to be a rigid body and meshed by hexahedron element. A numerical model of the wheel and striker were developed taking into account the nonlinearity of the material and the large deformation taking place. After the comparison of impact simulation results between three types of wheel, it could be concluded that rim flange thickness and spoke thickness was significant regarding impact strength of wheel. Each wheel had different structures of spoke but have the same result of main damage location. The Von-Mises stress concentrations occurred in the spoke at the contact areas between spoke and hub of wheel model. Base on these results in order to evaluate the effect of spoke thickness on the failure strength impact test .The spoke thickness of wheel B was increased for 2 mm with original spoke thickness. Evaluation and comparison of the results a among different spoke thickness of wheel B by applying total plastic work value as failure criteria wheel strength is made to optimize the structural design of the wheel.



Name: Mr.V-ris Jaijongrak

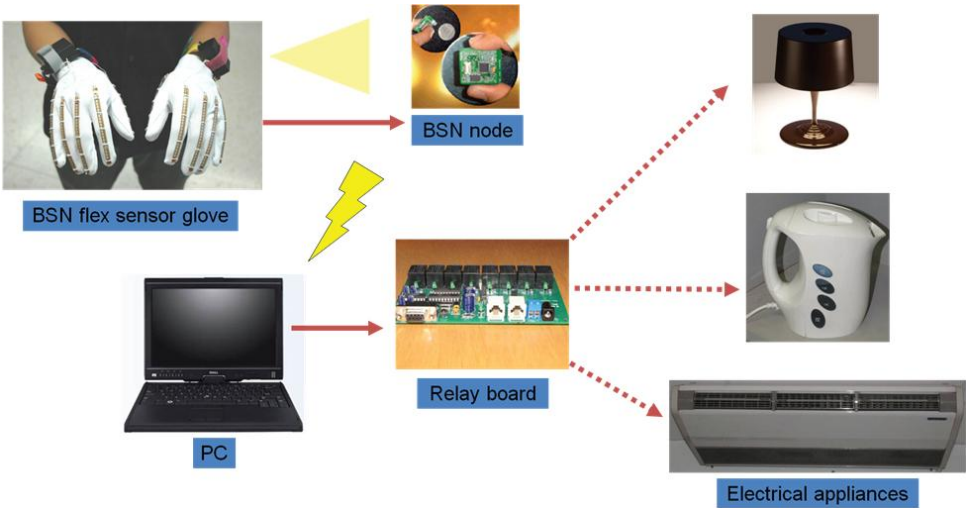
Class: First entering ICTES class

Personal message: "My experience with TAIST was exceptional. I had the wonderful opportunity of doing a research project in collaboration with SIIT, NSTDA (NECTEC) and Tokyo Tech. As a result, I had the chance of further study at Tokyo Tech, which is very famous in the engineering field. I feel very grateful for the TAIST project."

Research topic: Towards Gesture-based Interface for Intelligent Home using BSNs

Introduction: Body Sensor Network (BSN) is a new generation of wireless sensor networks which has integrated the rapid technological growth in physiological sensors, low power integrated circuits and wireless communication in a bundle. Within the past decade, we have witnessed a rapid surge of interest towards the development of new applications based on this technology. This thesis presents an attempt towards the development of a hand gesture-based interface for intelligent home applications. A BSN hardware platform called BSN node, developed at Imperial College, has been used in this study for data acquisition.

Based on the acquired data, gesture recognition is performed. Each recognized gesture can be mapped into different commands for an intelligent home application.



Conclusion: We have presented a BSN-based glove interface for controlling electrical devices in the smart home application. A recognition model was constructed based on supervised clustering. Real time recognition of input gestures is achieved by integrating the learned centroids and the nearest neighbor classification technique into the software platform for BSN-based application development.

Name: Mr.Amnart Kassanook

Class: First entering ICTES class

Personal message: "The courses at ICTES TAIST-Tokyo Tech taught me many things in advanced engineering and biomedical signal processing. I feel happy with the courses, lecturers, advisers, friends and environment."

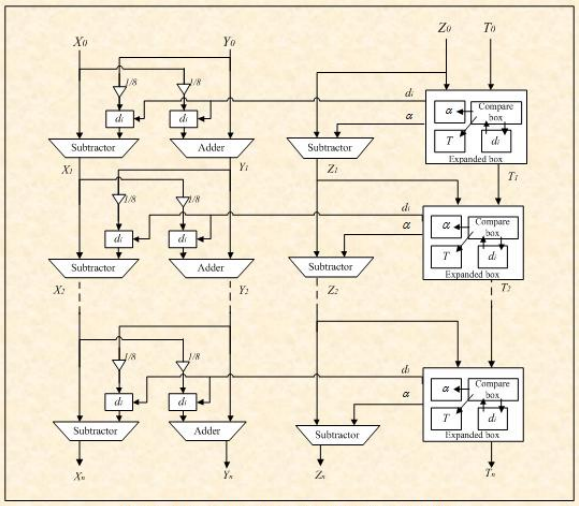


Figure1. architecture of radix-8 CORDIC

Research topic: Punctured Radix-8 CORDIC and Condition of Selection to Reduce Hardware complexity with Low Latency

Motivation: There are many beamforming techniques for ultrasound system. CORDIC is the interested choice for portable ultrasound system. CORDIC (Coordinate Rotation Digital Computer) was introduced by Jack E. Volder in 1959 to compute trigonometric function. In 1971, John Walker developed CORDIC to compute linear, hyperbolic, exponential, and logarithm functions.

Result

Table4. result of simulation

Method	Average Number of iterations (max)	Sum square error of tangent
Basic CORDIC	17.7765 (19)	10^{-5}
Puncture radix-8	10.3529 (14)	5.3789

Table5. approximately gate delay

Method	Number of gate delays	Number of gates in system
Basic CORDIC	835	4560
Puncture radix-8	652	2688

The CORDIC method becomes popular because it requires only adders and shifters to implement. There are many ways to make faster CORDIC implementation such as angle recording method, higher radix CORDIC algorithm, hybrid CORDIC or pipeline CORDIC. There are many ways to develop CORDIC technique, radix is one of those methods. Radix CODDIC was introduced by E. Antelo in 1995. Radix CORDIC is the method which can reduce iterations of CORDIC but the problem is requiring of hardware. Puncture radix-8 CORDIC, rounding, thresholding and condition of selection can solve this problem.

Name: Mr.Panupong Thanutong

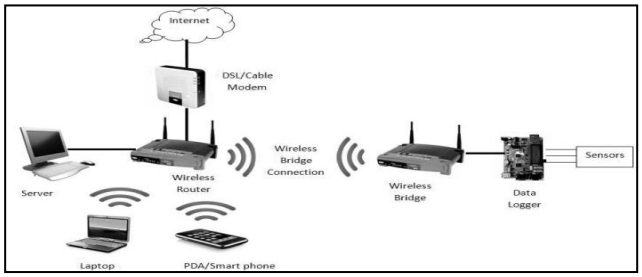
Class: First entering ICTES class

Personal message: "I really appreciate that I have graduated from the ICTES program of TAIST-Tokyo Tech. The course gave me a lot of knowledge and new technology for embedded systems. I hope this program continues to develop the abilities of technology specialists and I hope that these people will develop the technology, science, innovation and so on of the country."

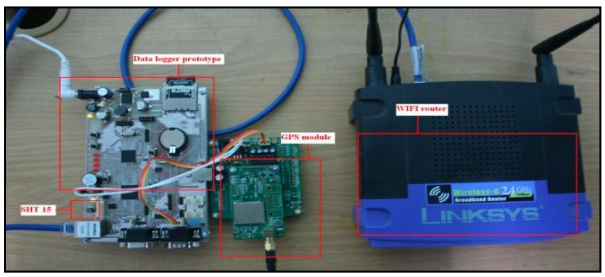
Research topic: Design and development of a smart data logger for Hydrological monitoring system

Objectives:

1. To study the design of a data logging device prototype that can collect data from environment sensors included real-time monitoring system.
2. To study and apply an embedded TCP/IP stack module and use this technique for acquiring and monitoring data from environment sensors through the internet browser.
3. To design and implement the software architecture and user interfaces of data logger system.



Block diagram of proposed system



Experiment preparation

Conclusions:

1. Data log files could be downloaded directly from Web pages and the format of data log files is CSV that is standard platform for using in many analysis software tools such as MATLAB and MS Excel.
2. We included a GPS receiver to provide referenced base location information and world standard time, so the base time of system is more precise.
3. Although the performances of software algorithm are not high like a computer's OS, the price of the prototype includes software is very cheap. The total cost of the system per one side base station is not over than 5,000 Bath but this price is not included external sensors.

Name: Mr.Rattanasak Kasettham

Class: First entering ICTES class

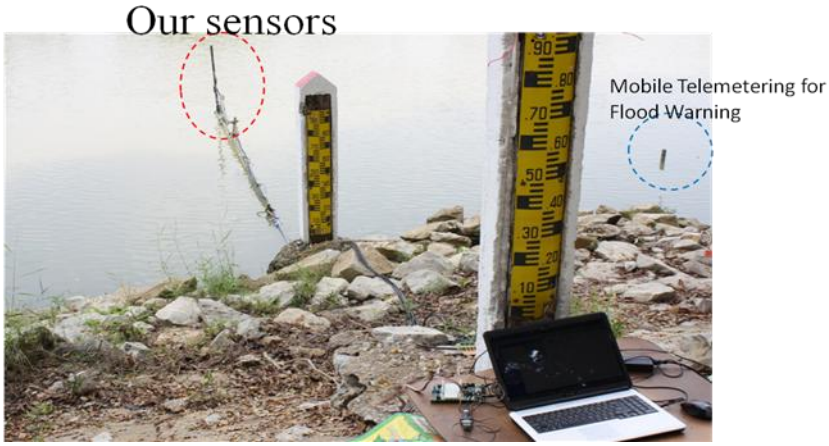
Personal message: "This has been my first experience of distance learning, so I have many impressions. I learned many things from the lectures of Japanese professors and co-lecturers from Kasertsart University and SIIT University were available to give details when I had questions. I am grateful to all the professors and to NECTEC for this program."

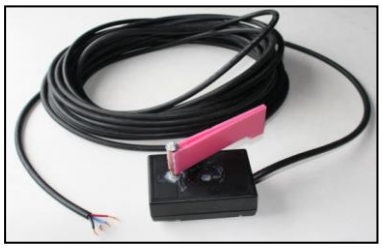
Research topic: Embedded Multi Sensors for Hydrological Monitoring system

Objective:

1. To design and develop the low cost flow velocity sensor for hydrological monitoring system.
2. To design and develop the low cost flow direction sensor for hydrological monitoring system.

Low cost flow velocity sensor

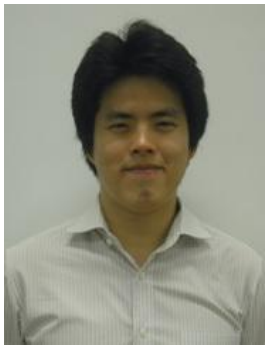




Low cost flow direction sensor

Conclusion:

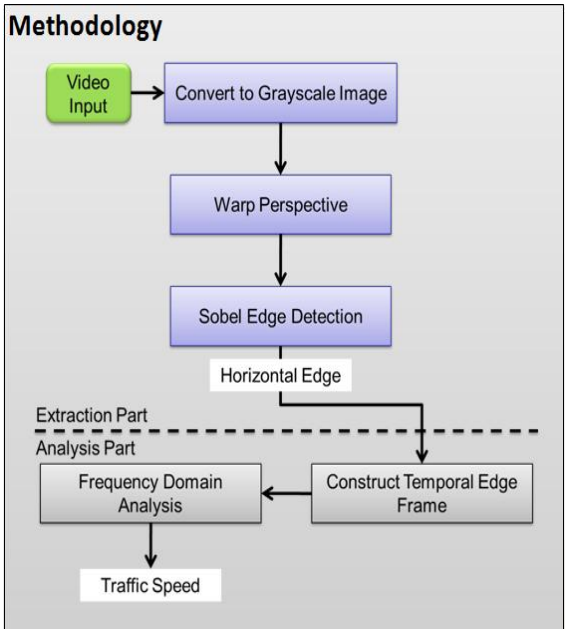
1. The low cost flow velocity sensors have an acceptable measure range and a low root mean square error. Furthermore, the measure in various depths can indicate the error of the sensors because of leaving in the river.
2. The low cost flow direction sensor has an acceptable accuracy but it needs to calibrate before using. Furthermore, the pitch and roll of the flow direction sensor has effect to the accuracy.



Name: Mr.Arucha Rungchokanun

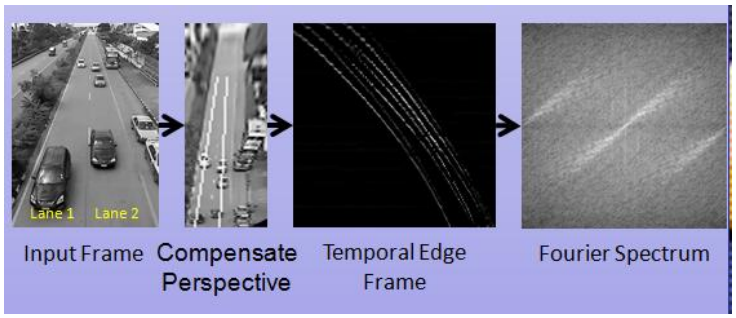
Class: Second entering ICTES class

Personal message: "Thank you for this embedded program. It has given me many opportunities as well as knowledge. I would like to express special thanks to everybody, my advisor, my thesis committee, P'P' at the TAIST-Tokyo Tech office and also my friends."



Research topic: Traffic Speed Measurement using Spatio-Temporal Model and Frequency Domain Analysis

Abstract: In traffic monitoring applications, traffic speed is an important parameter of traffic management. The method for traffic speed measurement using video based on Spatio-Temporal (ST) model and frequency domain analysis is proposed in this paper. This method is designed to be able to measure the traffic speed in every pattern of road. The novel of proposed method is unfolding the edge information on ST model and analyze them in frequency domain to determine traffic speed. The proposed method is evaluated by compare with actual speed. The traffic speed is measured accurately 97.33%.



Keywords: Traffic Speed, ST Model, Edge Feature, Frequency Domain, Perspective Effect, Uncalibrated Camera

Name: Ms.Sayumporn Pharsook

Class: Second entering ICTES class

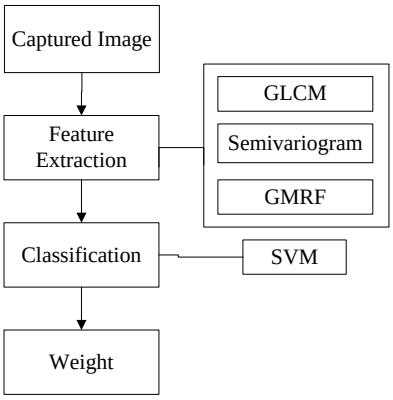
Personal message: "I'm so glad and proud to be a TAIST student. Other than technical knowledge from this program, my English skills have improved. I would like to thank all the professors, P' Nok, P' Kate and P' Puk for all their support. Thank you."

Research topic: Thai Crop Classification using Video Image Analysis

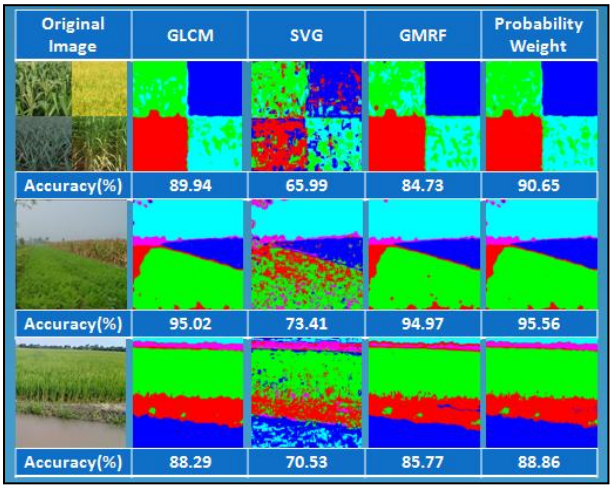
Abstract: There are many techniques used for image classification, most of them are often used in remote sensing of satellite image for land use and land cover maps. However, a limitation of satellite images is that it has a lot of data and sensitive to the weather condition. Therefore the video-based ground survey system has practical significance to solve this problem. The proposed method uses image captured from video camera on the

vehicle moving around the cropland for classification each type of crops. This classification based on texture analysis that uses three texture feature extraction techniques.

Methodology



Classification results and classification accuracy



They are Grey Level Co-occurrence Matrix (GLCM), Semivariogram function (SVG) and Gaussian Markov Random Fields (GMRFs). In this study, SVM is used as the classifier to classify texture data from each feature extraction technique. Two fusion schemes are considered in order to improve classification performance. First is the simple combination method which put all texture data from each feature extraction technique as an input of SVM, then SVM will classify these data into each class. Another method is the weight combination method using the decision fusion that weighs the classification result from each technique by the probability of detection and miss.

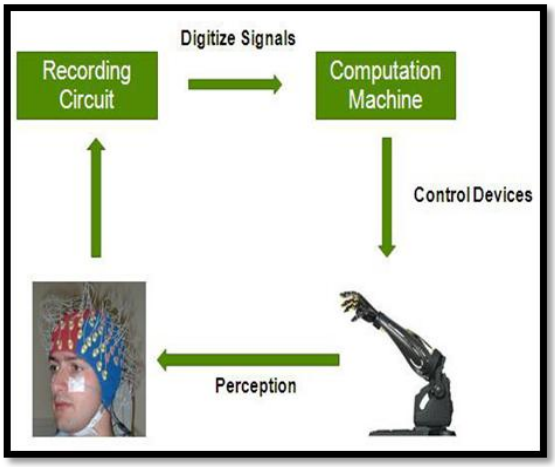
Name: Mr.Payat Jirasuwanpong

Class: Second entering ICTES class

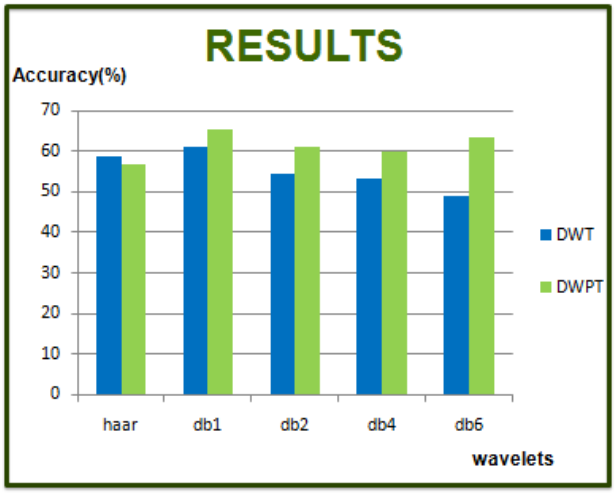
Personal message: "I have just graduated from the TAIST-Tokyo Tech program and I'm impressed by many things about it. First, the first day I came to our study room I was impressed by the high technology of the communications. Second, the program holds nice events and conducts field trips. Third, I had the chance of knowing Japanese professors, and that we may help each other. Finally, I'm glad to have gotten to know everyone (friends, staff and others)."

Research topic: Motor Imagery Classification based on EEG signal using DWPT and Neural Network

Abstract: Electroencephalogram (EEG) signals are one of the most well-known signals widely used in Brain Computer Interface systems. This presentation proposes the new method of frequency decomposition in the classification.

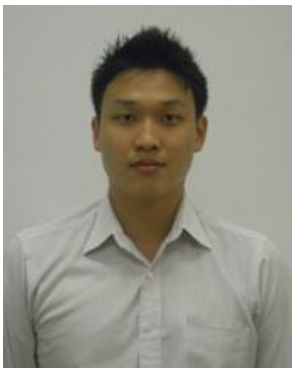


Discrete Wavelet Packet Transform (DWPT) allows adjustable frequency resolutions instead of Discrete Wavelet Transform (DWT). Subsequently, the Multilayer Percepton Neural Network (MLPNN) is used as a classifier in order to classify two Motor Imagery (MI) tasks. The results demonstrate the best accuracy of two-class (left and right hand motor imagery) classification is 65.56%.



Conclusion: DWPT is proposed to improve accuracy of classification instead of DWT so that we choose subbands more correct.

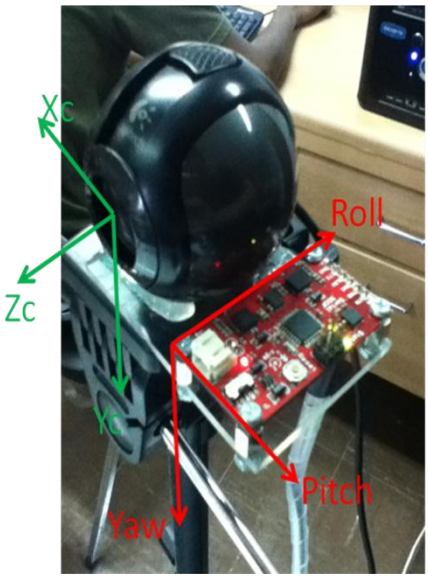
Mother wavelets influence on the decomposition and the classification accuracy. The results indicate the Daubechies1 wavelet produces the highest accuracy of the testing wavelets.



Name: Mr.Pongthorn Apiroop

Class: Second entering ICTES class

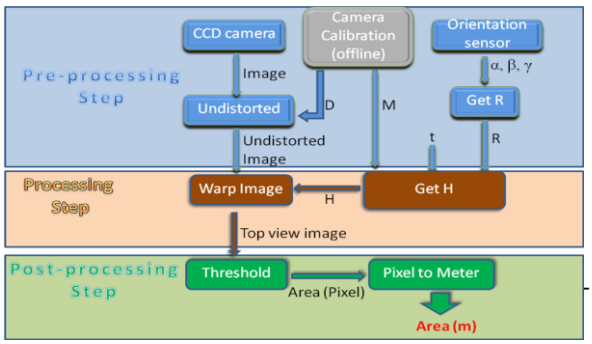
Personal message: "I am immensely grateful to all the professors at ICTES, NECTEC and KU for teaching me the importance of self-learning and the essence of keeping up with emerging embedded technology."

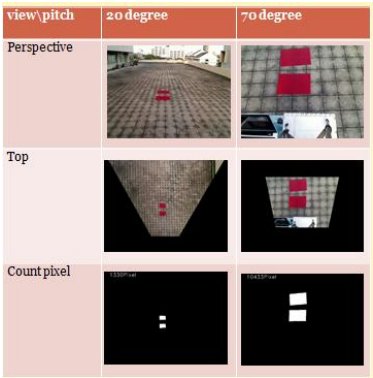


Research topic: Planar Surface Area Estimation using Camera and Orientation Sensor

Abstract: Our proposed scheme of area estimation system focuses on image warping to top view using computer vision and orientation sensor. The sensor which is attached to a camera is used to compensate the camera's orientation. One constraint is that the estimated area is planar surface. Lens' distortion is removed using distortion parameters. Subsequently, undistorted image is warped using homography matrix which consists of three parameters: intrinsic matrix, rotation matrix and translation vector. Finally, a method of mapping pixel area to real world area is introduced to calculate the planar surface area. The results show top view generated from the tilted camera using information from the orientation sensor in real time.

Keywords: Planar Surface Area Estimation; Orientation Sensor; Camera Calibration; Homography; Image Warpping.





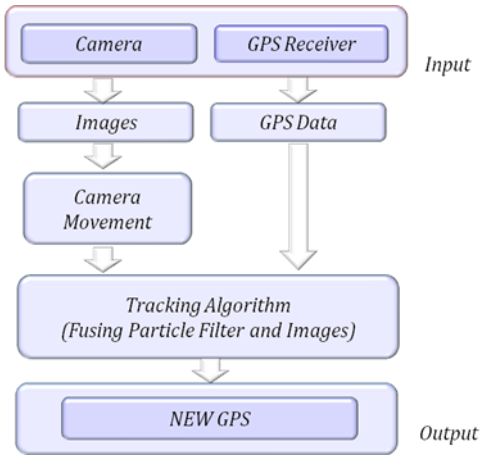
Name: Ms.Kanittha Sae-lim

Class: Second entering ICTES class

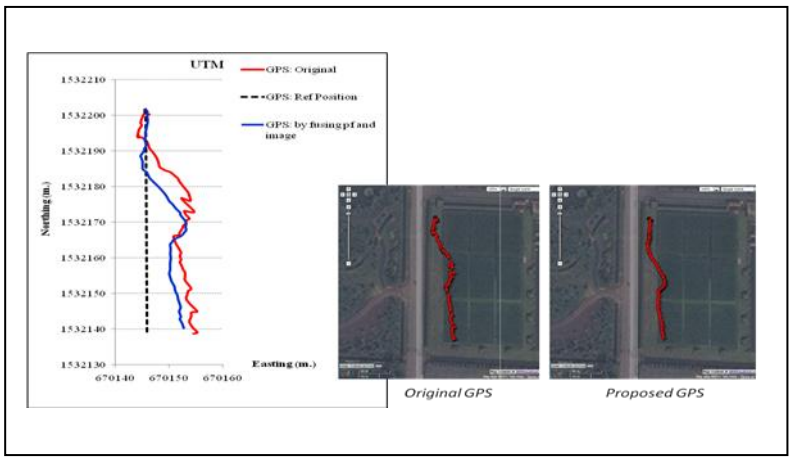
Personal message: "TAIST has consistently supported us, providing us scholarships together with kind professors who always introduced us to amazing technologies. Everything in the past two years has been a valuable experience. I sincerely thank all participants for this achievement."

Research topic: A Vehicle Tracking Algorithm Fusing Video and GPS data

Abstract*:* Accuracy of positioning system is important for many applications ranging from the automatic navigation in the city through the precision agriculture in the field. A regular GPS receiver has a low cost but with a low accuracy (2 to 30 meters). As a result, we propose a low cost system where the positioning data from GPS is fused with the images obtained by the mounted cameras on a moving vehicle. Our method uses the particle filter as the tracking algorithm and improves the accuracy based on epipolar geometry,



which represents the relationship of two corresponding images from video sequence. Local feature of the corresponding points among these views are extracted and matched by SIFT algorithm. Associated with the particle motions, these match points are reconstructed in 3D and then reprojected back to measure errors for weighting. The experiment demonstrates all optimum parameter values for each kind of tracking.



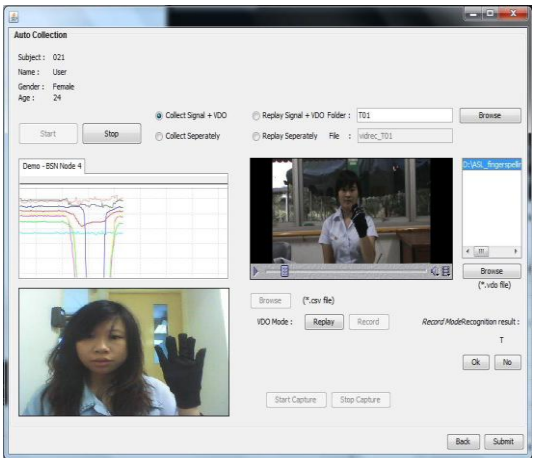
Name: Ms.Satjakarn Vutinuntakasame

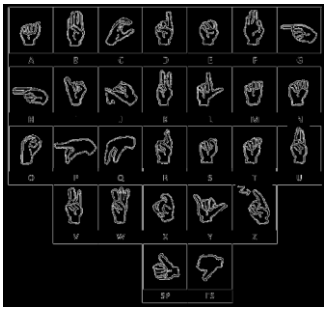
Class: Second entering ICTES class

Personal message: "Thank you **TAIST-Tokyo Tech** !! for giving me a good opportunity to study and meet new friends. Thank you all staff, professors, and advisors who always supported and helped us until the day of graduation. Without them and my family, I could definitely not have been a success today."

Research topic: Gesture Analysis and Development of an Assistive Device for Speech-Impaired Disabilities.

Abstract: This research focuses on the development of an assistive device for speech impaired disabilities. This study reports an ongoing progress towards a wireless assistive communication device for speech-impaired people. To achieve an accurate gesture recognition system, a detailed analysis of signals acquired from wireless sensor gloves has been performed.





Different scenarios where misclassifications may occur are presented along with potential solutions for each issue. Based on the proposed hierarchical classification framework, hand gesture recognition is performed based on input signals acquired using a wireless sensor glove equipped with five flex sensors and a 3D accelerometer. The recognized gestures are mapped into the corresponding sounds using speech synthesizer. To facilitate further research on this assistive system, a JAVA-based application has been developed for supporting data collection and user training process.

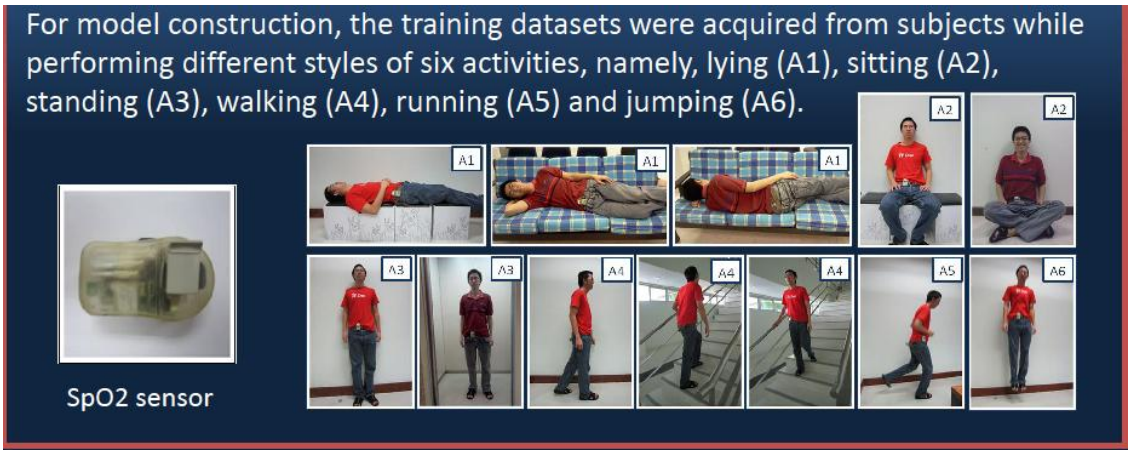
Name: Ms.Pitchakan Theekakul

Class: Second entering ICTES class

Personal message: "It was a great opportunity in my life to get a scholarship to TAIST-Tokyo Tech. Thank you to all the professors for giving me this chance and valuable knowledge, and thanks to all TAIST staff members for taking care of me."

Research topic: A semantic-based reasoning framework for pervasive sensing

Abstract: This study presents a hybrid framework for continuous monitoring using a Body Sensor Network (BSN) platform. In this framework, we illustrate how domain specific expert knowledge and observation of data in its feature space are combinely used for rule construction. The rule based mechanism is deployed as a tool for organizing/managing recognition models derived using a numerical method. As a demonstration, we construct a knowledge base for automatic activity recognition based on assumptions on characteristics of activities under investigation and constraints on device packaging design and on the way a device can be worn by a user.



The framework is implemented using Java Expert System Shell (JESS) and is applied on data sets collected under a semi-natural condition during a device-orientation-independent and device-location-independent activity recognition experiment. The implemented system is evaluated in situations where device orientations and locations are not known in advance and arbitrarily changed by users.

Keywords: Rule-based reasoning, body sensor network, activity recognition, device-orientation detection, rule learning

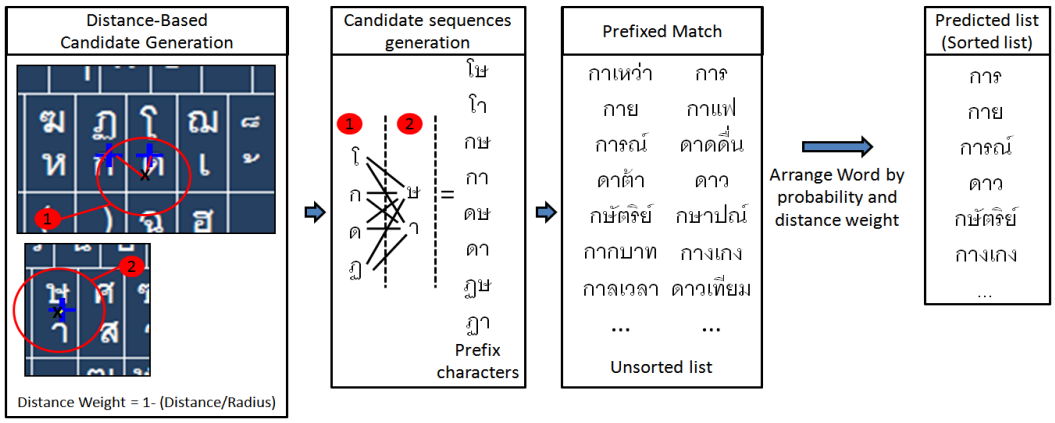
Name: Mr.Siwacha Janpinijrut

Class: Second entering ICTES class

Personal message: "This Program impressed me very much, improved my English, taught me to do research. It introduced me to a new world! Made me tough! Allowed me to come to know a lot of good people and, finally, improved my knowledge of embedded systems."

Research topic: A Statistical-Based Approach for Thai Text Input on Touch screen Mobile Phones

Abstract **-** This research is an improvement of Thai keyboard on Touchscreen mobile phones using a distance-based candidate generation technique. The technique considers characters nearby touch points of user as candidates. Each candidate has its own weight depend on distance from the touch points. Combining with language model, our technique yields higher accuracy compare to the ordinary method.



Moreover, we introduce new keyboard layouts in order to help the usage of disable persons. Our idea is that it should be faster when typing the vowel by thinking of only its position. This would help reduce the time that user needs to search of the vowel. So, we separate all vowels and tone marks into left, right, top and bottom of keyboard area based on Thai writing system. The proposed layouts perform better performance for both normal and disabled subjects.

Keywords: Touchscreen mobile phone, candidate selection, distance-based candidate generation, language model, keyboard layout.

"TAIST-Tokyo Tech--continuing to produce qualified graduates into the future"

TAIST-TOKYO TECH FREE SEMINAR

TAIST-Tokyo Tech hosts seminars in connection with the AE and ICTES programs. Four AE and five ICTES seminars were held from June to September. Two more AE seminars are planned, for November and January 2012. Seminar topics and leaders are listed below.

TAIST-Tokyo Tech では、プログラムをより広く知って頂くため、AE プログラム、ICTES プログラムそれぞれの公開セミナーを実施しています。2011 年 6 月から 9 月の間に AE プログラムから 4 講演、ICTES プログラムから 5 講演が実施され、引続き 2012 年 1 月にも予定されています。

Program	MONTH	TOPIC	Lecturer
AE	June 2011	1) Outline of Hybrid and Electric Vehicle 2) Application of “ORIGAMI” engineering	Prof.Dr.Hiroaki MORIMURA
	July 2011	Particle Type Kalman Filters for Nonlinear Systems : Theory and Applications	Prof.Dr.Masaaki YAMAKITA
		New energy conversion systems using NANO-Gap thermophotovolatics and SOFC with proton conductor anodes	Prof.Dr.Katsunori HANAMURA
	September 2011	Energy Supply & Automobiles in the future	Prof.Dr.Takeyuki KAMIMOTO (Prof.Emeritus Tokyo Tech)

Prof.Hiroaki Morimura

Prof.Masaaki Yamakita

Prof.Katsunori Hanamura

Program	MONTH	TOPIC	Lecturer
ICTES	July 2011	Speech and Language Processing: HMM-Based Approach to Expressive Speech Synthesis with Diverse voices and styles	Prof.Dr.Takao KOBAYASHI
		Speech and Language Processing: Acquisition of Sentiment Lexicon and Its application to sentiment classification	Prof.Dr.Manabu OKUMURA
		Smart Wireless Communication: A New Type of Wireless Receiver Front-End: Direct Sampling Mixers	Prof.Dr.Kiyomichi ARAKI
	August 2011	Information Theory : Introduction to the Information Theoretic Security and the Secure Multiplex coding	Prof.Dr.Ryutaroh MATSUMOTO
		Digital System Design : Multiprocessor System-on-Chip (MPSOC) Design Framework using Tightly-Coupled Thread Model	Prof. Dr.Tsuyoshi ISSHIKI

Seminars are advertized through NSTDA, supporting companies, partner universities and email. Attendees include students from both programs, NSTDA researchers and staff, and interested members of the general public.

このセミナーは TAIST- Tokyo Tech、TAIST 参加大学関係者、NSTDA 等を通じて広くアナウンスされ、賛助会企業様、TAIST 学生、NSTDA 職員、一般の興味を持った方々など様々な参加者を集めています。東工大教員による最新のセミナーを実施しておりますので、興味を持たれた方は是非お気軽にご参加ください。次ページのメールアドレスに事前予約をするだけで参加可能です（聴講無料）。

Seminar posters:

セミナーポスター例

TAIST-Tokyo Tech continues to offer relevant and up-to-date seminars led by professors from Tokyo Tech. We hope you will take part.

Interested in attending a free TAIST-Tokyo Tech seminar? Please reserve your seat by Email: **chayanan@nstda.or.th**

For more information, contact the Tokyo Tech Office (Thailand),
Second Floor, Incubator Wing Building (same building as Bangkok Bank) ,
Tel. 02-5648016-18 or 02-5647000 ext. 1257

MTEC laboratory visit

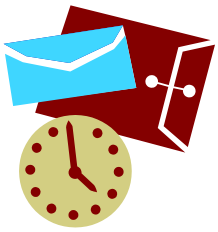
TAIST-Tokyo Tech arranged for a visit of MTEC laboratories on 28 July, 2011. Seven laboratories welcomed AE students of the fifth entering class:

1) Powder Characterization lab
2) Automotive lab
3) SEM and X-ray Microanalysis lab
4) Bioenergy lab
5) Plastic Technology
6) Powder Metallurgy
7) Near Net Shape Metal Manufacturing lab

The objective of the visit was to provide students with knowledge from the laboratories, not only focusing on the advanced technologies used and how to use the equipment safely, but also on formulating research topics. Students get ideas on such visits and will then decide which lab they prefer to work with after finishing their first-year course work.

2011 年 7 月 28 日、AE プログラム 5 期生は MTEC の 7 研究室を訪問しました。この研究室見学の目的は、各研究室で使われている最先端機材の安全な使い方を学ぶだけではなく、研究テーマのヒントを得ることでもあります。　学生たちは自ら研究アイディアを探し出し、自分の所属する研究室を選ぶ参考とします。

Advanced technological equipment in MTEC laboratories



TAIST JOB FAIR

TAIST Executives with 5 representative of supporting companies

Job Fair 2011, our first, was held August 3, with five companies participating and recruiting students. The Fair was attended by over 90 students and graduates.

2011 年 8 月 3 日、TAIS- Tokyo Tech は 5 社の賛助会企業様にご協力頂き、ジョブフェアー（就職説明会）を実施しました。これは、TAIST 修了生を中心とした、優れた学生と高度な人材を求める企業のマッチングを目指したもので、今回が第 1 回目です。魅力ある有名企業による説明会ということから、90 名を越える学生が参加し、盛況となりました。参加いただいた企業は以下の 5 社です。

Companies recruiting at the Job Fair:
- The ISUZU Group Foundation,
- Mitsubishi Electric Corporation,
- Nissan Motor Asia Pacific Co.,Ltd (formerly Nissan Technical Center South East Asia Co.,Ltd.)
- PTT Chemical Public Company Limited and
- UBE Chemicals (Asia) Public Company Limited.

Dr.Somnuk S.

Prof. Dr. Nobuo Fujii

Dr. Somnuk Sirisoonthorn, TAIST-Tokyo Tech Director, opened the Fair and gave the opening address. Prof. Dr. Nobuo Fujii and Prof. Dr. Akinori Nishihara, representing Tokyo Tech, gave welcoming addresses.

TAIST-Tokyo Tech ディレクターであるソムヌック氏の開式の言葉に続き、東工大代表の藤井教授、西原教授からの歓迎挨拶とともに始まりました。

Prof. Dr. Akinori Nishihara

Company recruiters gave overviews of their companies and of available positions. All attendees gained much fruitful information, including details of positions offered at the different companies. This was a good opportunity for TAIST-Tokyo Tech students and the companies to get to know each other.

参加いただいた企業様には、それぞれ会社概要や採用枠について説明頂き、参加した学生は多くの参考になる情報や募集職種の説明を聞くことができました。この説明会は、TAIST 学生と企業が互いを知る良い機会になることと思われます。



At the Job Fair ジョブフェアー会場の様子

UBE Technical Center (Asia) Limited (UTCA) presented a special lecture, Research & Development in a Petrochemical Company, by senior researchers Dr. Siricharn Jirapongphan and Dr. Athapol Kitiyanan.


UTCA special lecture

また、UBE Technical Center (Asia)からは、同社研究者であるシリチャーン氏及びアサポン氏による「石油化学会社における研究開発」と題した特別講演がありました。学生にとっては、企業における研究職のイメージが湧いたことでしょう。

TAIST-Tokyo Tech not only invited TAIST, TGIST, AND NUIRC scholars, but also master's students from our partner universities. The special lecture session was open to researchers and the general public.

TAIST- Tokyo Tech は TAIST の学生のみならず、NSTDA の奨学金である TGIST 及び NUIRC を受給している学生も TAIST 参加大学より参加可能とし、また特別講演については研究者や一般の方にも参加頂きました。今後も、このジョブフェアーは継続して行う予定です。

National Science and Technology Fair 2011
タイ国科学技術フェア 2011

Her Royal Highness Princess Maha Chakri Sirindhorn opened the National Science and Technology Fair (NSTF), 2011, on August 9. In the photograph below, the Princess visits the TAIST booth while students from King Mongkut's Institute of Technology Ladkrabang explain the Student SAE Formula racing car.

Her Royal Highness Princess Srirasm, Royal Consort to His Royal Highness Crown Prince Maha Vajiralongkorn, accompanied by His Royal Highness Prince Dipangkorn Rasmijoti, visited the NSTDA-TAIST corner on August 21.

2011 年 8 月 9 日、シリントーン王女殿下のご挨拶とともに、タイ国科学技術フェア（NSTF）2011 が開幕されました。この写真は王女殿下が我々TAIST の展示ブースを御訪問くださった時のものです。KMITL の学生が代表して、王女殿下に SAE 学生フォーミュラレーシングカーの説明を行いました。

また、8 月 21 日にはシーラット王女殿下（マハ・ワチラロンコーン皇太子妃）がティーパンコーン王子とともに NSTF を御訪問されました。



SAE 学生フォーミュラレーシングカーに興味を持ち、試乗を楽しむ見学者たち

*Enjoy the ride! Interest in our **SAE Student FORMULA** racing car.*

The National Science and Technology Fair, 2011 was hosted by the National Science Museum of the Ministry of Science and Technology, August 6-21 at the Bangkok International Trade and Exhibition Centre (BITEC). This is the largest science and technology exposition in Thailand.

The event is held every August, coinciding with National Science Day and honoring His Majesty King Rama IV, “the Father of Science in Thailand”, and the present king, His Majesty King Bhumibol Adulyadej, “the Father of Thai Technology and Innovation”. This event helps to stimulate interest in science and technology and promotes knowledge and understanding while disseminating advances in science and technology research to young people and the general public.

国立科学博物館及びタイ国科学技術省主催による「ナショナル科学技術フェア 2011」を８月６日から８月２１日に BITEC にて開催しました。これはタイにおける科学技術フェアで最も規模の大きなものです。このイベントは、毎年「科学の日」にちなんで８月に開催されます。この行事の１番の目的は、「タイの科学の父」、また「タイの技術・発明の父」とも呼ばれるラマ４世殿下を称えることですが、それと同時に科学技術や知識への興味・関心を高めることでもあります。

What is Student Formula SAE?

Student Formula SAE (FSAE) competitions are racing car competitions for students licensed by the Society of Automotive Engineering (SAE). The first competition was held 25 years ago and today more than 200 student teams compete worldwide. Competitions under FSAE rules are held in the United States, Brazil, Australia, Asia, Italy, the United Kingdom and Germany.

学生フォーミュラ SAE（FSAE）は自動車工学学会主催の学生のみが参加できる、レーシングカーコンペティションです。第１回大会は今から２５年前に開催され、以降２００以上のチームが世界中からこの大会に参加してきました。このような大会は、

ヨーロッパ、南アメリカ、オーストラリア、アジアの様々な国々で同様のスタイルで行われています。

The Student Formula SAE Competition

FSAE competitions pit student teams against each other in designing and building the best formula racing car. The teams consist only of students and are student-led as well. The teams are scored by idea, engineering skill and knowledge, driver skill and teamwork.

The competition includes two sections, Static Events and Dynamic Events, with scores given on the following events.

Static Events

- Engineering Design
- Cost Analysis
- Presentation

Dynamic Events

- Acceleration
- Skid Pad
- Autocross
- Endurance
- Fuel Economy

For further information, please refer SAE Rulebook.
http://students.sae.org/competitions/formulaseries

Library Training for TAIST Students
TAIST 学生のための図書館ガイダンス

Each year, TAIST-Tokyo Tech invites a Science and Technology Knowledge Services (STKS) official to instruct students of both the AE and ICTES programs in the use of library services. This year, the talk was held 13 June 2011 in Bussakorn Room, NECTEC building.

TAIST- Tokyo-Tech は、毎年 AE・ICTES 両プログラム学生のため、科学技術情報サービス（STKS）の職員をお招きし、図書館サービスについての講義をしていただいています。2011 年は 6 月 13 日に実施しました。

New students learn better how to use the nine STKS services at the presentation.

One such service is the online research database, ScienceDirect. According to the Wikipedia entry, “ScienceDirect is one of the largest online collections of published scientific research in the world. It is operated by the publisher Elsevier and contains nearly 10 million articles from over 2,500 journals and over 6,000 e-books, reference works, book series and handbooks issued by Elsevier. The articles are grouped in four main sections: Physical Sciences and Engineering, Life Sciences, Health Sciences, and Social Sciences and Humanities. For most articles on the website, abstracts are freely available; access to the full text of the article (in PDF, and also HTML for newer publications) requires a subscription or pay-per-view purchase.”

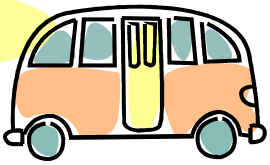
For more information, visit the STKS website at http://stks.or.th.

このガイダンスにより、TAIST 新入生たちは STKS にある９種のサービスのより効率的な使い方を学びます。

サービスの１つに、オンライン研究データベースの「サイエンス・ダイレクト」があります。「サイエンス・ダイレクト」は世界最大の出版された科学論文データベースの１つです。出版社エルゼビアによって運営され、エルゼビアから刊行される 2,500 誌以上の学術誌、6000 冊以上の電子書籍、参考研究、書籍やハンドブックから約１千万の記事が集約されています。

記事は物理科学工学、生命科学、厚生科学、人文社会科学４つの大きなカテゴリに分類されています。記事のほとんどはウェブサイトからアクセス可能で、概要は自由に見ることができ、全文は会員になる、もしくはペイ･パービュー方式により見ることができます。

Inviting Host Companies for TAIST Students Study Tour



TAIST 学生見学ツアー受入企業様募集！

TAIST arranges two to three study tours for our TAIST students every year, soliciting companies to host visits to their factories. These tours not only give our students the opportunity of experiencing real-life applications of technologies, but also help them to form goals and a strong sense of direction for the future.

At the same time, these tours are an excellent public relations opportunity for hosting companies. By hosting a tour, companies are able to communicate their needs to the students while learning of student needs as well.

All a company needs do is to appoint a guide to conduct the company tour, Tokyo Tech takes care of the rest, including chartering a bus.

These study tours have always been very successful, and fun too!

Take this great opportunity and sign up to host a study tour!!

TAIST 事務室では、年に２～３回の TAIST 学生向け工場見学ツアーを実施しています。このツアーは、学生にどのように技術が実生活に生かされているか学ぶ機会を与えるだけではなく、将来のビジョンを固める助けともなっています。

また、一方で見学を受け入れてくださる企業の皆様にとっても、学生からニーズや要望を聴くと同時に、企業側のニーズや要望を学生に伝えるチャンスとなります。

受入企業様にはご案内頂く担当者をご指名頂くだけで、その他必要なバス等の手配は TAIST 事務室にて行います。是非この機会をご活用ください（受入のお申し出は随時受け付けております）。

Companies that have hosted TAIST student tours
過去に訪問させていただいた工場

- Toyota Banpo Factory
- Fujikura
- PTT Research
- Technology Institute (PTT Group)
  and many more!

Interested in hosting or need more information?

Contact Tokyo Tech Office (Thailand)
Phone: 02-564-8016
E-mail: chayanan@nstda.or.th
taist@jim.titech.ac.jp(日本語)
Contact Person: Ms. Chayanan

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TAIST Tokyo Tech Office, National Science and Technology Development Agency
http://nstda.or.th/taist_tokyo_tech/
111 Thailand Science Park, Phaholyothin Road, Klong 1, Klong Luang, Pathumthani 12120
Ms. Chayanan: **chayanan@nstda.or.th** Phone: 66-2-564-8017 FAX: 66-2-564-8019

東京工業大学タイオフィス：Tokyo Tech Office (Thailand)
http://www.ttot.ipo.titech.ac.jp/index.html
P-205 Thailand Science Park, 111 Phaholyothin Rd., Klong 1, Klong Luang, Pathumthani 12120 Phone: 66-2-564-8016 to 8018 FAX: 66-2-564-8019
Ms. Krittaya: mailto:**krittaya@titech.in.th**
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