



UNIVERSITI
SAINS
MALAYSIA



INSTITUTE OF
POSTGRADUATE
STUDIES

Automotive Electronics and Magnetism

Electronics and Automobiles

Date: 14 January 2015

Time: 9 am – 11 am

Lecturer : Dr Shinichiro Mito
Venue: Seminar Room, Level
1, SERC, Engineering Campus

This lecture will be covering the three types of electronic devices which are used in automobile industries. First, we will discuss about Electronic control unit (ECU). It is a generic term for any embedded system that controls one or more of the electrical system or subsystems in motor vehicles. Types of ECU include electronic/engine control module (ECM), power-train control module (PCM), transmission control module (TCM), brake control module (BCM or ECBM), central control module (CCM) and others. Some modern motor vehicles have up to 80 ECUs.

The lecture is going to cover the entry-level electric and electronic circuits, micro-controller, field programmable gate array and their applications. Second, we will look over electronic sensors. The discussion will include thermometers, illuminometers, pressure sensors and magnetic-field sensors. Finally, we will think about Light emitting diode (LED) head light.

Magnetism and Automobiles

Date: 14 January 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Shinichiro Mito
Venue: Seminar Room, Level
1, SERC, Engineering Campus

Magnetism is the one of the most important parts of automobile technology. Especially, permanent magnets are influential for development of the Hybrid car and an Electric car. This lecture will cover the principle and history of permanent magnets.

Recently, strength of a magnet has rapidly increased. Development of Samarium-cobalt magnet in 1970s and Neodymium magnet in 1982 are breakthrough. Neodymium magnet is the strongest magnet at the present day. Maximum energy product, common figure of a merit of magnet, of the strongest magnet has increased by about ten times over the past century. Motors for hybrid car, such as Toyota PRIUS, is familiar application of strong permanent magnet. PRIUS utilize very compact powerful motor, which is using Neodymium magnet. Strength of the permanent magnet affects the size, weight and efficiency of a motor.

We will begin the lecture by defining magnetic materials. Then, we will discuss about principle of a permanent magnet shortly. Finally, we will trace the history with the principle of magnets.

Electronics and Automobiles

Date: 20 January 2015

Time: 9 am – 11 am

Lecturer: Dr Shinichiro Mito
Venue: IPS Training Room,
Main Campus

This lecture will be covering the three types of electronic devices which are used in automobile industries. First, we will discuss about Electronic control unit (ECU). It is a generic term for any embedded system that controls one or more of the electrical system or subsystems in motor vehicles. Types of ECU include electronic/engine control module (ECM), power-train control module (PCM), transmission control module (TCM), brake control module (BCM or ECBM), central control module (CCM) and others. Some modern motor vehicles have up to 80 ECUs.

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Digital Information and Communication Technology for ITS

ITS (Intelligent Transport System)

Date: 15 January 2015

Time: 9 am – 11 am

Lecturer : Dr Hideyuki Kobayashi
Venue: Seminar Room, Level 1, SERC,
Engineering Campus

Recently, serious road traffic problems have occurred in the Asian region. Intelligent Transport Systems (ITS) are a solution of these problems. It is called the ITS to communicate between cars and roads. The ITS solve problems about road traffic such as traffic congestions, air pollution and traffic accidents. This lecture centrally explain wireless communication using on the ITS. And then, you will learn applications of the ITS. This lecture targets a student who wants to know about wireless communication.

If you have never learned it, you do not be afraid. I will support you.

Many sensors and devices communicate on the ITS. If sensors connect using wireless network, we are able to sense something to be easier, deeper, and more convenient. This lecture explains outline of the wireless sensor network. First, this lecture explains fundamental of wireless communication. Finally, I explain background and outline of sensor network.

This lecture will be provided as an active learning. Thus, it is important to discuss with other students, get knowledge from classmates and enjoy discussions. If you want to need, I will help you.

Wireless sensor network

Date: 15 January 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Hideyuki Kobayashi
Venue: Seminar Room, Level 1, SERC,
Engineering Campus

Recently, serious road traffic problems have occurred in the Asian region. Intelligent Transport Systems (ITS) are a solution of these problems. It is called the ITS to communicate between cars and roads. The ITS solve problems about road traffic such as traffic congestions, air pollution and traffic accidents. This lecture centrally explain wireless communication using on the ITS. And then, you will learn applications of the ITS. This lecture targets a student who wants to know about wireless communication.

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ITS (Intelligent Transport System)

Date: 21 January 2015

Time: 9 am – 11 am

Lecturer : Dr Hideyuki Kobayashi
Venue: IPS Training Room, Main
Campus



Next-generation Energy Source

Next generation energy source – Biofuel

Date: 16 January 2015

Time: 9 am – 11 am

Lecturer : Dr Shin-ichi Akazawa

Venue: Seminar Room, Level 1, SERC, Engineering Campus

Recently, experts predict that the world's supply of petroleum. It is serious problem around the world. Electrical power plants and cars are powered by petroleum products. When the world's petroleum supply has exhausted, we will not be able to do anything. Furthermore, almost all chemical products are made from petroleum. In order to overcome this problem, we should develop alternative energy sources such as biofuel and solar energy. The biorefinery concept which produces various fuels and products from biomass, is very significant to many researchers. In fact, biofuel has become a major source of energy for some countries like Brazil.

This lecture presents comprehensive introduction of the next-generation energy source called biofuel.

How to make biofuel? – from the view of genetic engineering

Date: 16 January 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Shin-ichi Akazawa

Venue: Seminar Room, Level 1, SERC, Eng Campus

The biofuel is one of the most important next-generation energy sources. Genetic engineering which can operate a gene modified artificially is absolutely an imperative technique to make biofuels. The genetic engineering is a new technology that has rapidly developed from the 1990s. This technology became widespread on various fields such as food and medicine. A significant example of genetic engineering in the field of medicine is the development of induced pluripotent stem (iPS) cells. iPS cell technology is a key technique for next-generation regenerative medicine. Genetically modified food is another example of genetic engineering which is widely popular in the worlds right now. This lecture presents fundamentals of genetic engineering and its application, with focus on biofuels.

Next generation energy source – Biofuel

Date: 22 January 2015

Time: 9 am – 11 am

Lecturer : Dr Shin-ichi Akazawa

Venue: IPS Training Room, Main Campus

Recently, experts predict that the world's supply of petroleum. It is serious problem around the world. Electrical power plants and cars are powered by petroleum products. When the world's petroleum supply has exhausted, we will not be able to do anything. Furthermore, almost all chemical products are made from petroleum. In order to overcome this problem, we should develop alternative energy sources such as biofuel and solar energy. The biorefinery concept which produces various fuels and products from biomass, is very significant to many researchers. In fact, biofuel has become a major source of energy for some countries like Brazil.

This lecture presents comprehensive introduction of the next-generation energy source called biofuel.

Development of Sustainable Urban Transport Systems

Traffic safety measurement

Date: 4 February 2015

Time: 9 am – 11 am

Lecturer : Dr Jun Sakamoto

Venue: Seminar Room, Level 1, SERC, Engineering Campus

Malaysia is facing a serious traffic accident with the large rise in motorization in the recent years. The number of dead people in the country had been increasing, and recent value was 2.4 per 10,000 which is fifth times of Japan's rate. The government adapts road safety strategy for 2011-2020. Citizens have been interested in the problem.

This session gives an explanation about the topic of traffic safety measurement. First, I explain traffic accident analysis. It is important to recognize that traffic accident is a rare event. Secondly, I expound the effectiveness and evaluation of traffic safety measurement considering cost benefit aspects. Finally, I introduce the traffic safety measurement using new technology. The possibility of probe car data utilization has been examined in Japan.

In Malaysia, the car ownership has been growing rapidly in recent years. It causes serious urban transport problems such as traffic congestion, environmental concerns. Thus, there is a need to appropriately shift from using private car to public transport.

This lecture gives an explanation about the topic of urban public transport. First, I explain the public transport's impact to the society. The development of the transport system affects not only the improvement of convenience but also the formulation of urbanization. Secondly, I expound how to support public transportation. It has a relationship with not only current transit use but also public engagement. Finally, I introduce a mobility management. In Japan, the measure for recalling about appropriate car use has started recently.

Urban public transport

Date: 4 February 2015

Time: 2.30 pm – 4.30 pm

Lecturer: Dr Jun Sakamoto

Venue: Seminar Room, Level 1, SERC, Engineering Campus

Malaysia is facing a serious traffic accident with the large rise in motorization in the recent years. The number of dead people in the country had been increasing, and recent value was 2.4 per 10,000 which is fifth times of Japan's rate. The government adapts road safety strategy for 2011-2020. Citizens have been interested in the problem.

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Traffic safety measurement

Date: 10 February 2015

Time: 9 am – 11 am

Lecturer : Dr Jun Sakamoto

Venue: IPS Training Room, Main Campus



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The Role of Mechanical Engineering in the Automobile Industry

Mechanical engineering relevant to the automobile

Date: 5 February 2015

Time: 9 am – 11 am

Lecturer : Dr Seiji Fujiwara

Venue: Seminar Room, Level 1, SERC, Engineering Campus

Mechanical engineering is one of the most important departments in the development or manufacture of an automobile. The department of mechanical engineering is mainly consists of following five engineering fields; material and material mechanics engineering field, energy engineering field, design and production engineering field and control engineering field. The Department of mechanical engineering is well known for almost all of students, but few students know the detail of this department. In this session, I will explain the each field of mechanical engineering briefly through the development and manufacture of automobile and understand where/how the mechanical engineering is relevant to the automobile industry.

I hope that this session will be helpful or become motivation of students who begin to study mechanical engineering.

Engine system of automobile

Date: 5 February 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Seiji Fujiwara

Venue: Seminar Room, Level 1, SERC, Engineering Campus

In this session, an automobile engine system is focused on and following three topics are explained; the principle of engine system, introduction of actual engine cycle, and why the jet engine is generally not used for an automobile. I will explain the engine system using the first and second law of thermodynamics. In order to understand these topics completely, sufficient knowledge of thermodynamics is required. However, students of not only mechanical engineering department but also other department ought to be able to understand the contents of this session because the explanations are carried out from the fundamental topics of engine system. I hope that this session provides a spark for student to take an interest in engine system.

Mechanical engineering relevant to the automobile

Date: 12 February 2015

Time: 9 am – 11 am

Lecturer : Dr Seiji Fujiwara

Venue: IPS Training Room, Main Campus

Mechanical engineering is one of the most important departments in the development or manufacture of an automobile. The department of mechanical engineering is mainly consists of following five engineering fields; material and material mechanics engineering field, energy engineering field, design and production engineering field and control engineering field. The Department of mechanical engineering is well known for almost all of students, but few students know the detail of this department. In this session, I will explain the each field of mechanical engineering briefly through the development and manufacture of automobile and understand where/how the mechanical engineering is relevant to the automobile industry.

I hope that this session will be helpful or become motivation of students who begin to study mechanical engineering.

The automobiles emit gas to the atmosphere and it contains NO_x, Particle Matters and so on. These pollutants cause some disease on human. Therefore there are laws to limit the materials in the gas emitted from automobiles in Japan. I will explain about these laws and standards and the atmospheric environmental impact caused by the automobile. In addition, the materials emitted from automobiles are taken into a rain falling through the atmosphere or accumulate on the ground and flush by a rain and flow into reservoirs. They might cause the acidic or polluted phase in reservoirs. I will talk that the mechanisms which the emitting gas draw the bad impact to the water environment.

There are some water environmental problems occurring in the Southeast Asia now. For example the polluted reservoirs by heavy metals, Hg and As, high eutrophication in lakes and coastal area, infection of diseases by poor salinity system in urban area. These problems used to be occurred in Japan and known as diseases, e.g. Minamata Hg disease, Toyama As disease and others. However we solved them to use the remediation technologies and scientific approaches for many years. I will talk these problems why it was occurred, what mechanism was happened, what kinds of health problems were occurred and how to remediate these serious polluted situations. And I would like to discuss with you about the problems, causes, the methods of remediation and management of them.

The automobiles emit gas to the atmosphere and it contains NO_x, Particle Matters and so on. These pollutants cause some disease on human. Therefore there are laws to limit the materials in the gas emitted from automobiles in Japan. I will explain about these laws and standards and the atmospheric environmental impact caused by the automobile. In addition, the materials emitted from automobiles are taken into a rain falling through the atmosphere or accumulate on the ground and flush by a rain and flow into reservoirs. They might cause the acidic or polluted phase in reservoirs. I will talk that the mechanisms which the emitting gas draw the bad impact to the water environment.

Environmental Issues Focused on Automobile, Atmosphere and Water

The environmental impacts by automobile

Date: 11 February 2015

Time: 9 am – 11 am

Lecturer : Dr Yoshitaka

Matsumoto

Venue: Seminar Room, Level 1, SERC, Engineering Campus

Water environmental problems

Date: 11 February 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Yoshitaka

Matsumoto

Venue: Seminar Room, Level 1, SERC, Engineering Campus

The environmental impacts by automobile

Date: 13 February 2015

Time: 9 am – 11 am

Lecturer : Dr Yoshitaka

Matsumoto

Venue: IPS Training Room, Main Campus



Materials in Cars and Building Structures

Earthquake damages of structures regarding cars

Date: 25 February 2015

Time: 9 am – 11 am

Lecturer : Dr Tsutomu Iwashita

Venue: Seminar Room, Level 1, SERC, Engineering Campus

The 1995 Kobe Earthquake caused tragic damage to a lot of structures and killed over 6,000 people and injured 40,000 people. Structures include buildings and non-buildings regarding cars such as highways. Highways, office buildings and houses fell down. That, of course, paralyzed traffic and hampered rescue. The damages of structures will be introduced in the lecture. The lecture will provide the information about why the structures were subjected to damages from the earthquake. In addition, you will learn the technology about how to prevent damaging from a large earthquake.

The structure of Tokyo Sky Tree

Date: 25 February 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Tsutomu Iwashita

Venue: Seminar Room, Level 1, SERC, Engineering Campus

Tokyo Sky Tree in Japan is the largest tower in the world. It was built in 2012. To build the world highest tower in Japan where there is a possibility that a large earthquake will occur, the engineers involved in Tokyo Sky Tree used advanced technology including new materials and construction methods, which will be introduced in the lecture. In addition to that, you will also learn basic knowledge about how to design and build a tall tower. To be more specific, you will learn structural members and truss structures.

Earthquake damages of structures regarding cars

Date: 26 February 2015

Time: 9 am – 11 am

Lecturer: Dr Tsutomu Iwashita

Venue: IPS Training Room, Main Campus

The 1995 Kobe Earthquake caused tragic damage to a lot of structures and killed over 6,000 people and injured 40,000 people. Structures include buildings and non-buildings regarding cars such as highways. Highways, office buildings and houses fell down. That, of course, paralyzed traffic and hampered rescue. The damages of structures will be introduced in the lecture. The lecture will provide the information about why the structures were subjected to damages from the earthquake. In addition, you will learn the technology about how to prevent damaging from a large earthquake.

Materials in Cars

You will learn relationships between chemistry and automobiles. The cars are comprised of such as metals, plastics and glasses. These material designs are based on chemistry. Fuels are also indispensable to drive a car. How many kinds of elements do we need to make a car? After this class, you will understand how basic chemistry is important for the fundamental engineering. You will also study the periodic table, typical elements and transition metal elements, hydrocarbons, organic polymers, reaction kinetics and environmental chemistry. High school level of chemistry and mathematics are required.

Chemistry of cars

Date: 3 March 2015

Time: 9 am – 11 am

Lecturer : Dr Toru Okawara

Venue: Seminar Room, Level 1, SERC, Engineering Campus

You will learn about catalytic degradation of harmful exhaust gas from cars. The cars emit huge amount of carbon dioxide as well as toxic gases such as Sox, NOx and other fine particles. If we stop considering the harmful exhaust gases, the world air pollution will become worse. To avoid the serious situation, we should control the exhaust gases from cars. In this second lecture, we will focus on degradation method of the exhaust gases. Currently, cars must be equipped with a catalyst converter. The catalyst, so called 'Three-way Catalyst' consists of ceramics and some platinum-group metals. You will also learn about reaction mechanisms of degradation processes. The attendance at the first session is required.

Inorganic catalysts for degradation of exhaust gases

Date: 3 March 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Toru Okawara

Venue: Seminar Room, Level 1, SERC, Engineering Campus

You will learn relationships between chemistry and automobiles. The cars are comprised of such as metals, plastics and glasses. These material designs are based on chemistry. Fuels are also indispensable to drive a car. How many kinds of elements do we need to make a car? After this class, you will understand how basic chemistry is important for the fundamental engineering. You will also study the periodic table, typical elements and transition metal elements, hydrocarbons, organic polymers, reaction kinetics and environmental chemistry. High school level of chemistry and mathematics are required.

Chemistry of cars

Date: 6 March 2015

Time: 9 am – 11 am

Lecturer : Dr Toru Okawara

Venue: IPS Training Room, Main Campus



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Architectural Environmental Engineering

An indoor environmental quality in an automobile- oriented society

Date: 4 March 2015

Time: 9 am – 11 am

Lecturer : Dr Ryushi Kimura

Venue: Seminar Room, Level 1,
SERC, Engineering Campus

With motorization in Malaysia, there are concerns that traffic noise and exhaust gas by vehicles cause an indoor environmental deterioration. When you open the window to gain a fresh air, the exhaust gas and noise by vehicles might intrude unwillingly. The deterioration of the indoor environmental quality caused the exhaust gas and noise is threatened your health. These bad indoor environments could cause unhealthy conditions such as asthma and sleep disorder. However, you will improve the indoor environmental qualities by architectural environmental engineering after you receive my lecture.

In this session, some architectural environmental techniques to improve the indoor environmental qualities will be introduced. Group working will be conducted because participants consider their own solution. A number of the preferable participants in this lecture are 40 or less.

Realization of sustainable city in Malaysia

Date: 4 March 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Ryushi Kimura

Venue: Seminar Room, Level 1,
SERC, Engineering Campus

With high economic growing in Malaysia, a demand of a high quality of life with low energy consumption is increasing. To achieve the goal, we have to consider the key concept of 'sustainability'. The first, a concept of smart city as a sustainable city is introduced. The smart city can control an energy usage generated by solar power, wind power efficiently by some architectural technologies. Secondly, we discuss to realize the sustainable city in Malaysia based on the architectural environmental engineering.

In this session, we will conclude about ideal city in Malaysia, after discussing the ideas such as sustainable architectural technology, and human activities in Malaysia. Additionally, group working and active discussion will be conducted because participants consider their own solutions. The participants will be required to join actively discussing and sharing their ideas. A number of the preferable participants in this lecture are 40 or less.

An indoor environmental quality in an automobile- oriented society

Date: 5 March 2015

Time: 9 am – 11 am

Lecturer: Dr Ryushi Kimura

Venue: IPS Training Room,
Main Campus

With motorization in Malaysia, there are concerns that traffic noise and exhaust gas by vehicles cause an indoor environmental deterioration. When you open the window to gain a fresh air, the exhaust gas and noise by vehicles might intrude unwillingly. The deterioration of the indoor environmental quality caused the exhaust gas and noise is threatened your health. These bad indoor environments could cause unhealthy conditions such as asthma and sleep disorder. However, you will improve the indoor environmental qualities by architectural environmental engineering after you receive my lecture.

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Computer Engineering, Numerical Simulation and Automobile

Computer engineering and automobile

Date: 5 March 2015

Time: 9 am – 11 am

Lecturer : Dr Shoichi Furuyama

Venue: Seminar Room, Level 1,
SERC, Engineering Campus

The computer engineering is one of the most important technologies for developing a new automobile product. Especially the computer simulation has been used for about 20 years to develop a new product such as the car shape design by fluid dynamics, the air flow in the room and thermal simulation of engine. The introduction of computer simulation applied to automobile will be lectured in the first lesson. Moreover, the super-computing technique will be introduced because the technique is very important to achieve the high resolution, the high accuracy and the high speed calculation. Students can discuss and understand the connection between the computer engineering techniques and the automobile.

The world's trends of the simulation technology and some basic numerical simulation techniques are lectured in the second lesson. At first, the background of simulation technology will be introduced. Especially the world's trend of High Performance Computing (HPC) such as supercomputer, performances, architecture and usage will be explained. The student will exercise some numerical solvers, such as approximation equations, matrix and differential equations. The students will also study some programming techniques in C / Java languages. The algorithm for the solver will be discussed in the team work. Students will understand the algorithms for numerical solvers from the lecture.

Numerical simulation techniques

Date: 5 March 2015

Time: 2.30 pm – 4.30 pm

Lecturer : Dr Shoichi Furuyama

Venue: Seminar Room, Level 1,
SERC, Engineering Campus

The computer engineering is one of the most important technologies for developing a new automobile product. Especially the computer simulation has been used for about 20 years to develop a new product such as the car shape design by fluid dynamics, the air flow in the room and thermal simulation of engine. The introduction of computer simulation applied to automobile will be lectured in the first lesson. Moreover, the super-computing technique will be introduced because the technique is very important to achieve the high resolution, the high accuracy and the high speed calculation. Students can discuss and understand the connection between the computer engineering techniques and the automobile.

Computer engineering and automobile

Date: 6 March 2015

Time: 3 pm – 5 pm

Lecturer : Dr Shoichi Furuyama

Venue: IPS Training Room, Main
Campus