



Inaugural Professorial Lectures

UniMAP's professors come from a diverse background as well as expertise, enabling the best transfer of knowledge to undergraduates and postgraduates alike. UniMAP has in her "menara gading" an arsenal of renowned names who have carved an illustrious and academically wonderful careers. There have been six inaugural lectures to date, with two from Mechatronic, and one each from Electrical Systems, Materials, Manufacturing and Microelectronic. Profs. Sazali and Zul Azhar are familiar "house-hold" names in the UniMAP circle. Prof. Kennedy is one of the pioneers of KUKUM / UniMAP. Prof. Ryspek would represent the latest addition to our growing family of educators. There are others who profess just as much but have yet to lecture us. We await their lectures too, to adorn the UniMAP hall of fame.

Power Electronics - The Enabling Discipline
Professor Robert T. Kennedy

The significant element in determining the price of the product relies so much in the electrical energy costs of manufacturing, transportation to the sales point, heating or cooling and lighting the shops, and even the production of gasoline for the worker's cars. Due to this, the needs for more efficient usage of electricity is crucial as it account for approximately 40% all of the energy used of which over 50% is used inefficiently, (80%) 'all-on' or 'all-off' electromechanically controlled electric motors. This would bring a major impact on conserving natural resources, reducing electricity bills, making more affordable products that in return increase the standard of living worldwide. In fact, Power Electronics will create efficiency through conversion where 30% of the world's energy could be saved. Here, the Electrical Power Quality too is seen as integral part of the process since it plays an integral part of our way of life - Industry and Business alike. Although the electrical transmission and distribution system is reliable, it is uneconomical to improve power quality at the supply stage despite demand from the digital society. The disturbances it carries will effect production processes severely and lead to financial losses. Here, the paper shall look at the Power Electronic mitigation equipment that serves as enabler to protect from losing plant output to power supply disturbances.

An inaugural lecture is the lecture a person gives upon being bestowed with a certain title / power. In UniMAP's case, its appropriately named professorial, to distinguish from other forms of inaugural lectures. Hence the inaugural professorial lecture is given by newly appointed professors, who can use this lecture platform, to address a bigger and more varied set of listeners. It is a form of showcasing the achievements of the professors, as well as an opportunity to attract fund providers / students etc.

An abstract from each of the six professors are given following this. It is hoped that uniMAP will have many more of such kind to profess and lead UniMAP to greater glory.



Biomimetic Sensor For Quality Control and Standardization of Herbs.**Professor Dr. Mohd Noor Ahmad**

The quality control and phytomedicine standard is facing a tremendous challenge due to the high complexity of herbs. In the research of medicinal herbs, the TLC, GC and HPLC are used in fingerprinting the chemical contents of herbs. However, it takes a long time, is expensive and highly dependant on volatilities and intricacies of the instruments and herbs. Hence, a more analytical and innovative method which can be performed at a faster and economical rate has been initiated with e-nose and e-tongue. The sensors are used for well known herbs in the Southeast Asia; namely *Eurycoma longifolia* or Tongkat Ali. E-tongue consists of number of membrane sensor arrays which emulate human gustatory system. Meanwhile E-nose uses pizeoelectric materials such as quartz, which are layered with lipid-polymer membranes. In order to materialize the organoleptic approach to obtain heightened sensitivities as well as classification and capability of product identification, the inclusion of data; mathematical techniques that combine two or more artificial perception from the analysis of E-tongue and E-nose has also been studied.

Theory of Labor and Machine Productivity**Professor Dr. Ryspek Usubamatov**

The economic growth of a country is depicted through the level of science and technology as most countries in the world today depend heavily on industries regardless small or heavy. To probe further into this claim, the theory of productivity for labour and facilities can be applied in analyzing the industry and country's progress and development of production facilities. This theory focuses on the ratio of quantity of labour expenditure in production annually. Furthermore, the theory also looks at the evaluation of facilities and work force based on productivity, reliability, cost, universality, mobility, quantity and quality. With this, the theory of machines productivity is introduced to further assist the production whereby the aims for the later theory is to increase the output of machineries with high quality products. The theory of machine productivity is so universal that it is applicable to any type of industries due to its three main approaches therein; (1) Scientific and methodical base-main concepts and definitions, (2) Fundamental tendency and methods – discovering reasonable links and regularity of design and development of industrial machines and (3) Applied direction-practical solution of calculation, design, exploitation, and research by criterion of machine productivity.

Helping The Visually Impaired For Their Autonomous Navigation.**Professor Dr. Ramachandran Nagarajan**

The requirements of blind people of today are vast. They wish to enjoy all aspects of life in spite of the fact that they are blind. Moving through obstacles, stationary or dynamic, collision free without human assistance is their most important requirement. This is known as autonomous navigation. Other requirements associated with autonomous navigation are identifying object, knowing the object size, computing object distances and recognizing the directions of its movements. The main technique used in this work of vision substitution for the blind uses a set of digital video cameras. The images captured by the cameras are processed by a portable processing equipment to produce specialized stereo sounds. The sounds provide an information on understanding the presence of the object nearby, its size and its distance so that the blind can either avoid the object and comfortably walk collision free or reach the object, touch and grasp. The image processing technique and image-to-sound conversion procedures are briefly described. A set of video clips also demonstrates the navigating equipment and on how the blind can walk collision free within obstacles.

Acoustic Modeling, Analysis and Applications.**Professor Dr. Sazali Yaacob**

The advent of computer technology is owed to the power of microprocessor speed. Consequently, signal processing has been easier and various techniques can be adopted. Work on signal processing has been limited to certain applications. When we mention about acoustics, two schools of thought come to mind. One school of thought will define it as an energy that is audible to human beings. As such, it is usually related to sound. However, a vibrating steel plate does emit a sound wave. Thus acoustics does also mean vibration. Acoustics is the science of sound and the transmissions of vibrations in gases and solids. The science of acoustics spreads across so many fields in music, medicine, architecture, industrial production, psychology, warfare etc. Less attention is given to acoustics although sound is the next sensory stimulus to vision that provides intelligence to humans. Here, we will look into the use of acoustic technology in several applications from speech recognition, voice pathology, noise control, noise signature, speech intelligibility, speech classification and sound modeling.

Understanding the Small World: An Insight into the Application of Transmission Electron Microscopy in Characterizing Epitaxial Layers**Professor Dr. Zul Azhar Zahid Jamal**

Transmission electron microscopy (TEM) is an unrivalled technique for observing, characterizing and analyzing almost any type of material. In physical science, the first observations of defects (i.e. dislocations) by TEM were published in the 1950s. Since then the technique has been developed into an indispensable tool for materials scientists, not only for the characterization of extended defect structures of material, but also for the understanding of the mechanisms that control their properties. Here, a snapshot on the tremendous power and versatility of this technique is discussed. In addition to the basics and fundamentals of TEM, related research works on the characterization of defects in semiconducting epitaxial layers that I had pioneered and contributed to, namely on the development of large-area TEM specimen preparation technique, the characterization of the diamond-shape defects, and the study of dopant diffusivity via TEM, are presented.

