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MALAYSIA BOARD OF TECHNOLOGISTS

TECHIES

RETHINKING "JOBS" FOR OUR CHILDREN

Datuk Seri Panglima
Wilfred Madius Tangau

INTERVIEW WITH SHAIFUL HISHAM SAMSUDIN

Recipent of the National
Technologist Award 2016

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EDITOR'S NOTE

Datin Paduka Ir. Dr. Siti Hamisah Tapsir
Editorial Adviser / Board Members

Following our inaugural edition that was launched in November 2016, we have worked hard to bring out the best to our bulletin so that it truly caters the needs of both our technology and non-technology communities.

We are proud to present to you the Jan-Mar 2017 issue of TECHies. The feature topic in this issue is Robotics. We bring you a special column from the honourable Minister of Science, Technology and Innovation (MOSTI), YB Datuk Seri Panglima Wilfred Madius Tangau on rethinking "jobs" for our children. We also feature an article from Malaysia Society for Engineering and Technology (MySET). Department of Polytechnic Education writes about pathways that can be taken by graduates of polytechnics and community colleges to achieve professional status. Nano Malaysia Berhad shares some insights about the future of nanotechnology in Malaysia and the need for skilled workers in the said sector. The relations between the need for skilled worker and dependency to foreign labour are also discuss by our columnist.

Exclusive this month, we catch up with the winner of the National Technologist Award 2016, Shaiful Hisham Samsudin, highlighting his recent success in the National Innovation Award 2016. We hope Shaiful Hisham will be an inspiration to our technologists to showcase their talents at the national and international levels in the weeks, months, and years to come.

Proving our support to the government's initiatives to spark the interest of Malaysian students to Science, Technology, Education and Mathematics (STEM), we feature articles on Robotics that has become a trend in the current education world. Indeed, given its fast-rising popularity, robotics will be making huge headways in the future of STEM education in the country.

We hope this edition will inspire everyone to read, write and contribute to MBOT. Happy Reading!

FIND INSIDE

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Robotics Education : Emerging Trend in Technology Education

By Assoc. Prof. Dr. Muhammad Fahmi Miskon

The Institute of Electrical and Electronics Engineers (IEEE) Robotics and Automation Society (RAS)

The Institute of Electrical and Electronics Engineers (IEEE) Robotics and Automation Society (RAS) Malaysia is one of the 24 IEEE Malaysia Section technical chapters in Malaysia. IEEE is a non-profit organization and is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. IEEE and its members inspire a global community to innovate for a better tomorrow through its more than 420,000 members in over 160 countries, and its highly cited publications, conferences, technology standards, and professional and educational activities. IEEE is the trusted "voice" for engineering, computing, and technology information around the globe.

IEEE RAS Malaysia strives to advance innovation, education, as well as fundamental and applied research in robotics and automation. Robotics focuses on systems incorporating sensors and actuators that operate autonomously or semi-autonomously in cooperation with humans. Robotics research emphasizes intelligence and adaptability to cope with unstructured environments. Automation research emphasizes efficiency, productivity, quality, and reliability, focusing on systems that operate autonomously, often in structured environments over extended periods, and on the explicit structuring of such environments.

The society provides aid in promoting close cooperation and exchange of technical information among its members and affiliates, and to this end holds meetings for the presentation of papers and their discussion, sponsors appropriate periodicals and special technical publications, and through its committees studies and provides for the needs of its members and affiliates as well as supporting robotic and innovative competitions and talks around Malaysia. Almost annually IEEE RAS Malaysia organizes the society flagship competition and conferences i.e. the IEEE International Symposium on Robotics and Manufacturing Automation (IEEE ROMA), the IEEE RAS International Robot PRIDE Competition and the IEEE International Symposium on Robotics and Intelligent Sensors (IEEE IRIS). Last year, the IEEE ROMA was conducted as part of the Robot Fiesta Malaysia 2016 held in Universiti PETRONAS Malaysia and IEEE IRIS was conducted in Tokyo, Japan. PRIDE competition was held during both of the events
.

As a society that promotes innovation and education in robotics and automation, the use of robots in education is highly encouraged and 'robots in education' has become one of the regular tracks in any of the RAS Malaysia conferences. In fact the PRIDE competition which is endorsed by the Ministry of Science, Technology and Innovation Malaysia (MOSTI) and Ministry of Education Malaysia (MOE) received participation from primary and secondary schools as well as from colleges and universities. Private robotic clubs also often send children that enroll in their courses to join in the competition. Having to innovate and then to defend ideas to international judges exposes the participants to an innovation culture.

An innovation competition such as PRIDE is the pinnacle of excellence in Robot education. In its background, many courses that teach and use robots in education become the platform for creating the pool of talent from various levels.

In institutes of higher learnings (IHL), colleges as well as secondary and primary schools, robots are used as educational tools for science, technology, engineering and mathematics (STEM) teaching and learning activities.In IHLs, dedicated robotic coursesare designed to prepare graduates for robotics related jobs such as designing new robots and applying existing robots for industrial automation. Other courses use robots as means to demonstrate abstract concepts in STEM, to increaseengagement as well as to expose students to skills required in the futureincluding computational and critical thinking, complex problem solving and creativity. Robotic projects allow learners to be actively involved in knowledge construction. Learners will achieve in-depth understanding of the subject matters by relating their existing information with the new information they obtain while working in robotics project.

Robotics Education in Classroom

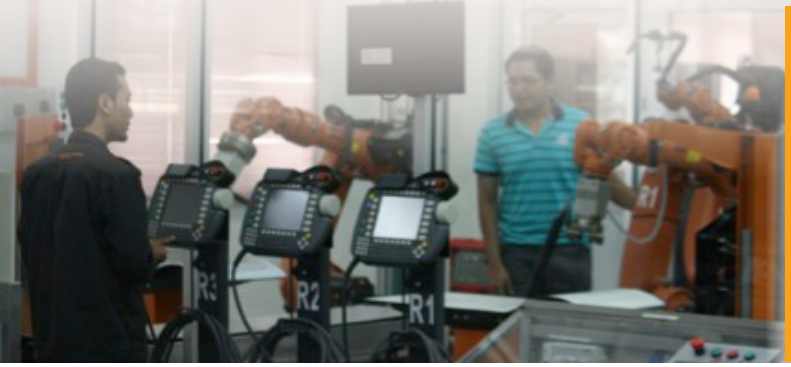
The multidisciplinary knowledge involved in robotics study can systematically be categorized into knowledge in science and technology applications.These includestatics and dynamics, kinematics, mechanisms, controls, sensors, actuators and drives, communications, programming and computing. Many branches of mathematics including algebra, geometry, trigonometry, calculus, probability and statistics areappliedin many of the long lists of disciplines mentioned. In many occasions, other disciplines includingbiology, psychology, computer science, chemistry and even geography arealso involved in branches of robotics study.Considering the multidisciplinary nature of robotics, curriculum design for teaching and learning using robotics has a lot of room to be creative. Almost any knowledge, no matter how basic or how advanced, can be leveraged by the use of robots during learning.

The resources needed in using robots in the classroom must be taken into account before committing to the robotics learning approach. This is

to ensure the ability to sustain the operation and maintenance of the robots and to come-up with a suitable approach in conducting robotic classes. One of the obvious factors is the much higher financial burden to purchase and maintain a robot. Another factor is the requirement to have the expertise to operate the robot. Instructors must also commit to the extra effort required to design suitable learning material and preparation of the robotic modules. They must have the patience and knowledge to troubleshoot many of the technical problems that arise. They must also consider the amount of access and equal opportunity that each individual student will have in interacting with the robot. The capacity of using a robot must be carefully built before the learner is exposed to more complex robotic tasks. Other risks involved in having a robot in the classroom should also be considered. These include the safety of the user and the robot, equipment downtime, incompatibility and limited licensing of the programing software and overwhelming task for the learners in robotics project. With these factors in mind, one needsto carefully think of the worthiness and return of investmentin using robotics in education.

With the huge amount of investment being poured into having robotic technology in the classroom, the utilization of the robot must be optimized. Alignment between all courses that build up the capacity of the learner to use the robot should be done prior to choosing the type of robotic brand. Robotic simulation software that is compatible with the robotic platform should be considered instead of having too many duplicates of the robots. This will reduce cost, improve safety as well as provide more access to students to the learning materials. Moreover, the procurement must carefully consider the period and coverage of the warranty and after sales service.

In conclusion, even though having robots in class is highly beneficial, careful planning and consideration should take place before committing to having robotics modules for the classroom. Appropriate teaching methods need to be formulated and integrated into school curricula to ensure efficiency and effectiveness in deliverables.



Bibliography:
Dr. Fahmi is an associate professor in Universiti Teknikal Malaysia Melaka (UTeM) and an Executive committees (Social and Education) IEEE Robotics and Automation Society (RAS) Malaysia 2017. He was the former Vice Chair IEEE Robotics and Automation Society (RAS) Malaysia 2016. He has a PhD. in ECSE (Robotics) Monash University, Australia.