2021

TEACHING PORTFOLIO

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1 INTRODUCTION

I have started my career as a lecturer in the academic world in the School of Electrical Engineering (SKE) (previously known as Faculty of Electrical Engineering), Universiti Teknologi Malaysia (UTM) (see **Link 1.1**). The appointment started on 08th January 2008, after graduating with my MSc degree at the University of York, the United Kingdom, in 2007 (see **Link 1.2**). In 2013, I completed my Ph.D. under the supervision of the late Prof. Dr. Marzuki Bin Khalid. In improving my career path and professional visibility, I have registered as a member of IEEE, IET, graduate Technologies under Malaysia Board of Technologists (see **Appendix 1.1**) and graduate engineer under Board Engineer of Malaysia (see **Appendix 1.2**). In 2018, I was appointed as Nvidia Deep Learning Institute (DLI) ambassador (see **Link 1.3**) to teach AI in the ASEAN region , see **Appendix 1.3**. In the same year, I have been invited to be a member of the Special Interest Group of Machine Learning in Academy Science of Malaysia, see **Appendix 1.4**. In the year 2020, I have been certified as Professional Technologist, see **Appendix 1.5**. Recently, in early June, I have been certified for Chartered Engineer (CEng), UK, see **Appendix 1.6**.

At the beginning of my teaching year, I have been assigned to teach the subject Electrical Technology in the semester 1 2008/2009 session. In the following semester 2 2008/2009, I have been assigned to teach a first-year subject, Instrumentation, for section 6. In 2013, I returned from my study leave and started serving the SKE again and then transferred to Electronic Systems Engineering (ESE), Malaysia-Japan International Institute of Technology (MJIIT) in September 2014. I began to teach several subjects, for example, Digital Signal Processing and Programming for Engineers. In 2015, I started my supervision for Final Year Students and had the opportunity to teach Artificial Intelligence subject, i.e., SMJE 3203, as my expertise and field of interest.

In general, this teaching portfolio covers the whole teaching subject since the beginning of my career at UTM, including my teaching experience in 1) SKE (see **Link 1.4**) and 2) MJIIT (see **Link 1.5**). The list of subjects in two different faculties is shown in **Figure 1-1**.

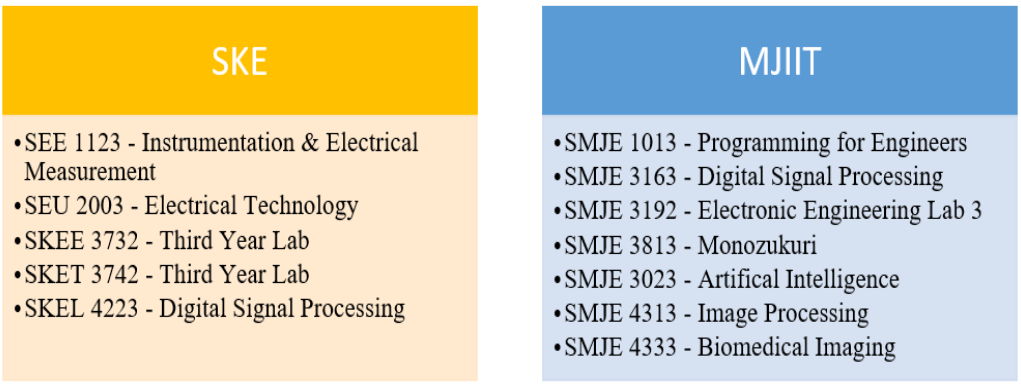

Figure 1-1 Teaching Responsibility in Two Different Faculties

2 TEACHING PHILOSOPHY

"*Bringing the Research Advancement to Classroom for Teaching & Learning*."

My journey started as I was a student. The experience I gained had influenced my teaching philosophy, and I well-used it into my teaching career as an academician right after graduating with my MSc degree

in 2007. I like what I do, and I need my students to love what they are doing, which is learning. The opportunity to gain research skills either from academia or the industry world has motivated me to share the knowledge and experience with my student. I want my enthusiasm and passion to be portrayed and communicated to my students so that even if they did not get 100% of my lecture, they would be interested enough to come to the class, working together with me to find the best learning approach and even better, to keep learning on their own. Also, the opportunity to synchronous with the industry need will prepare the student for their future job and prepare them as a global player in Industry 4.0. One of the pillars in RR 4.0 is AI as a tool. The value in embracing the teaching philosophy will enable me to align with UTM's vision to become A Premier University Providing World-Class Education and Research. Also, this aligns with UTM's mission to develop Holistic Talents and Prosper Lives Through Knowledge and Innovative Technologies.

As a UTM lecturer and Nvidia Deep Learning Institute (DLI) Ambassador to teach AI in this region, I have been invited to several programs Internationally and involved in teaching. For example, I have been invited as visiting lecturer in Keio University (2016) as shown in **Figure 2-1** (see **Link 2.1**), Kyushu University (2017) as shown in **Figure 2-2** (see **Link 2.2**), and Telkom Bandung University (2018), in Global Learning Week (GLoW) as shown in **Figure 2-3** (see **Link 2.3**). Besides that, I have been invited for a sharing session at University Gadjah Mada, Indonesia (see **Link 2.4**), and Artificial Intelligence Workshop in Thailand (see **Link 2.5**). Since July 2018, I have been responsible for leading the Electronic Systems Engineering Department, MJIIT, where most of my time manages the department and program.

Figure 2-1 Visiting Lecturer in Keio University

Other than that, I have been locally involved in teaching at other universities, for example, research sharing sessions at Universiti Malaysia Pahang (UMP), Universiti Teknologi Melaka (UTeM). I am also active in Industrial Talk for Nvidia Ambassador and several workshops at the Magic and MTDC program. All these opportunities, will be beneficial as preparation for me to become a future teacher for society, bridging the gap from research to the classroom. Therefore, it can be used to prepare UTM students to be ready for Real Industry World.

Figure 2-2 Visiting Lecturer in Kyushu University.

Figure 2-3 Visiting Lecturer in Telkom Bandung University (GLoW2018)

2.1 Upgrading Course Syllabus

As the Nvidia DLI ambassador and the Members of the ASM Special Interest Group on Machine Learning, I have the opportunity to overview the requirement from the industry and global trends in teaching AI subjects. Therefore, I have aligned the curriculum for SMJE 3203 AI subject in MJIIT to

the latest technique on AI deep learning as part of the subject to cover the industry's needs. Also, the feedback from Mr. Liew Vie from Intel as our Industry Advisory Panel **Appendix 2.1** to revise the curriculum of AI subject by covering latest AI topic is aligned on what we have done at MJIIT. The involvement enhances my knowledge and view of my teaching methods as I have gained more experience and teaching material from the industry. In addition, Nvidia DLI has provided me access to training material for personal training and teaching. Thus, it helps me a lot in improving my teaching methods.

3 TEACHING RESPONSIBILITIES

As mentioned previously, I started my first year teaching at the Faculty of Electrical Engineering in 2007 after I graduated. Then I continued my study for Ph.D. Degree and started teaching again in 2013 at the same faculty. Finally, in May 2014, I transferred to Malaysia-Japan International Institute of Technology in the Electronic System Engineering Department. As a lecturer, I have the teaching responsibility to 1) teaching course subjects and 2) supervised a student.

3.1 Taught Course Subjects

There are several courses that I had been taught covering first year to fourth year subjects, for example, Electrical Technology, Instrumentation, Digital Signal Processing, Programming for Engineers, Artificial Intelligence, etc. In the first semester of 2016/2017, I have been assigned to teach two sections of Programming for Engineers (SMJE1013). SMJE1013 subject introduces the basic concept of problem-solving and programming principles for a scientific and technical application implemented using the C++ language. This course is one of the cores subject to the first-year students, and the total numbers for SMJE 1013 are more than 30. I also have been appointed as the course coordinator for this subject. The responsibility as a course coordinator to coordinate and ensure the teaching resources support is following the content and assessment of the university guidelines.

For the second semester of 2016/2017, this is my second time teaching Artificial Intelligence (SMJE3203) for 1 section. I also have been appointed as the course coordinator for this subject. This course introduces students to the fundamentals of three essential techniques of artificial intelligence (AI), namely, artificial neural networks (ANN), genetic algorithm (GA), and fuzzy logic. Furthermore, this course gives the students appropriate knowledge and skills to develop, design, and effectively analysed these AI techniques for practical problems with some degree of accuracy.

The students will also be given hands-on programming experience developing fuzzy logic and neural networks system and genetic algorithm to solve real-world problems effectively. The section that I taught was section 1 from the Electronic System Engineering Department. Since 2007, I have been taught the following courses as in **Table 3-1** since I joining UTM.

3.2 Student Supervision

Besides teaching, starting from semester 1 2015/2016, I have to supervise final year students completing their final year project (FYP). The FYP covers two subjects, including SMJE 4193 (FYP 1) and SMJE 4193 (FYP 2). Until now, I have been supervised more than 30 students for their final year project. The list of all my FYP students is attached in **Appendix 3.1.**

Moreover, in 2014 I also started to supervise postgraduate students researching for Master's and Ph.D. Study. As the main supervisor, I have 14 Master's students; eight of them have completed their studies. Also, I have 7 Ph.D. students, and 1 of them has graduated recently. The list of postgraduate students under my supervision is as in **Appendix 3.2**. My first Ph.D. student, as shown in **Figure 3-1** is now working as a lecturer in Telkom Bandung University (see **Link 3.1**). Also, another example of my graduate Master's student is shown in **Figure 3-2.**

Table 3-1 Information of Course Teaching Subjects

YEAR OF SEMESTER	SEMESTER (1/2)	SUBJECT CODE	NAME OF SUBJECT	CLASS SIZE	STATUS
2020/2021	1	SMJE1013	Programming for Engineers	>60	Coordinator
2019/2020	2	SMJE 4333	Biomedical Imaging Systems	>15	Coordinator
2019/2020	2	SMJE 4313	Image Processing	>30	Coordinator
2019/2020	1	SMJE1013	Programming for Engineers	>30	Coordinator
2018/2019	2	SMJE3203	Artificial Intelligence	>70	Coordinator
2018/2019	1	SMJE 3813	Monozukuri Project	>30	Shared
2018/2019	1	SMJE1013	Programming for Engineers	>30	Coordinator
2017/2018	2	SMJE3203	Artificial Intelligence	>70	Coordinator
2017/2018	1	SMJE1013	Programming for Engineers	>30	Coordinator
2016/2017	2	SMJE3203	Artificial Intelligence	>70	Coordinator
2016/2017	1	SMJE1013	Programming for Engineers	>30	Coordinator
2016/2017	1	SMJE1013	Programming for Engineers	>30	Coordinator
2015/2016	2	SMJE3203	Artificial Intelligence	>70	Coordinator
2015/2016	1	SMJE1013	Programming for Engineers	>30	Coordinator
2015/2016	1	SMJE1013	Programming for Engineers	>30	Coordinator
2014/2015	2	SMJE3163	Digital Signal Processing	>30	Coordinator
2014/2015	2	SMJE3163	Digital Signal Processing	>30	Coordinator
2014/2015	1	SMJP1013	Programming for Engineers	>30	Coordinator
2014/2015	1	SMJE1013	Programming for Engineers	>30	Coordinator
2013/2014	2	SKEL4223	Digital Signal Processing	>30	Shared
2013/2014	2	SKET3742	Makmal Umum Tahun 3	>30	Shared
2013/2014	1	SKEE3732	Makmal Umum Tahun 3	>30	Shared
2013/2014	1	SKEE3732	Makmal Umum Tahun 3	>30	Shared
2013/2014	1	SKEE3732	Makmal Umum Tahun 3	>30	Shared
2008/2009	2	SEE1123	Instrumentation	>30	Shared
2008/2009	1	SEU2003	Electrical Technology	>30	Shared
2008/2009	1	SEU2003	Electrical Technology	>30	Shared

Figure 3-1 My Ph.D. Student VIVA - Hilman Fauzi Tresna Sania

Figure 3-2 My Master Student VIVA - Wan Siti Nur Shafiqa Wan Musa

3.3 Other Roles

Besides supervising final year students and postgraduate students, I have also been appointed as an industrial training supervisor for SMJG 3026 for undergraduate students. As a supervisor, I am responsible for assessing and evaluating those industrial training student's performances throughout their training session and report. All the reports are carefully assessed based on the university guidelines and then collected for future references. As I mentioned previously, I am also actively

teaching postgraduate students, lecturers, industrial participants for AI upskilling program in Malaysia and ASEAN region. One of the advancement AI sharing sessions with the business community at MDEC is shown in **Figure 3-3**.

Figure 3-3 AI Industry Talk for Business Solution

4 TEACHING METHODOLOGY & STRATEGIES

I choose the appropriate teaching method based on the nature of the subject taught and class condition. Artificial Intelligence (SMJE3203), for instance, requires the students to understand the fundamentals of three important techniques of AI, namely, artificial neural networks (ANN), genetic algorithm (GA), and fuzzy logic. Before learning this subject, students at department ESE, MJIIT, must learn Programming for Engineers (SMJE 1013). Therefore, I explained and demonstrated the ability to develop fuzzy logic, ANN, and GA using appropriate programming languages, software tools, and hardware development for solving the given problem. Then, I apply the design systems using ANN, GA, and fuzzy logic for real-world applications based on the theoretical framework. I use other teaching methods such as student-cantered learning, project-based learning, an assignment, and a group project.

I maximize the usage of e-learning systems that helps me to update all the subject material to my students before the lecture started. Using e-learning, students can get the lecture notes earlier, attempt the quiz and test, submit their assignment anytime. This technology and communication system help us a lot to improve our teaching and education quality.

4.1 Teaching Strategies

My teaching strategies include:

Imply textbook of Artificial Intelligence, C++ Programming in the classroom – Imply a good Artificial Intelligence, C++ Programming textbook recommended by many lecturers and most suitable for students. The book provides a lot of good examples and engineering applications. Recently, the

students have been introduced to online platforms such as Google Colab, see **Link 4.1**. The student is facilitated to use a common programming language for AI development known as python. All these materials make it available to the student even at the beginning of the semester. The screenshot on the provided platform is shown in **Figure 4-1**, see **Link 4.2**.

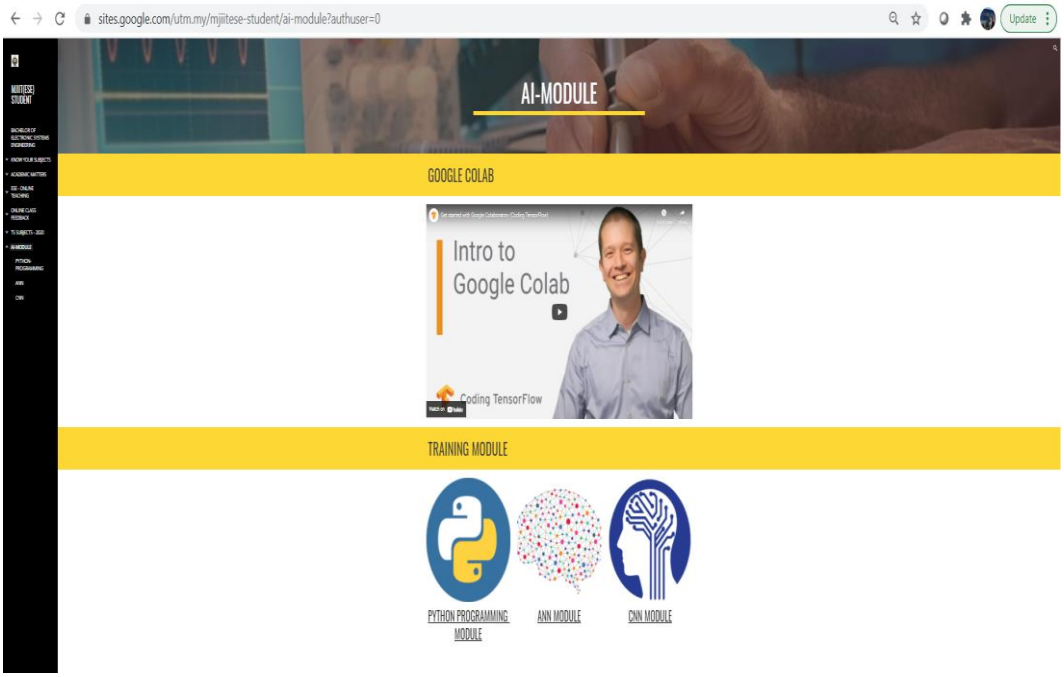

Figure 4-1 AI Platform for the Student using Google Colab.

I. To encourage students to find an example on the open-source website and do some hands-on programming to familiarize themselves with the problem.
II. Show YouTube or video projects to give an idea to the student for better understanding.
III. Provide some practice for the student to increase their knowledge and developed their skills.
IV. Motivate the student to learn and understand certain concepts for their good.
V. Give tutorials or extra exercises to students to increase their understanding and skills of solving the given problems. Well explained the solution of tutorial in the classroom.

4.1.1 Class Sessions

I choose a case study as an approach to the PBL approach in active learning mode in my class. In this session, students are given a recent journal article to discuss. They have to highlight the methods used, identify the research problem and justifications given by the authors. They are also required to critique or comments based on what they have learned in the class. Through a critical discussion, students will learn how basic knowledge can be expanded into fruitful research and at the same time trained to be a critical thinker instead of just absorbing whatever information that they acquire.

I will also survey my teaching method so that as I go along with my lecture, students can give comments or express their opinions, for example, how they like the course to be delivered. This survey is critical because I want my class to be as comfortable as possible to facilitate the learning process. Moreover, some vital UTM graduate attributes have been highlighted, including the skills mentioned above of critical thinking & problem-solving and communication, teamwork, information management, and lifelong learning, entrepreneurship, leadership, pro-activeness and ethics, and integrity. The university urges this are repeatedly being reminded to the student. So that they are aware and focus on what the university is expecting from them and, more importantly, the real world out there is counting on them to deliver by having so-called graduate university students. The general overview and objectives of the course, implementation of the assessment, and review prerequisite

materials are clearly explained. These include the explanation on all the Program Outcome (PO), Course Outcome (CO), Complex Activities (CA), Complex Problem (CP), and Knowledge Profile (KP), which associated with the course taught. I will develop a good rapport with my student that I am friendly, so they are not afraid to approach me on any problem concerned. They are encouraged to see me at any time available for any questions or confusion, which cannot be determined during lecture time. By creating a conducive environment, students will enjoy learning. They will keep up their attention in lectures, and the most important thing is that they are not reluctant to ask and discuss related questions or problems with the lecturer and amongst their colleagues.

I will also take a few minutes to summarize the previous lecture and encourage students to give their opinion on what they have learned from the last class. Then I will correlate them with the new course that will be taught for that day. Doing this will help the student refresh the previous lecture and relate it to the current lecture content. Thus, any misunderstanding on the topic taught could be detected and can be clarified.

4.1.2 Cooperative Learning

In line with the OBE approach, which has been implemented in many higher educational institutions, I have started incorporating cooperative learning techniques during class sessions in the past few years. The student will be given several essential topics and conditions, which are parts of the syllabus, and they were asked to discuss the topics in-group of two or three students. Then they were asked to present their understanding of the given topics. This approach will allow the student to practice their communication skill, critical thinking, accepting different opinions and ideas, and come out with a suitable conclusion.

4.1.3 Coursework – Projects & Group Work

Every semester, I assign my students to several groups to carry on hands-on projects see **Appendix 4.1**. To enhance their understanding of those subjects, I like to allow them to find their favourite topics according to the specific objectives of the coursework. Students can find out how the subjects can help them in their own favourite fields. In addition, students could understand the theory and the outcome by their coursework besides just reading the results from the book. Presenting their works is the last part of the coursework, and it is essential for them, as I will evaluate their works based on the questions that I ask them. Then, they will notice what they have been learned and what they should learn for the next to enhance their understanding.

4.2 Assessment Method

My grading is based on the student's overall performance, which will be assessed throughout the semester. This grading will cover the student's participation in class, afford in submitting assignments, tests, and final exams.

4.2.1 Exam

To assess the cognitive part, the students will have to sit for an exam. For example, in SMJE 3203, there will be test 1, test 2, and the final exam. The question is considered as a high cognitive level of problem-solving. Therefore, test 1 would only cover Week 1 to Week 5, while Test 2 only covers Week 6 until Week 10. In the final exam, most of the topics will be assessed comprehensively from Week 1 to Week 10. The final exam questions will be structured so that they require the students to link all the information they have gained to solve a problem and see a real-engineering problem.

4.2.2 Assignment

The assignment would be given individually or by a group. Students can choose their group members. The assignment's focus is mainly to educate students for life-long learning, especially in gaining recent information about the topic discussed by the AI community. For SMJE3203, the students must complete one assignment. For the written assignments, they must make an executive summary on the latest advancement for selected topics. There would be a limit to how much the students must write, and overextended submission will be penalized. Marks are given based on specified rubrics, which is uploaded earlier in the e-learning portal.

4.2.3 Quiz

The quiz would be held at a random time. During the first introductory lecture, I would inform the students that there will be a quiz as we go along with every topic. It will include just a few short questions. It is just a way to know how my students are catching up with my lecture schedule.

4.2.4 Peer & Teacher Evaluation

This peer/teacher evaluation is for the PBL session. Through discussion and presentation, both psychomotor and affective domains can be evaluated. The students are required to discuss/critics a recent journal article or any topics that they choose. Marks will be given based on specific rubrics.

4.3 Time Management

I am very flexible when it comes to meeting sessions with my student concerning time or place. Whenever is necessary, I will spare my time for discussion with my student even after office hours or during weekends.

4.4 Feedback & Critical Thinking Approach

Feedbacks and comments from my student are crucial for my continuous quality improvement (CQI). Thus, I will survey my teaching method so that as I go along with my lecture, students can give comments or express their opinions, for example, how they like the lecture to be delivered. This feedback is vital because I want my class to be as comfortable as possible to facilitate the learning process. The feedback will be used to resolve any errors about knowledge dissemination techniques and the course content. This continuous improvement is significant for the future betterment of the student learning aspect and as well as for my teaching carrier. In my class, I choose a case study as an approach to PBL. In this session, students are given a recent journal article to discuss. They have to highlight the methods used, identify the research problem and justifications given by the authors. They are also required to critique or comments based on what they have learned in the class. Through a critical discussion, students will learn how basic knowledge can be expanded into fruitful research and at the same time trained to be a vital thinker instead of just absorbing whatever information that they acquire.

5 DESCRIPTION OF COURSE MATERIALS

In general, this teaching portfolio covers the whole teaching subjects since the beginning of my career at UTM including my teaching experience in 1) SKE and 2) MJIIT. Following are brief descriptions of courses that I have been taught: –

1) **Programming for Engineers (SMJE1013) -** This course introduces basic concepts of problem solving and programming principles that appropriate for scientific and technical applications implemented using the C++ language. In this subject we start to introduce mobile apps known as sololearn platform to learn programming (see **Link 5.1**)
2) **Artificial Intelligence (SMJE3203) -** This course introduces students to the fundamentals of three important techniques of artificial intelligence (AI), namely, artificial neural networks (ANN), genetic algorithm (GA), and fuzzy logic. These techniques have been successfully applied by many industries in consumer products and industrial systems. ANN provides strong generalization and discriminant properties and offer a simple way of developing system models and function approximation. GA is adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics for optimization and search problems. Fuzzy logic offers flexibility in developing rule-based systems using natural language type of rules. They are highly applicable for many pattern recognition applications. This course gives the students appropriate knowledge and skills to develop, design and analyze effectively these AI techniques for practical problems with some degree of accuracy. The students will also be given a hands-on programming experience in developing fuzzy logic and neural networks system as well as genetic algorithm, to effectively solve real world problems. As mentioned previously, the latest CNN for computer vision has been introduced to this subject. Also, platform on the cloud to run AI project development has been introduced by using Google Colab (see **Link 4.1**)
3) **Final Year Project (SMJE4913 & SMJE4923) -** The Final Year Project (FYP) is a subject that must be completed by final year students as a requirement to receive the Bachelor of Engineering degree. In this subject, the students will be given two semesters to work on a task that is related to their field of interest. Students are expected to do their work independently most of the time, but their progress will be monitored closely by their supervisors. At the end of the project, students will have to document their work in a thesis which must be hard bounded and submitted to the faculty.
4) **Biomedical Imaging Systems (SMJE4333) -** This course introduces students to the principles and design of medical imaging system. The students will also be taught to diagnose and interpret some medical images.
5) **Image Processing (SMJE4313) -** This course introduces student's fundamentals of digital image and computer vision to help them understand various concepts and algorithms in image processing. Students will gain hands-on experience in using software tools for processing digital images. Further, students will learn application of image processing in computer vision e.g., object recognition, detection, segmentation etc.
6) **Digital Signal Processing (SMJE3163)-** The course covers Digital Filters design, Adaptive Filters, Hardware and Software of DSP, Correlation and Spectral Estimation of Random signals, and Time-Frequency Spectrum Analysis. This course introduces the Problem/Project Based Learning (PBL) on various applications in DSP. The PBL will focus on audio, speech signal processing.
7) **Monozukuri Project (SMJE3813) -** This course expose student to the "Monozukuri" concepts – the Japanese way of making products through creation of innovative works. The course consists of the lectures – to provide students with specific knowledge and skills on project design and analysis which allow students to design, build and verify their design project. This course requires application of the knowledge developed in prior courses and familiarize the students with the engineering design process such as definition, synthesis, analysis, and implementation in the collaborative classroom environment that emphasis on the teamwork. The project is also stress on the important of other influences on design such as economics, reliability, performance, safety, ethics, and social impacts.
8) **Electronic Engineering Laboratory 3 (SMJE3192) -** Fully experimental work in laboratory. This lab works will cover open-ended experimental topics on THREE courses i.e. (i)

Communication Electronics, (ii) Control System and (iii) Microprocessor and Microcontroller. Experiments are to be carried out every week in a small group. Discussion about experimental data with analysis is required to students, through group discussions and their own reports. Repeating discussion and analysis on experimental results are expected to brush up engineering mind of students involved.

9) **Digital Signal Processing (SKEL4223) -** Review on continuous-time signals and systems, introduction to digital signal processing, basic idea and benefits, examples and applications. Discrete-time signals and systems; signal definition: periodic and periodic, stability, causality, convolution. Spectrum of representation of discrete-time signals; sampling theorem, the discrete-time Fourier transform (DTFT) and its properties. Difference equations and discrete-time systems; difference equations: infinite impulse response (IIR) and finite impulse response (FIR) and signal flow graphs. z-transform: derivations, region of convergence, transformation properties, stability-poles and zeros, inverse z-transform-long division and partial fraction expansion, conversion to analog to digital system: impulse invariant and bilinear transform. Analysis and design and of digital filters: Filter basics, analog filter prototypes, design of IIR filter – bilinear transformation method, design of FIR filter – window method, window functions. Discrete Fourier transform: Discrete Fourier Series (DFS), Discrete Fourier transform (DFT), spectrum analysis of signals, Fast Fourier transform (FFT), frequency domain implementations of linear systems. Application of digital signal processing: speech processing, image processing, signal analysis, and telecommunications.
10) **Instrumentation (SEE1123) -** This course deals with the fundamentals of measurement science (metrology), measurement systems and instruments. Whilst the emphases if on electrical measurements the measurement of non-electrical quantities such as pressure and temperature are also covered. Topics include Error and Probability, DC and AC Quantities, Physical Quantities, Data acquisition, Transducer, Coding and Decoding and Telemetry.
11) **Third Year Lab (SKEE3732/SKET 3742) -** 3rd Year Laboratory is a required course for third year students in Bachelor of Engineering degree program. This course requires students to conduct four experiments in four different laboratories (Basic Power, Power Electronics, Basic Microwave, Applied Control Lab). This laboratory is conducted as a Project Based approach. The students are grouped into 3-4 students, and they will be given problems to solve that require them to conduct experiments in-lab (3 hours/week) and out-of-lab (equivalent to 2 hour/week) within three weeks. The students arerequired to solve the given project as a team, design suitable experimental procedures and conduct the experiments, present the problem solutions and submit a report following the IEEE standard journal format.
12) **Electrical Technology (SEU2003) –** This course deals with electrical characteristics of individual electric and electronic elements, several kinds of circuits which realize particular functions will be treated. The devices treated are mainly linear passive devices such as resistors, capacitors, and inductors. Topics include basic electrical circuit laws and properties, circuit analysis and theorems, DC/AC networks.

6 EFFORT TO IMPROVE TEACHING

I always try to improve my teaching in every academic semester by being organised and creative in presenting the course materials to the students. The presented course materials are prepared to be aligned and updated with the latest knowledge in the field. The application of recent tools to support teaching and learning of the subject, i.e., Sololearn Application, (see **Link 5.1**) supports teaching in programming, as shown in **Figure 6-1**. Also, I have to find ways to explain a specific topic in a creative, clear, and concise manner where it should be looked interesting with online modules such as

Coursera (see **Link 6.1**), Udemy (see **Link 6.2**), and many more. This is achieved by knowing the contents well and how best to present and use the best digital platform for teaching.

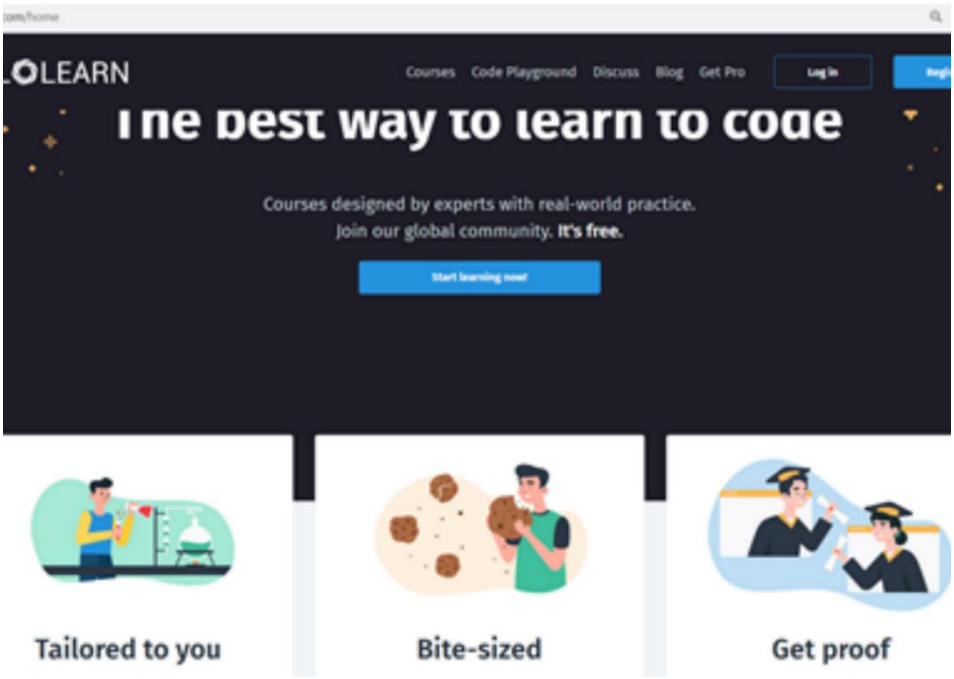

Figure 6-1 Sololearn as Tools to Facilitate Teaching and Learning.

As coordinator for programming and AI subjects, the coordinator is subjected to curricular revision as part of continuous quality improvement of the subject. For instance, the feedback received from the Industry Advisory Panel from Intel as in **Appendix 2.1** on AI-specific subject to review the content of the curriculum by including the latest AI technique, which is not available in 2017 or earlier, see **Appendix 6.1**. Therefore, starting in 2018, I have included the latest algorithm known as Convolutional Neural Network as part of the curriculum see **Appendix 6.2.** Also, the student has been exposed to real engineering problems as part of the project to be assessed. Similar to SMJE 1013, the student is now exposed to the common programming language as it is a pre-requisite to AI subject since semester 1 of the academic year. The student has been exposed to python programming to prepare them for various project development in their study. The changes are based on the observation of the Industrial need and the current trend of technology.

Innovation in teaching can be applied in the classroom by involving in conferences, workshops, and training. A complete list of attended seminar and conferences are given in **Appendix 6.3**. Meanwhile, the selective workshops and seminars for this teaching portfolio are highlighted as it focuses on the improvement of teaching and learning activities.

I. Coordinator for Japan-Asia Youth Exchange Program in Science (SAKURA Exchange Program in Science) at Tokyo City University (see **Link 6.3**), Japan (30th July -8th Aug 2017) see **Appendix 6.4**. The photo session of the event is shown at **Figure 6-2**. The program is a platform for student exchanges between Asia and Japan of youths. They will play a crucial role in the future field of science and technology through the close collaboration of industry-academia-government by facilitating short-term visits of competent Asian youths to Japan. This program aims at raising the interest of Asian youths toward the leading Japanese science and technologies at Japanese universities, research institutions, and private companies. The program aims to invite a student to experience the research in a Japanese-style laboratory, a family-like organization composed of professors, graduate students, and undergraduate students. Invited

students will experience a series of research activities from problem discovery to problem resolution by problem-based learning (PBL).

Figure 6-2 Sakura Exchange Program for PBL at Tokyo City University

II. Teaching Assistant for Nvidia Deep Learning Institute at GTC San Jose, USA (see **Link 6.4**) (26^{th}-29^{th} Mar 2018) – As Nvidia ambassador, I was given an opportunity to attend the NVIDIA's GPU Technology Conference (GTC) that was being held at Silicon Valley, California as shown in **Figure 6-3(d)**. NVIDIA's GPU Technology Conference (GTC) is the premier AI and deep learning event, providing you with training, insights, and direct access to experts from NVIDIA and other leading organizations. Also, I have the opportunity to assist the AI teaching for large participants from all over the world, as shown in **Figure 6-3(a)**. Also, I have been certified as Nvidia DLI ambassador for this program to be part of Nvidia ecosystem in this region to promote AI, see **Appendix 6.5.**

In this premiere AI conference, I have the opportunity to interact with technology experts from NVIDIA and other leading organizations from all over the world. Not only that, you will get valuable insight and hands-on training through hundreds of labs, talks, and research posters. GTC showcases the latest breakthroughs from universities, startups, and major enterprises in various fields such as autonomous vehicles, smart cities, virtual reality, and more. Some featured topics during the conference included Deep learning & AI, Accelerated Analytics, Virtual & Augmented Reality, Autonomous Machines, HPC & Supercomputing, GPU Virtualization, and so much more. There are many past attendees from giant companies like Google, Hewlett Packard, Dell, and Facebook. I am also taking part as a teaching assistant for Nvidia in the Silicon Valley conference for AI.

III. Visiting Lecturer at Telkom Bandung University Global Learning Week (GLoW) 2018 in Telkom University (see **Link 2.3**) (21st May -1st June 2018), see **Appendix 6.6** – I have the opportunity to share my teaching experience and learn from other lecturers from different countries for two weeks' program as shown in **Figure 6-4**. The specific task assigned to me is to teach undergraduate students in Telkom Bandung University AI-specific subjects. The student has been exposed to the latest AI technology and the development of the algorithm.

Also, I have been given an opportunity to do my research by sharing it with the lecturers from Telkom Bandung University.

(a)

(b)

(c)

(d)

Figure 6-3 Nvidia GTC Conference (a) Teaching & Technical Assistance at NVIDIA Deep Learning Workshop (b) Photo with Level 5 Autonomous Car by Nvidia (c) Nvidia Conference Grand Opening (d) In Front of San Jose McEnergy Convention Center

(a)

(b)

(c) *(d)*

Figure 6-4 Global Learning Week (GLoW) 2018 in Telkom University (a) Grand Opening Ceremony (b) Photo at Asian Africa Museum (c) Photo at Open Library (d) Research Sharing Session with Telkom Bandung University Lecturer

IV. Artificial Intelligent Workshop at 3F Resources Sdn. Bhd. (6th Oct 2017) (see **Link 6.5**)– The sharing session with local IT company for the importance of AI in the software based business. The event with the company director is shown in **Figure 6-5**.

Figure 6-5 AI Workshop at 3F Resources Sdn. Bhd.

V. Deep Learning Fundamentals in Computer Vision 1.0 for iTrain Asia in ADAX, The Vertical Business Suites, Bangsar South (7th Sept 2018) is shown in **Figure 6-6** – see **Link 6.6**

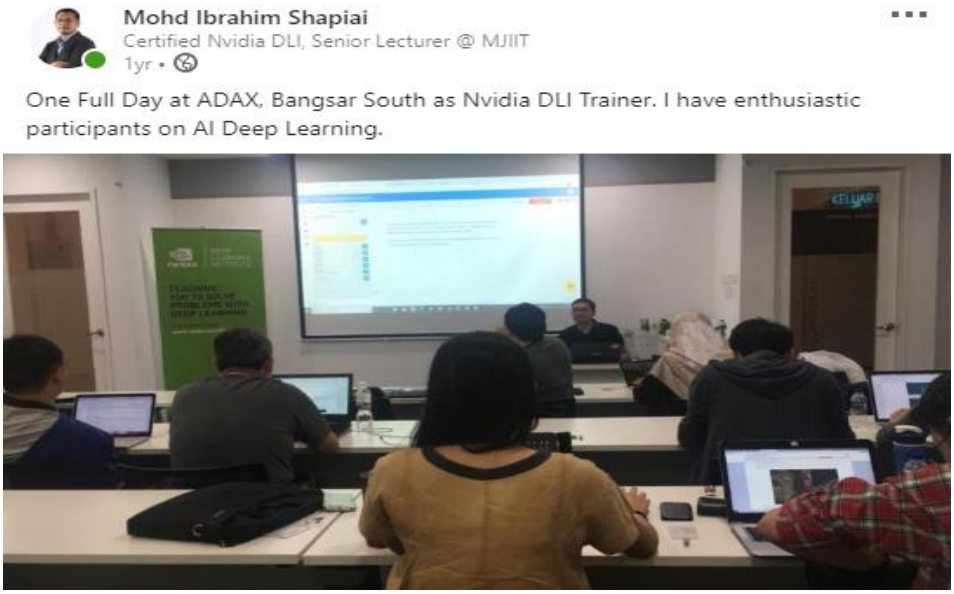

Figure 6-6 Deep Learning Fundamentals in Computer Vision Training at ADAX, MDEC

VI. Artificial Intelligence Deep Learning Application in MaGIC, Cyberjaya (21st Sept 2018) is shown in **Figure 6-7** – see **Link 6.7**

Figure 6-7 Artificial Intelligence Deep Learning Application Training at MaGIC, Cyberjaya

VII. CAIRO-NVIDIA Workshop (24th Sept 2018) Unleash the Power of AI in Malaysia is shown in **Figure 6-8**. The workshop is the platform to discuss on the strategic partner for lab initiative between UTM and Nvidia.

Figure 6-8 CAIRO-NVIDIA Workshop at MJIIT

VIII. Fundamental of Deep Learning for Itrain Asia Training in Software Park Thailand (26th Oct 2018) is shown **Figure 6-9** – see **Link 2.5.** The training is conducted for industry participants from various manufacturing business.

Figure 6-9 NVIDIA Training at Software Park Thailand

IX. MTDC ReUnites II 2018 I4.0 Unconference is shown in **Figure 6-10** – see **Link 6.8** (23rd - 25th Nov 2018) – I have been invited as keynote speaker in sharing the advancement of AI for industry application, see **Appendix 6.7**

Figure 6-10 Interview Session in MTDC ReUnites II 2018 I4.0 Unconference

7 EVALUATION OF TEACHING

I usually feel great when I completed a lecture with a student's active participation in the class. However, I will feel miserable if I can't have the active involvement of my student during the lecture. To ensure my students were not confused on any specific topics, I always make spot questions. In general, the student who has to answer will be selected randomly like a roulette wheel before he/she can pass the baton to his/her friend to answer my next question.

All these activities provide me with an indicator of student understanding. It is a good platform for me to improve my teaching by giving more attention to less active students in my lecture. I felt weird at first, but when my students started to enjoy it, I am relieved. The guilty feeling was due to the feeling that I am only listening to them without giving my lecture most of the time. Alhamdulillah, many semesters later, I managed to achieve good points. In Semester 1 2016/2017, all the mentioned strategies to engage with students, I have been awarded "Award of Excellence" by UTMLead for the effort of active blended learning class, see **Appendix 7.1**. I always strive to be better or at least maintain the same ratings every semester. My students' rating scores are given in **Appendix 7.2.**

This feedback is essential because I want my class to be as comfortable as possible to facilitate the learning process. Since Semester 2 2019/2020, online and immediate feedback is important as most of the lectures were conducted online. The immediate feedback from students is a tool to align the teaching methodology and improve teaching effectiveness. Some of the student feedbacks are shared in **Appendix 7.3** and google form link as in **Link 7.1.** The opportunity as Nvidia DLI ambassador, this platform allows me to conduct AI classes for postgraduate students and lecturers. To improve my teaching quality, I always prepare feedback forms and reflect on the given response. Some of the recorded feedback from postgraduate students and lecturers joining my class is given in **Appendix 7.4.**

8 EVIDENCE OF STUDENT LEARNING

The evidence of student learning is essential in order to measure how effective the lecture is delivered. This evidence should reflect the student grade performance at the end of the semester. One of the strategies that I have prepared for the AI subject (SMJE 3023), I have prepared a tutorial in guiding the student to answer the respective theoretical which is heavily involved in the subject even though for third-year students. The example of a tutorial is given in **Appendix 8.1**. The improvement is recorded in OBE PO3 achievement for final exam results compared to the test 2, as shown in **Figure 8-1**. This specific course assessment report is given in **Appendix 8.2.**

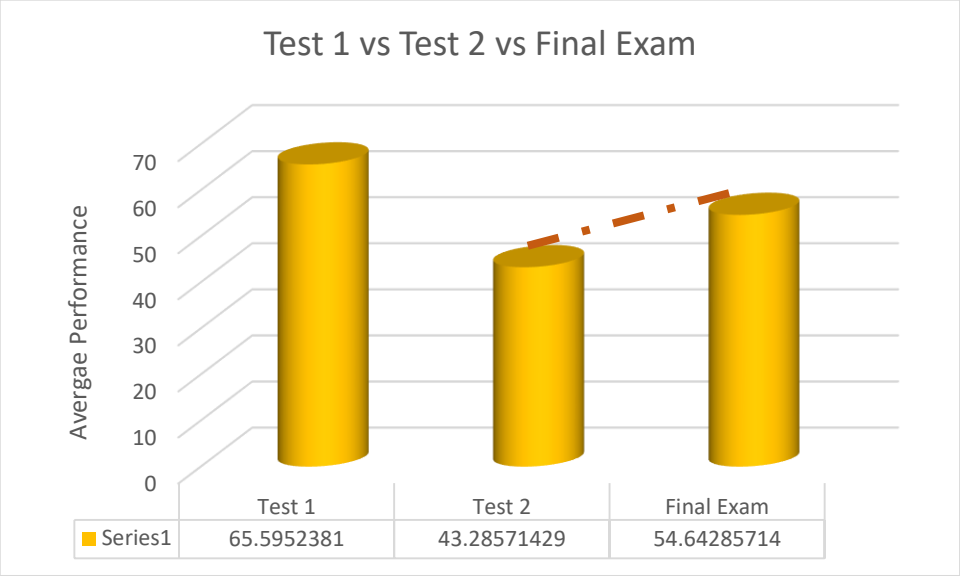

Figure 8-1 Improvement of PO3 achievement

Every year, I will have at least three FYP students under my supervision. In MJIIT, we have a sempai-kohai approach where the postgraduate student will mentor FYP students. We have allocated Friday afternoon as the slot for a student to present their work progress in our lab. This slot is known as rinkoh session, in which the lecturer in the lab will head the rinkoh session. Since the beginning of supervised FYP students, I actively involved with weekly student progress. I am very interested in nurturing the research skills in completing their projects. One of the crucial elements of their works is their writing skills. I always encourage my FYP student to publish his/her work at a conference or even a journal publication. Hence, the commitment as supervisor is very crucial in facilitating the conference or journal. I am actively reviewing his/her manuscript to improve the writing quality for publication. Some of the examples on reviewing the manuscript are shown in **Appendix 8.3.** Some of the prepared manuscripts have been submitted to JTEC (see **Link 8.1**), ICITEE 2018 (see **Link 8.2**).

Also, as a supervisor for FYP students, I always encourage my student to be global and future engineers for the world community. In **Figure 8-2**, my FYP student under in academic session 2018/2019 has the photo session after the FYP exhibition day, i.e., I am the tallest person in the photo. The two students next to me are now my Master's student working on AI for two different applications 1) medical imaging and 2) occupancy modelling for heat and ventilation air-cond system. Meanwhile,

the two most left and right in the photo now work in Japan as an engineer, see **Appendix 8.4**. The most left student is now an AI engineer with Denso Corporation in Nagoya, Japan (see **Link 8.3**).

As a lecturer and certified Nvidia Deep Learning Institute (DLI) Ambassador, I have conducted several pieces of training and workshops for AI, Deep Learning, and Machine learning. The conducted events are not only for academia but also for Industry participants. As the demand is very high, especially from industry in the Industrial Revolution 4.0 (IR 4.0) era, I have produced few training modules to cater to the need as given in **Appendix 8.5**.

Figure 8-2 My FYP Students for Academic Session 2018/2019

9 TEACHING GOAL

9.1 Short Term Goal

As an academician who has given lectures for the past ten years, I believed a good and responsible teacher should not only focus on making the student get good grades. More importantly, an academician should emphasize to their students the knowledge application they have learned in their daily lives in better and correct ways. My teaching goals for any course subjects are:

- To bring the latest trend on the teaching subject through research work to classroom
- To help students to develop an inclusive understanding on the course taught.
- To motivate students' interest and enthusiasm on the subject matter
- To inspire students to be able to apply the knowledge taught in their daily life especially when comes to the working arena and not just to have exam-oriented mind.
- To inspire creative thinking in students' learning skill, which is very much required as a good and responsible Electric/Electronic Engineers

- To develop student to incorporate good moral value in their daily life as well as in delivering responsible or any given task.
- To present to engineering students the importance of qualitative and conceptual knowledge and how to apply the knowledge in facing a real problem or situation.

Besides that, to improve my teaching skills and knowledge, I will enhance my knowledge and practice by seeking additional information by attending a workshop, academic program, event, professional development sessions, etc. Recently, I have been certified as a Chartered Engineer from Engineering Council, United Kingdom (UK) through membership of IET (see **Link 9.1**). Now, I am striving for my Professional Engineer under BEM (see **Link 9.2**). I will also spend more time researching and finding with my students and joining a research collaboration group with other educators from other universities. It will help me a lot in enhancing my knowledge and teaching practice.

9.2 Long Term Goal

With my long-term goals as an academician, I aspire to become a leading researcher and lecturer. They can drive for lab financial sustainability and to be world recognised researchers. Therefore, I can bring the quality of the teaching and learn to the world-class quality of education in UTM. This journey will take more time, might be 20 to 30 years. Through this development process, I need to gain more experience and build my research and teaching reputation. I have been involved in an administration position as I have been taking responsibility for the last six years. For example, Facilities Manager, Procurement Manager, and Head of Department of Electronic System Engineering, this experience helps me to develop my leadership skills and professional relationships with staff members, society, and industry.

Also, as an official member of CAIRO, I am responsible for bringing the centre towards financial sustainability lab and a world-renowned centre in the field of AI and robotics. For example, as a researcher, I need to strengthen my industry linkage to bring more research opportunities and teaching materials to industry players. Doing that can help boost the centre finances through the establishment of relations with industry and other parties. For several years, I have increased my research collaboration with the industry through several research collaboration events, as shown in **Figure 9-1**. The collaboration work includes few initiatives such as project development with 3F Resouces Sdn. Bhd. (see **Link 6.5**), Cuatro Services Sdn. Bhd. (see **Link 9.3**), Tenaga National Berhad Research Sdn. Bhd. (see **Link 9.4**), and few others. Hence, it allows me to gain more accessibility to the industry grant. Therefore, the philosophy to shape my classroom with the latest research trend will be possible soon.

(a)

(b)

(c)

(d)

Figure 9-1 Industry Collaboration (a) UTM Engineering-Industry Innovation Day 2019 with Industry Partner (b) Industry Project with X-FAB Semiconductor (c) SEMICON 2018 at KL with Cuatro Services Sdn Bhd (d) Cradle Grant Pitching with Industry Partner

10 CONCLUSION

In conclusion, through my experience as an academic in the last ten years, I discovered and experienced many things in my career development. The upside-down that I have been through in sharing my knowledge with my students is one of the memorable memories that I will remember for the rest of my life. By sharing my journey, I hope that later, a compilation of my teaching portfolios can be a handy resource for knowledge sharing. I think this is one way to leave my academic world legacy.

"*Bringing The Research Advancement to Classroom for Teaching & Learning*."