

INTRODUCTION

1.0 THE INTERNET OF THINGS (IOT) – WHY IT MATTERS

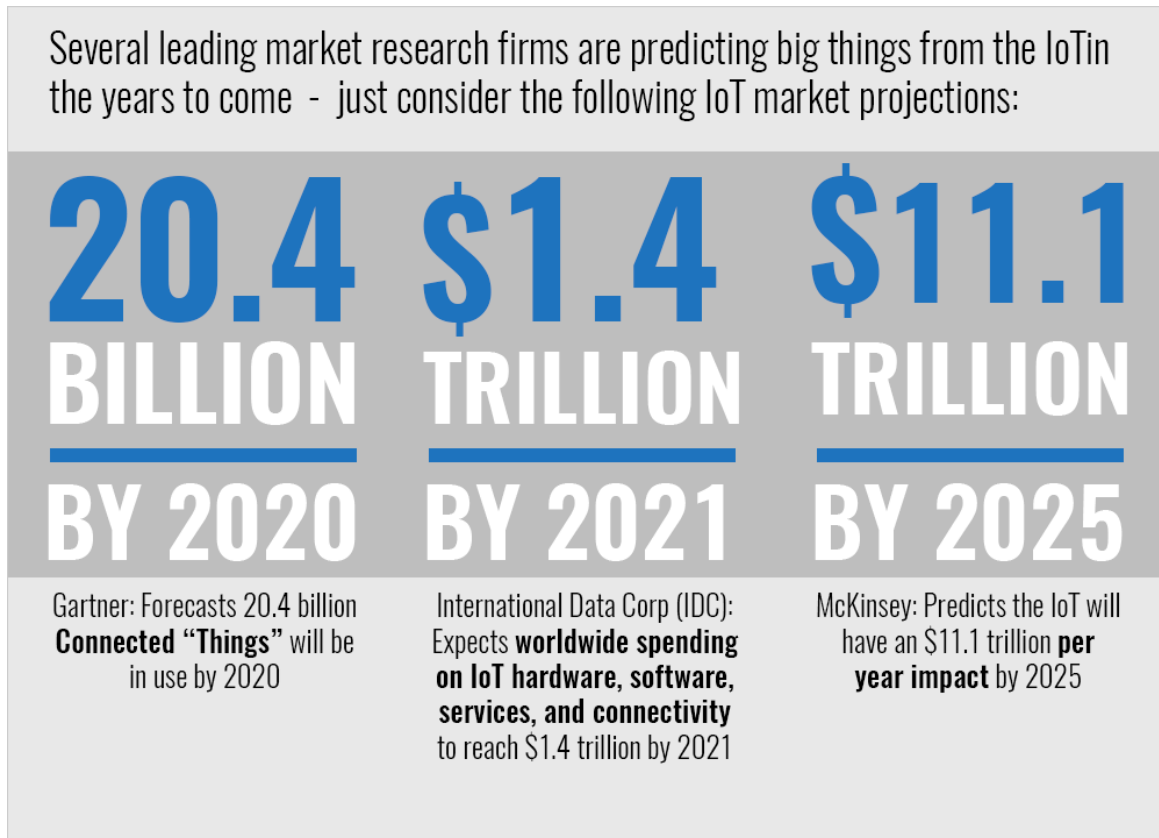


Figure 1

IoT being one of the technological ecosystems with an estimated market size of up to \$11.1 Trillion per year in 2025 (McKinsey Global Institute) [1] is becoming a prominent source for new hires in the engineering field. The IoT ecosystem uses well-established technologies in many fields; however, it adds new and often challenging requirements on extant techniques. Proliferation of the cyber physical devices and the need to handle large data sets calls for special skill sets by new graduates. Many wireless schemes have been or are being redesigned to address battery life and cost of solution issues. At the same time, the industry needs to hire and retrain many technical personnel to address these issues and support this newly evolving ecosystem in many different markets.

These facts culminate in the need for engineering students to be skilled to handle the new challenges and match the hiring market needs. As importantly, the more experienced technical personnel need to be retrained to understand this evolving ecosystem. In this light, we have taken parallel symbiotic steps to address these challenges.

2.0 WHY MUST YOU ATTEND THE IOT TRAINING?

Tekmark Group designed this IoT program as a resource for educators in colleges, tertiary institutions and research labs to teach students about the architecture, technologies and ecosystems of the Internet of Things.

The Internet of Things (IoT) is the next mega trend that will change the way we live and work, and it is predicted to touch almost every consumer and industrial application. The core technologies that enable the IoT are wireless communication and sensor developments, and ongoing advances in these technologies result in unique challenges. These challenges include new communications standards, increased sensor integrations and power consumption management. This puts heavy stress on an IoT device's design and validation cycle, and designers must constantly innovate to quickly and successfully develop and deploy IoT devices in the market.

The next generation of engineers will play a key role in the development of the IoT, and it is important that students graduate from an engineering program prepared for the electronic design, test and measurement challenges ahead of them. Educators must not only teach students the basics of designing and testing an IoT system; they must provide students with an understanding of the entire IoT ecosystem and relate these experiences to real-world applications.

Our program integrates hands-on industry relevant experiences and real-world applications in design and testing. This is in-line with the Malaysian Government "Transformasi National 2050 (TN50)" initiative and the country's Education Blueprint, as TVET Malaysia is tasked to produce 60% of Tomorrow's Workforce [2]. Besides, the IoT training program also cover the most critical technologies in a typical end-to-end IoT system, including various access technologies, higher layer protocols and new measurement equipment to address more accurate and sensitive current draw of circuits to assist with power-frugal designs for long battery life. Programmable board and practical kit along with several experiments are used to gear towards IoT applications and solution.

2.1 Training Objectives

Student-level final year project development is an important process engineering student have to go through before graduation. The main intention of this process is to train a student with prototyping skill, problem solving skill, and trouble-shooting skill. No doubt some of the excellent projects will be further developed beyond final year due to its commercialization value, most of the projects are being done merely to score the exam.

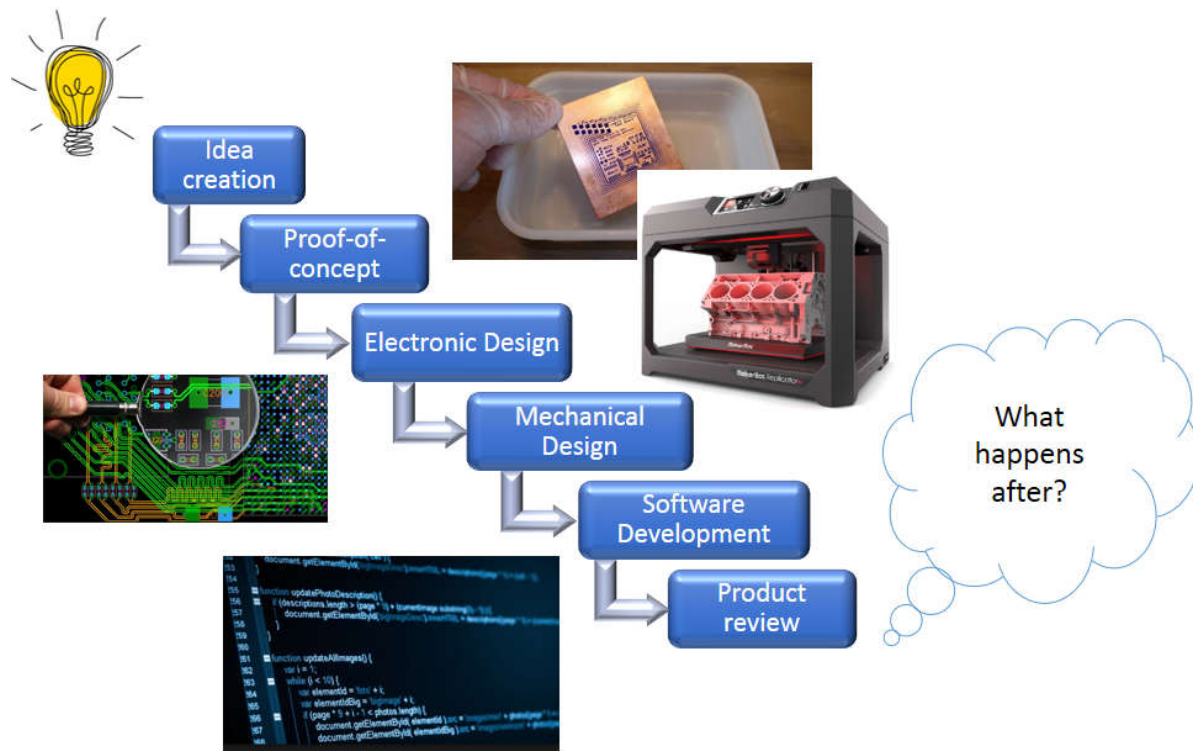


Figure 2

On the other hand, designing a commercial-ready IoT product requires very different design methodology from designing a hobbyist-alike IoT prototype. With readily-available sensor nodes and prototyping boards like Arduino and Raspberry Pi in the market, one can easily integrate IoT components to form an IoT application in quick turnaround time. However, this is not the case with mature IoT products that are ready for mass-production.

In order to develop an IoT product that is reliable, the developer has to go beyond functionality. Product quality, power consumption characterization, battery life characterization, conformance to standards, laws, as well as regional safety regulations form important safety net for product quality assurance.

3.0 IOT TRAINING PROGRAM: WIRELESS CONNECTIVITY PROTOCOL

Course Description:

To provide a comprehensive IoT learning and project practical platform that cover IoT Zigbee wireless communication protocol

Course Details:

This training course supports up to 5 basic topics as below:

1. Introduction to ZigBee Kits
2. Basic Peripherals of sensor node
3. Sensors Interfacing Techniques
4. ZigBee Protocol Stack
5. Andriod/WEB Application

Course Duration: 2 Days

Learning Outcome:

By the end of this course, students should be able to develop their own IoT solution through ZigBee wireless communication protocol. Student will be able to apply the acquired knowledge to real environment and to create related IoT products and services to the market.

Training Content:

Day 1:

Introduction to IoT Sensor Node

- Introduction to IoT architecture, hardware design and programming tools.
- Introduction to Zigbee Wireless Module (TI, CC2530)
- Introduction to IAR Embedded Workbench for 8051(software)
 - a. Create new project
 - b. Configure project option
 - c. Debugging mode

Introduction to IoT Sensor Node

- Introduction to Zigbee Z-stack protocol
 - a. Information of broadcast/multicast
 - b. Star & Tree topology
 - c. Serial Application
 - d. Protocol analysis

Day 2:**Introduction to IoT Application Platform**

- Digital type of sensor interfacing
 - a. Temperature and humidity sensor (DHT11)
- Actuator controlling
 - a. Buzzer
- Introduction to Web Application
 - a. HTML, Javascript
 - b. Webstrom
 - c. Remote Control and monitoring through webapps
- Introduction to Mobile Application

Fee: Please request for an official quotation from sales representative in contact details below.

**Prerequisite: Participant require basic knowledge of C language and Java script*

4.0 CONTACT INFORMATION

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Established since 1994, Tekmark Group provides accurate test & measurement science solutions to strategic industries. Tekmark is well equipped with an ISO certified service & calibration lab and has over 10 offices across the ASEAN Region. Tekmark is the Sole Authorized Technology Partner for Keysight Technologies in Malaysia.

5.0 REFERENCES

- [1] J. Manyika, M. Chui, P. Bisson, J. Woetzel, R. Dobbs, J. Bughin, D. Aharon, "The Internet of Things: Mapping the Value Beyond the Hype", Executive Summary, McKinsey and Company, June 2015
- [2] Eleventh Malaysia Plan 2016-2020, Page 8.