

# IR4.0 BUILD REAL – Makerspace Training on Industrial Revolution 4.0 – IIOT STEM fest

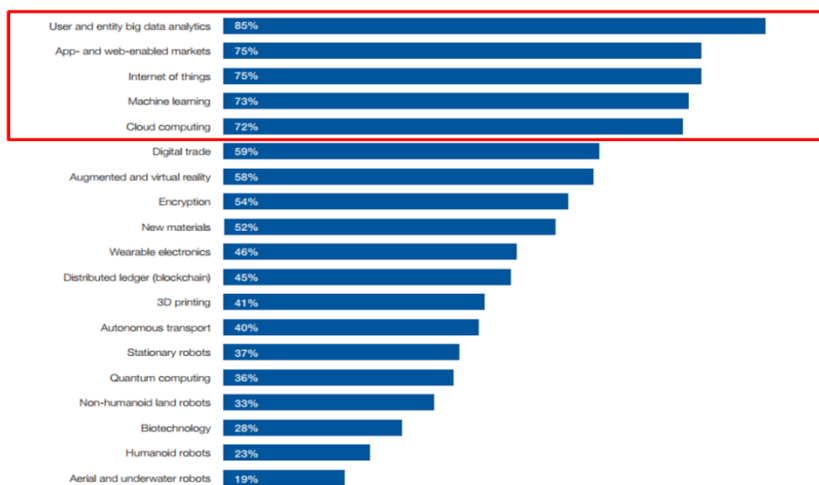


## Overview

The Industrial Revolution 4.0 (IR 4.0) is expected to change how we live, work, and communicate; it is also likely to change the things we value and the way we value them in the future. Presently, we can already see changing business models and employment trends. Figure 2 defines clearly the skills and knowledge required to be employable in this 21<sup>st</sup> century.

Automation and Cognitive computing are change agents in Industrial Revolution 4.0 that will make certain groups of employees redundant, replacing them with new workers with the needed skills or with machines that do the job cheaper. Gone are the days where students go to college or university to study for a degree that will set them up with a job for life.

Figure 2: Technologies by proportion of companies likely to adopt them by 2022 (projected)



Source: Future of Jobs Survey 2018, World Economic Forum.

With a rising level of complexity of IR 4.0 technologies and its cost of training, experts suggest that **Makerspace**, which is characterized by open source innovation and learning-by-doing, should be utilized as a tool to train students and graduates. It's important to impart foundation learning to students using blended project-based, practice-oriented learning and Innovations so graduating students become highly creative with abilities to think critically and become self-learner to remain relevant in this era of rapid changes. With appropriate accreditation and certification to this form of supplemented learning will further ignite the students' interest to pursue in-depth studies in areas of IR4.0.

## Training Synopsis

This Training is designed primarily for students in the **Upper Secondary schools, Industrial Skills Learning Centers, Higher Learning Intuitions and Universities** to give them a fundamental knowledge on Industrial Revolution 4.0 and practical guides on several of the associated technologies (pillars) with hands-on activities to train the student on implementing a real-world projects involving System Integration, Automation, gathering data, sending, storing and analyzing it in a Makerspace learning environment. Participant will build full end-to-end project gathering information from field devices such as sensors and sending them over the internet via cloud computing to an IOT platform for Data Analytics. They also will learn to develop programming algorithms to read data from field devices (e.g. Sensors), control actuators and complete a close-loop automation process system. Various real-time visualization tools will be introduced to monitor on-screen data and variables for testing and debugging.

## Training Objective

The objective of this training is to provide students with Fundamental knowledge of Industrial Revolution 4.0 and strong foundation skills in several pillars associated with IR 4.0. Students in group will build a fully automated real-world project using FlowLogic 6 – Visual programming tool which includes System integration, Big Data, Data analytics, Cloud Computing, IOT and Cognitive computing. Students will gain the following knowledge and skills after the training....

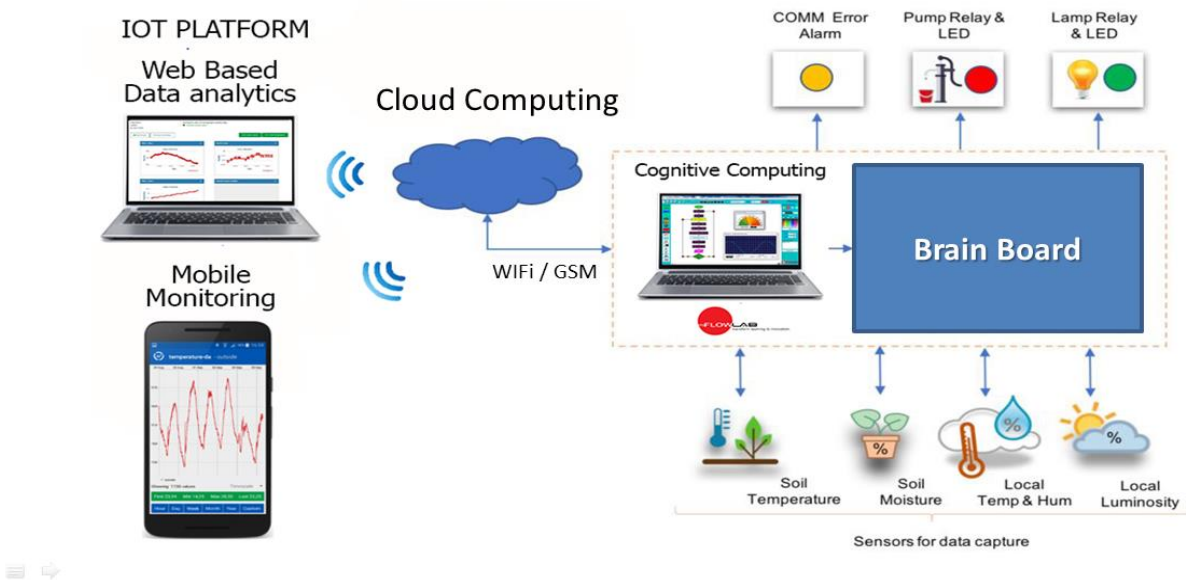
- What is Industry 4.0 and technologies (pillars) associated with it
- The Challenges and opportunities
- Physical computing integrating and controlling Digital and Analog devices
- Programming algorithm that can be applied across any programming language
- Open source IOT platform to analyse and visualize data
- Building Real-world Model with IOT capabilities
- Connect and Collect data from sensors
- Sending data via Cloud computing for centralized monitoring via mobile devices

- Build custom Web based dashboards for IOT data Analytics and Visualization
- Enhances Creativity, Problem Solving and Computational Thinking
- Ability to Invent new products by applying the knowledge learned
- Become self-learners
- Entrepreneurship, can become a Makerspace Trainer *(after level 2)*

## Training Contents

This training course progressively teaches students towards completing an IOT Enabled Automated Environment and Plant monitoring & control project with the following topics:

### **IOT Enabled Automated Environment and Plant monitoring & control project SYSTEM INTEGRATION, IIOT, BIG DATA & ANALYTICS, CLOUD COMPUTING and COGNITIVE COMPUTING (Programming Algorithm)**



## Day 1

### 1. Intricacies of Industrial Revolution 4.0 (IR 4.0)

*Theory*

- What is IR 4.0
- The associated Technologies (pillars)
- The Challenges and Opportunities

*8.00 am – 10.00 am (2 hours)*

### 2. Working with Programming Algorithm

*Theory & Practical*

- What is programming algorithm
- Properties of Algorithm
  - Explore conditions, loops, variables, and processes

- b. Explore Visual programming tool to develop algorithm
- c. Design Algorithm to develop beacon strobe light for Anti-Collision
- d. Design Algorithm to develop rocket launcher *10.15am – 1.00 pm (2<sup>3/4</sup> hours)*

**3. Prepare Software & hardware for Physical Computing** *Theory & Practical*

- a. What is Physical Computing
- b. Installing devices drivers
- c. Installing programming software tool
- d. Introduction to microcontroller and workstation
- e. Establishing communication between PC and workstation
- f. Build and integrate a real-world physical project *2.00 pm – 3.15 pm (1<sup>1/4</sup>hours)*

**4. Working with Electronic and Sensors** *Practical*

- a. Connecting Audio and Visual indicator digital devices
- b. Connecting Humidity and Temperature Sensors
- c. Connecting Analog Gas Sensor
- d. Connecting Analog moist sensor
- e. Connecting Digital actuator
- f. Testing and calibration *3.30 pm – 5.30 pm (2 hours)*

**Day 2:**

**1. Industrial Internet of Things – IIOT Fundamentals** *Theory & Practical*

- a. What is Internet of Things –IIOT
- b. Connect the Things (Field Devices and sensors) to microcontroller
- c. Configure the Things
- g. Test and analyse data produced by the Things *8.00 am – 10.00 am (2 hours)*

**2. Cognitive Computing Fundamentals** *Theory & Practical*

- a. What is Cognitive Computing
- b. Dynamically collect data using sensors
- c. Develop algorithm to process the data with arithmetic’s function
- h. Automate Output processes using the data *10.15am – 1.00 pm (2<sup>3/4</sup> hours)*

**3. Cloud Computing and Data Analytics Fundamentals** *Theory & Practical*

- a. What is Cloud Computing
- b. Collect real-time data from the Things (Sensors) to send to cloud
- c. Prepare web service to collect and store data from remote things
- d. Retrieve the data using mobile devices for real-time monitoring
- e. Export the data to perform basic Data Analytics *2.00 pm – 3.15 pm (1<sup>1/4</sup>hours)*

**4. Project sharing session - Activity** *3.30 pm – 5.30 pm (2 hours)*

## **Who should attend?**

- Students from Upper Secondary schools, IKBN, Polytechnic, ILP(s), Universities and also employees from any industry

## **Pre-requisites**

**Digital STEM** – Makerspace Train the Trainers (TTT) Program

## **Duration**

- 2 Days ( 16 Hours) – 8.00 am to 5.30 pm

## **Date**

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## **Venue**

-

## **Price**

- RM X,XXX.00/ per participant

## **Training material**

Each participant will receive the following:-

- 1 unit of ULTIMATE STEM Starter Kit (Visual Programming Tool, Microcontroller, Electronics, Sensor and Accessories)
- Lesson plan
- Access to Open source IOT Platform.

## **Meals**

- Refreshments, Snacks and Lunch will be provided during the training

## **Certification of COMPETENCY will be awarded**