EDUCATE ABOUT IOT WITH THE IOT DEVICE LEARNING KIT

[1]Dr. Suraj Shankarrao Damre, [2]Mrs. Abhilasha Sandeep Kore, [3]Ms. Geeta Dilip Nikude
[1,2,3]Assistant professor, IT Department, D.Y. Patil College of Engineering Akurdi.
surajdamre@gmail.com, askore@dypoeakrudi.ac.in, gdnikude@dypcoeakurdi.ac.in

Abstract
The rapid growth of inexpensive, accessible communications devices being integrated into new devices or Existing physical devices turn them into smart devices creating the Internet of Things
(Iodine). The growing use of these devices has attracted attention from various fields, including consumer markets, business, industry, healthcare, government, education, research and many other sectors. In education sector, many organizations are exploring advanced applications of digital infrastructure to Improve the ability to learn and teach difficult subjects in science, technology, engineering, and mathematics (STEM). IoT devices in classroom or laboratory activities can improve learning process with creative ideas to enhance students' learning motivation much more quickly and effectively. In addition to using IoT to improve the educational process, IoT is also an important research topic. IoT training includes many different components including hardware, software, programming and electronic. How IoT is integrated into the program will be based on the program's goals. Because non-engineers, non-programmers and many others, IoT courses must be designed and delivered in a suitable manner way different from the way it is done with engineering, engineering technology and computer science great. This article will discuss the use of widely available educational IoT toolkits that can be used to beginners or non-adults.
Keywords: Internet of Things, IoT, Learning Kit, IoT Education, IoT Application, IoT Development Kit, IoT Starter Kit.

1. INTRODUCTION
The Internet of Things (IoT) is a global platform of connected devices are transformed from stupid
and fixed physical devices into smart devices the device is responsive and functional environment, people and other devices in one real-time environment. However, IoT has defined and interpreted in various ways by various authors and researchers suitable for their application after the term IoT has come to the world. This term was first used by Kevin Ashton during his radio presentation frequency identification (RFID) at Procter & gambling (P&G) 1999 (Ashton, 2009). Based on for Oriwoh and Conrad (2015), IoT represents "Whatever is needed.   »
Cisco (Noronha, Moriarty, O'Connell and Villa, 2014) calls it the Internet of everything (IOE). Cisco states that "IoE brings together people, processes, data and what needs to be created more suitable network connection and more valuable than ever: information transformation in actions that create new, richer possibilities unprecedented experience and economic situation

opportunities for businesses, individuals and country" (Barakat, 2016). According to the commission, Eldrige and Chapin (2015), IoT often mentioned with situations in which network connectivity and computational capabilities extend to objects, sensors, and everyday items are often not taken into account computers, allowing these devices to create, exchange and consume data with minimal human resources Involvement.

Current development of IoT as an emerging technology, Technology has attracted many fields of education, government, healthcare, industry and others. International Data Company, IDC (2019) estimate there are 41.6 billion people connected everything will be used worldwide at the end 2025. Gartner, Inc. (2014) also mentioned that one a typical family home can accommodate more than 500 smart devices in 2022 With such immensity the possibility of using IoT devices, this creates Need to learn IoT for students while it create opportunities for educators teaching practice.

2. IoT IN EDUCATION SYSTEMS

Many educational institutions and educators are continuously explore new opportunities and Look for new technologies to improve learning and the teaching process. On the path of discovery, Many teachers find IoT to be an interesting tool ability to integrate into their training activities. There are two main types of IoT in educational activities:

a) Apply innovative methods using IoT equipment to improve difficult teaching theme made easy.

b) Integrate IoT courses Study program.

IoT devices are additional functions of Existing digital technology is used in learning and teaching environment with supplements Interactive smart board, smart multimedia pen/stylus, graphics tablet, document camera, digital podium, clicker, interactive LCD screen, microphone, speaker, etc. IoT usage. The device will lead the whole class towards intelligence Class. This will provide higher levels Personalized active learning environment for student.

Another category of IoT is teaching IoT how students from different backgrounds. For the facility

with existing courses related to electricity, electronic engineering, programming, microcontroller architecture, robotics and others have a very open discussion wondering if they need anything in addition to IoT education (Lyzhin, Efremov, Rolich, Voskov and Abrameshin, 2019). For those not related to the above fields, You have to approach it in a different way. Lyzine and community. (2019) used a general approach to Teaching IoT means designing scalable educational tools builders to carry out multidisciplinary projects practice sessions. Many organizations offer courses on IoT from Start progressing to the next advanced level about their program and curriculum. Some Institutions also offer specialized courses in IoT as well a certificate program. Burd, Barker, Divitini, Perez, Russell, Siever et al Tudor (2018) discusses challenges and decisions participated in delivering the first IoT course and propose the design of an IoT curriculum and choose the right tools to get started quickly for beginners. According to their article, Current course approaches can be described into four types as follows:

a) Category 1: Broad Introduction to Internet of Things Concepts in a Single Course

b) Category 2: Integrate IoT Concepts into Existing Courses

c) Category 3: Focused Course Intended as Part of an IoT Specialization
d) Category 4: Courses about Specific UseCases that Employ IoT

Most IoT courses are mainly focused and involved in the hands-on hardware-centric project. These
projects consist of the following platform and tools:
a) Hardware Platform e.g. Arduino, Raspberry Pi, Beagle Bone, Intel Edison, Microbit, Particle Photon, etc.
b) Software Platform e.g. C, Java, Python, etc.
c) Cloud Platform e.g. MQTT, CoAPP, HTTP, etc.
d) Network Communication Platform e.g. WiFi, Bluetooth, Zigbee, Z-wave, etc.
e) Components and Accessories Sensors, Actuators, jumper wires, breakout boards, push buttons, etc.

Most projects use one or more materials and software platforms. Among these types, choosing the hardware platform is the most important difficult. IoT hardware platform is the way to establish the relationship between device sensors, actuators and data networks for forward information. The two most common and commonly used IoT hardware platforms are arduino and Raspberry Pi.

Dobrilovic and Zeljko (2016) proposed IoT platform for university programs using IoT educational kit includes Arduino Uno card. Raspberry Pi was chosen because of its low price, efficiency and flexibility can help introducing IoT, educational model system (Mahmood, Palaniappan, Hasan, Sarker, Abass and Rajegovda, 2019). Research presented by Zhong and Liang (2016). and provide project-based and teaching methods. The learning method is designed in the IoT course for University student majoring in computer science specialized in using the Raspberry Pi platform as an effective tool means of significantly improving student learning performance and experience. Paper of Presented by Kurkovsky and Williams (2017).

Experience integrating IoT projects into one existing systems programming course using raspberry cake. At two-year college, course on IoT introduces the IoT platform using Raspberry Pi and Arduino are for the desiring non-majors generate interest in STEM fields (Maullett, 2018).
Raspberry Pi and Arduino platforms are selected thanks to large community support, low cost, open source code and easy availability of much of the source code examples of IoT projects.

3. IoT EDUCATIONAL KIT
The IoT educational kit includes a set Components include circuit boards, jumpers electrical wires, development control board, sensors, motor and electrical components such as resistors, capacitors, inductors. Often used Development boards are Arduino-Uno, Raspberry Pi, Intel Galileo card, beagle bone, etc.
In the study by Ilia et al. (2019), the most used educational projects and learning kits mainly with the use of Arduino or PCB based ESP8266. Kusmin (2019) discussed the systematized

design of an IoT device toolkit for inquiry-based learning. The kit is designed by maintenance teachers and students from different schools Their choice of kit is based on the list of kits. Preliminary projects are designed to learn these Basic functions of IoT devices. Some of them, The projects are:

    a) Led Blinking
    b) Dimming LEDs
    c) Temperature and humidity reading
    d) Activating/Deactivating relay switches

The advanced project for the next level of the project can be designed to solve real-time problems. Some of these projects are:

    a) IoT based smart parking system using RFID
    b) Smart irrigation system using IoT
    c) Cloud based temperature monitoring system
    d) Smart streetlights
    e) IoT based smart fire alarm system
    f) IoT Face Recognition AI Robot

These advanced projects are designed that uses tremendous applied research skills and use of kits

to solve real-time problems.

These IoT education kits can be classified into two groups.

a) Raw kit without instructions and uses of the ingredients depends entirely on the student and guidance from educators.

b) All-in-one education kit is provided Full assembly instructions for the product are provided project with all materials and software components. These kits are commonly known as DIY (do it yourself) kits or IoT development kit or IoT starter kit.

These types of kits come in the form of all-in-one kits with all the necessary ingredients and steps

with step-by-step instructions. Most of these kits come with a smartphone app allows for easy connection with preloaded projects. Examples of such kits are

a) Spark Fun IoT Starter Kit with Blynk Board

b) Osoyoo Robot Car Starter Kit

c) Make block Ultimate 2.0 10-In-1 Robot Kit

d) Sun founder Robot Raspberry Picar-S Kit

e) Lego Mind storms EV3 kits

These development kits are suitable for the entry level learners of IoT. So, these types of kits are

used by the high school students and STEM students of non-technical majors, beginners of programming. These are also useful for the business who are stepping in the IoT technologies.

4. BENEFITS OF EDUCATIONAL IoT KITS

There are several benefits to adopting Learning IoT Toolkit. Some of these benefits are:

• There are many kits available in the market can be chosen based on their ability to pay. Educational kits are available for different ages groups and groups of learners.

• Educational kits are great for beginners because it doesn't require much experience. Kits are delivered step by step Online tutorials and tutorials are highly recommended available.
• Most toolkits include cloud applications integration.

5. CHALLENGES OF EDUCATIONAL IoT KIT

There are several benefits to adopting Learning IoT Toolkit. Some of these benefits are:
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6. CONCLUSION

The growing use of IoT devices has gained traction of interest to many industries, including education industry. The need to innovate teaching methods are imminent due to it diverse nature. Learning kits serve all learners level. There are many educational kits available Available for beginners, advanced users and applied researcher.

There are many opportunities to apply Educational kits for learners. Use Educational kits accelerate the learning process and Realize the potential of IoT. Ascending awareness and knowledge of IoT adopted subjects can lead to the development of new subjects Smart things. The dream of a possible intelligent world become reality.

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