Center for Learning and Development

IIHMR, Bangalore

IIHMR BANGALORE | INSTITUTE OF HEALTH MANAGEMENT RESEARCH
South Campus, IIHMR Group

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2-DAYS TECHNICAL WORKSHOP ON INTERNET OF THINGS (IoT) & INTERNET OF MEDICAL THINGS (IoMT) FOR HEALTHCARE

2-Days Technical Workshop on Internet of Things (IoT) & Internet of Medical Things (IoMT) for Healthcare (30th January – 31st January,2024)

Training Report

2-Day Technical Workshop	2 Days	10.00am-4.00pm

1. Introduction

The training program introduces fundamental and advanced principles and practices of the Internet of Things (IoT) with the aim of enabling participants to design, construct, and implement IoT solutions. The text also examines a range of technologies and protocols employed in communication, encompassing emerging IoT-friendly apps and physical layer protocols. Participants will acquire a comprehensive comprehension of widely recognised Internet of Things (IoT) frameworks and standards. The training program encompasses widely used cloud platforms that offer extensive services and emphasizes the process of constructing such platforms. This orientation aims to elucidate the fundamental utilization of the Arduino environment in the development of various projects. The knowledge and the process of connecting a sensor to an Arduino micro-controller and retrieving data from the sensors help the trainees to gain insight of IoT technology and its usability/deployment in healthcare. Open platforms provide users with the capability to securely store their sensor data in cloud-based environments.

Background and Objectives

The outcome of this orientation is to design and implement a module that enables voice-controlled functionality for hospital/healthcare automation systems. Understanding the new technology and skill set required in an employee for the embedded industry. Understanding the robotics future and scope. Understanding the different Micro-controller available in the industry & their use. In-depth knowledge on design, construction and programming concepts involved in building an autonomous robot. Learn & interact with renowned industry experts. One can manipulate control devices that are connected to an Arduino micro-controller by utilizing the address bar of a web browser. Develop a web-based interface incorporating interactive buttons to facilitate the management and regulation of air conditioning devices within a networked environment.

Objectives

- Provide introduction to Internet of Things (IoT) and IoMT.
- Exposure to various sub-fields and technology stacks of IoT and IoMT. Enable people to convert their IoT product idea into a low-cost working prototype for improving healthcare.
- To program an Arduino micro-controller to effectively retrieve and modify sensor data utilizing cloud connectivity.
- To generate the knowledge for developing an application for the purpose of managing, monitoring, and regulating electrical appliances used for patients care inside a hospital setting.
- To create an environment using the Arduino micro-controller programmed to receive and interpret commands transmitted through Bluetooth from a mobile application.

2. Program duration and venue:

2-Days long technical workshop on 30th January,2024 and 31st January,2024.

3. **Training Team:** **a. Dr. Pankaj Rahi**
   Associate Professor, Health Information Technology Management IIHMR-Bangalore.
   b. Mr. Raavi Singh
   Artificial Intelligence & IoT, Makerinme Technologies Pvt Ltd.
   c. Mr. Vishal Patil
   Engineer Makerinme Technologies Pvt Ltd.

4. **Structure of the program:**
   a. Program duration and venue- 2-Day online workshop.
   b. Mode of training delivery (Online/Offline)- Hybrid
   c. Evaluation/Assessment (Pre and Post)- Yes
   d. Number of participants and profile- 10

1. Dr. Manjushree Kumar
   Certified External Assessor NQAS, Professor in Hospital Management Examiner, Consultant Hospital Services.
2. Jyoti Chetty
   Professor, Department of Psychiatric
   Krupanidhi College of Nursing.
3. Dr. Sarat.S
   Student, IIHMR-Bangalore
4. Ebin M Yohannan
   Student, IIHMR-Bangalore.
5. Dr. Shriraam. S
   Student, IIHMR-Bangalore.
6. Mr. Laxminarayan S
   Head of Operations & Policy
   SMBT Group of Institutions, Nashik, Maharashtra.
7. Prof. Venkatesh K
   Professor and Principal
   Padmashree College of Hospital Administration, Kengeri
8. Dr. Priya T. Nandimath
   Professor and Principal
   School of Pubilc Health, Padmashree College, Kengeri
9. Mr. Pratyush Shekhar Jha
   Student, Institute of Chemical Technology, Bhubaneswar, Odisha
10. Mrs. Chethana T.V
    Assistant Professor, New Horizon College.

5. Topics covered on the respective days.

Day1: Introduction to IoT

- Basics of IoT & IoT applications in various industries
- Updates in the IoT industry
- IoT alliances and standards

Introduction to Arduino Open-Source Electronics Platform

- Overview of ARDUINO & Open-Source Micro-Controller platform
- Basics of Electronics, Sensors & Actuators

Hands-on with Arduino

- About Arduino IDE
- Digital Output as LED Glow
- Digital Input using Switch
- Control Output using Digital Input

Sensors Interfacing and Wi-Fi Modules understanding & Functioning.

Thingspeak apps or alternative Open-Source app & it's functioning using Internet.

- Temperature and humidity sensor
- Linking your X (formerly Twitter) account with Cloud Server
- Generate API and program Arduino
- How to tweet using Arduino & working with sensor data on Twitter

Bluetooth Module

- Introduction to Bluetooth Module (HC-05)
- Interfacing of Arduino with HC-05

MIT App Inventor

- Introduction to MIT app inventor platform
- Create app to control electrical devices in home/office

Connections for Hospital Automation

- Understanding Relay Switch
- Making Connections of Relay Switch

• Controlling Relay using Arduino 0utput

• Connecting AC devices with Arduino via Relay

Day2: Arduino Programming for Bluetooth

• Program Arduino to read command transferred from app using Bluetooth

• Develop the module as voice-controlled home automation

Understanding of Sensors like:

• Ultrasonic Sensor

• Mechanism of Ultrasonic Sensor

• Program Arduino and Interface Ultrasonic Sensor

• Measure distance using Ultrasonic Sensor

• MQ2 Gas Sensor

• Understanding Analog Sensor

• Measure Gas or Smoke level using MQ2 Gas Sensor

• Alarm System if smoke value crosses threshold level

Data Reading and Controlling using online platforms.

• Update Ultrasonic and MQ2 Gas Sensor reading over Cloud

• Turn Wi-Fi Module as Station

• Connect some devices through Wi-Fi in the given network & program Arduino

• Program Arduino to receive command as static I.P. address

• Control devices connected to Arduino from address bar of web browser

Web Page Development

• Create webpage with buttons to control AC units in a network

• J QUERY Introduction, Program Arduino

• Connect ESP8266 and Relay with Arduino

• Run the complete unit using the web page for controlling of devices

Review and Recap of Whole Session

• Doubt Clearing

• Question Hour

• Project Suggestions.

6 Training Method:

a. Interactive Session on IoT & IoMT and its applications in healthcare.

b. Hand on training with the IoT & IoMT devices.

7 Outcomes of the programs:

- **The outcome of this orientation is to design and implement a module that enables voice-controlled functionality for hospital/healthcare automation systems.**
- **Understanding the new technology and skill set required in an employee for the embedded industry.**
- **Understanding the robotics future and scope.**
- **Understanding the different Micro-controller available in the industry & their use.**
- **In-depth knowledge on design, construction and programming concepts involved in building an autonomous robot.**
- **Learn & interact with renowned industry experts.**
- **One can manipulate control devices that are connected to an Arduino micro-controller by utilizing the address bar of a web browser.**
- **Develop a web-based interface incorporating interactive buttons to facilitate the management and regulation of air conditioning devices within a networked environment.**

8 Recommendations:

- The participants are sensitised for hands-on exposure of Low code No Code environment and thereafter how to build the IoT based Model for start using the IoT or IoMT based model for healthcare services.
- Participants found the training, interactive and interesting as it is full filling the objects of the program. Moreover, this orientation has given them the insight of actual use of IoT or IoMT for monitoring the real-time scenarios of the healthcare so that the Quality in the services od healthcare should be improved.
- Since the training have hands-on part associated with it so participants can build the Fire-detection and Monitoring System using the Mobile App, Realtime Fever or temperature or Humidity Monitoring. CT/MRI based Image Classification Model., Obstacle Detection system being beneficial for deaf and Dum persons.
- Other than this complete overview of the real time- Public Health system in link of Pollution and Toxic gases monitoring has also been demonstrated during this training. AI-based Cancer detection System, Medicine Reminder etc has also been discussed in detail.
- Discussion for buildings the Mental health monitoring system and ortho-aid using IotT has also been discussed.
- Participants are also interested and requesting for conducting such programme for their College Students at their locations also.

9 Glimse of Program.

10. Annexure: Session plan

Date	Timing	Topic	Resource person
Day 1 – 30th January,2024	10.00am- 4.00pm	**Introduction to IoT** • Basics of IoT & IoT applications in various industries • Updates in the IoT industry • IoT alliances and standards **Introduction to Arduino Open-Source Electronics Platform** • Overview of ARDUINO & Open-Source Micro-Controller platform • Basics of Electronics, Sensors & Actuators **Hands-on with Arduino** • About Arduino IDE • Digital Output as LED Glow • Digital Input using Switch • Control Output using Digital Input **Sensors Interfacing and Wi-Fi Modules understanding & Functioning.** **Thingspeak apps or alternative Open-Source app & it's functioning using Internet.** • Temperature and humidity sensor • Linking your X (formerly Twitter) account with Cloud Server • Generate API and program Arduino • How to tweet using Arduino & working with sensor data on Twitter **Bluetooth Module** • Introduction to Bluetooth Module (HC-05) • Interfacing of Arduino with HC-05 **MIT App Inventor** • Introduction to MIT app inventor platform • Create app to control electrical devices in home/office **Connections for Hospital Automation** • Understanding Relay Switch • Making Connections of Relay Switch • Controlling Relay using Arduino 0utput • Connecting AC devices with Arduino via Relay	Dr. Pankaj Rahi, Mr. Vishal Patil & Mr. Raavi Singh

Day2- 31st January,2024	10.001m-4.00pm	**Arduino Programming for Bluetooth** • Program Arduino to read command transferred from app using Bluetooth • Develop the module as voice-controlled home automation **Understanding of Sensors like:** • Ultrasonic Sensor • Mechanism of Ultrasonic Sensor • Program Arduino and Interface Ultrasonic Sensor • Measure distance using Ultrasonic Sensor • MQ2 Gas Sensor • Understanding Analog Sensor • Measure Gas or Smoke level using MQ2 Gas Sensor • Alarm System if smoke value crosses threshold level **Data Reading and Controlling using online platforms.** • Update Ultrasonic and MQ2 Gas Sensor reading over Cloud • Turn Wi-Fi Module as Station • Connect some devices through Wi-Fi in the given network & program Arduino • Program Arduino to receive command as static I.P. address • Control devices connected to Arduino from address bar of web browser **Web Page Development** • Create webpage with buttons to control AC units in a network • J QUERY Introduction, Program Arduino • Connect ESP8266 and Relay with Arduino • Run the complete unit using the web page for controlling of devices **Review and Recap of Whole Session** • Doubt Clearing • Question Hour • Project Suggestions.	Dr. Pankaj Rahi, Mr. Vishal Patil & Mr. Raavi Singh