Experiment No._07

Title: Virtual Lab on IoT

Batch: B2 **Roll No.: 16010421059** **Experiment No.:07**

Aim: Virtual Lab on IoT

Resources needed: Internet

Theory:

Virtual Labs project is an initiative of Ministry of Human Resource Development (MHRD), Government of India under the aegis of National Mission on Education through Information and Communication Technology (NMEICT). This project is a consortium activity of twelve participating institutes and IIT Delhi is coordinating institute. It is a paradigm shift in ICT-based education. For the first time, such an initiative has been taken-up in remote-experimentation. Under Virtual Labs project, over 100 Virtual Labs consisting of approximately 700+ web-enabled experiments were designed for remote-operation and viewing.

Activity:

Select any experiment of IoT / Embedded system from the given list of experiment on Virtual lab website.

https://vlab.amrita.edu/?sub=78&brch=256&sim=1394&cnt=4

Aim:

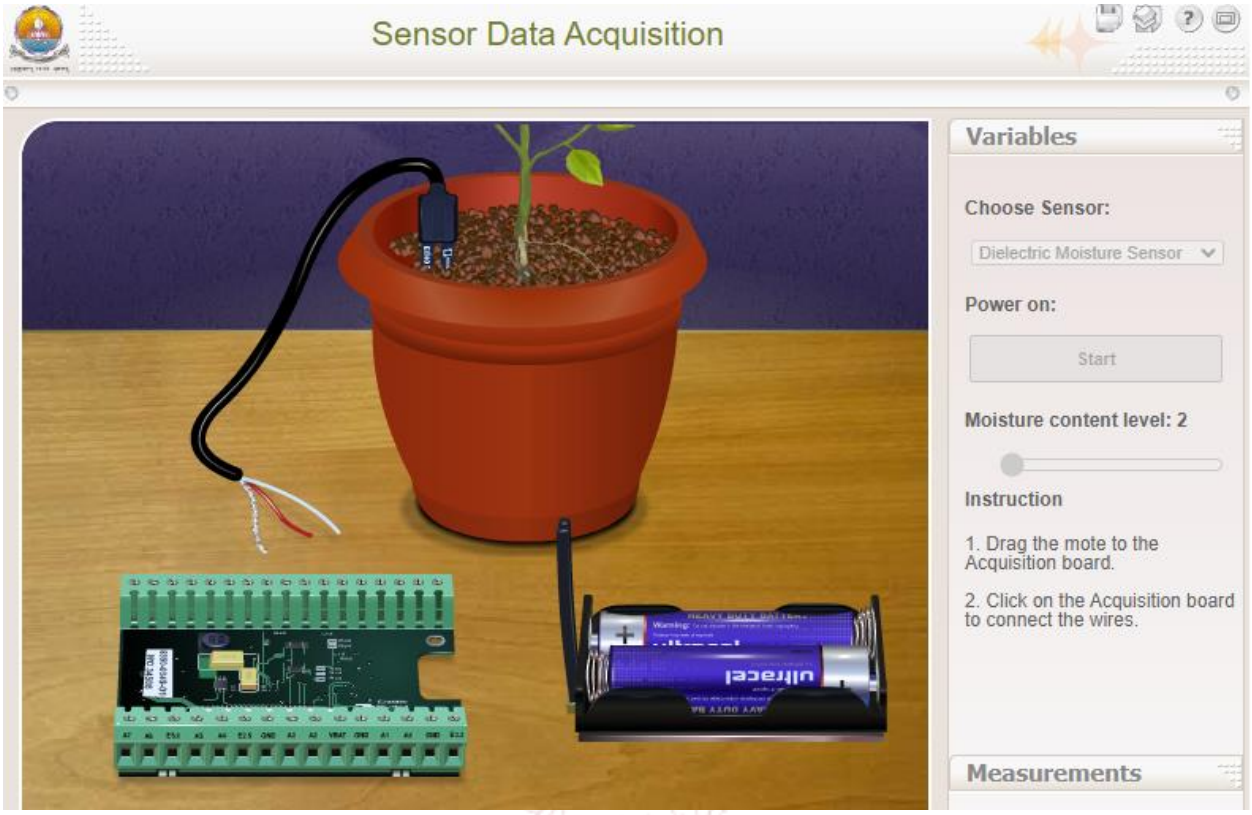
To implement wireless sensor network (WSN) to acquire sensor data from the wireless sensor board and also from external sensors such as dielectric moisture sensor, rain gauge, temperature sensor, humidity sensor etc

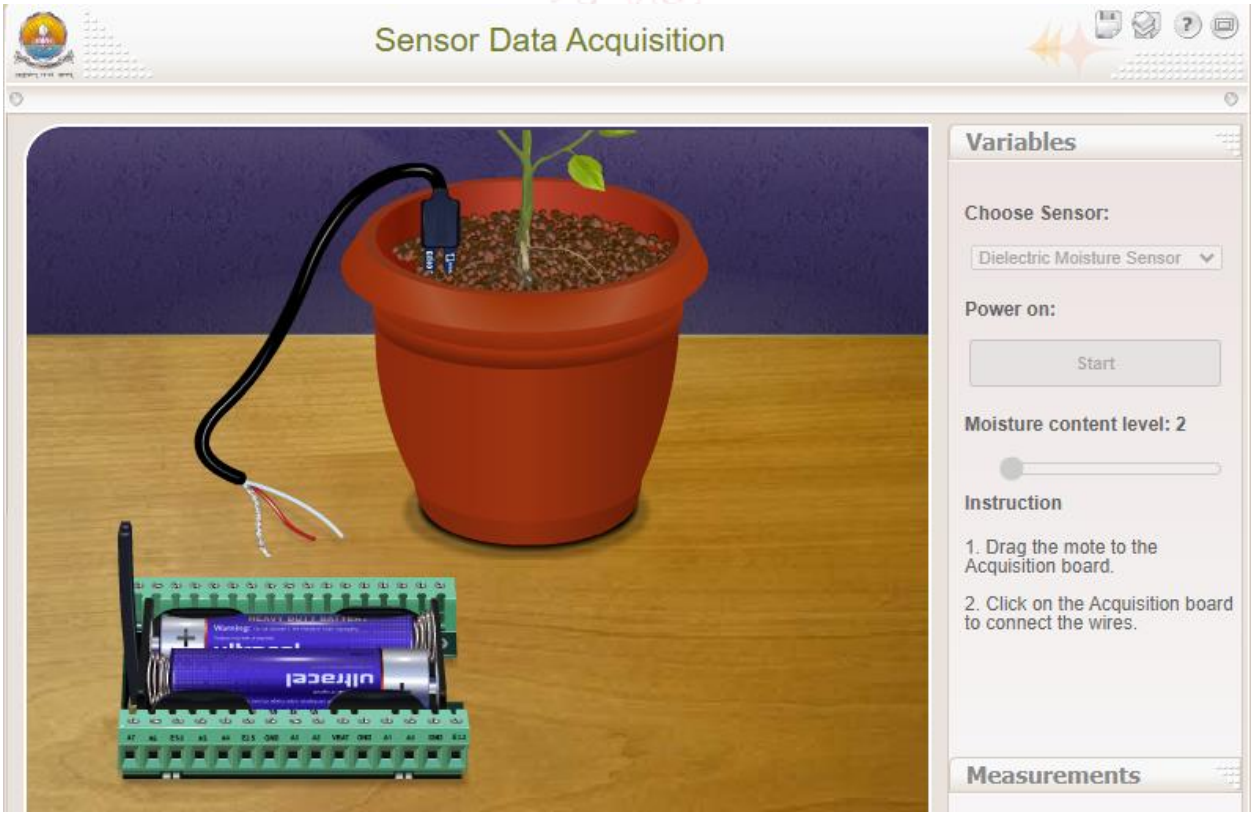
Objective:

- To understand the concept of acquire sensor data from the wireless sensor board and also from external sensors.
- To understand the usage of the different sensors like moisture sensor, rain gauge, temperature sensor, humidity sensor etc.

Results: (Program printout with output / Document printout as per the format)

Simulation:


Sensor Data Acquisition
Variables
Choose Sensor:
Dielectric Moisture Sensor
Power on:
Start
Moisture content level: 2
Instruction
1. Drag the mote to the Acquisition board.
2. Click on the Acquisition board to connect the wires.
Measurements


Sensor Data Acquisition
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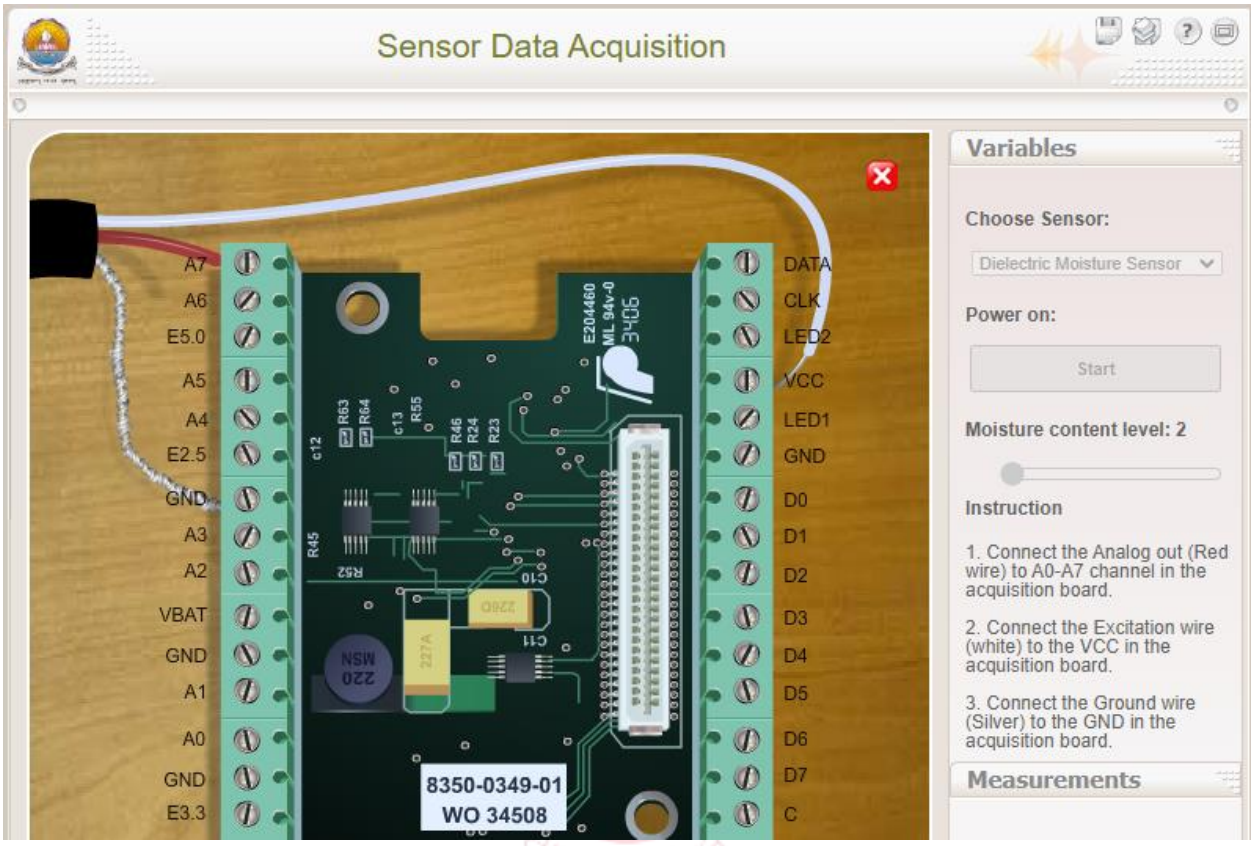
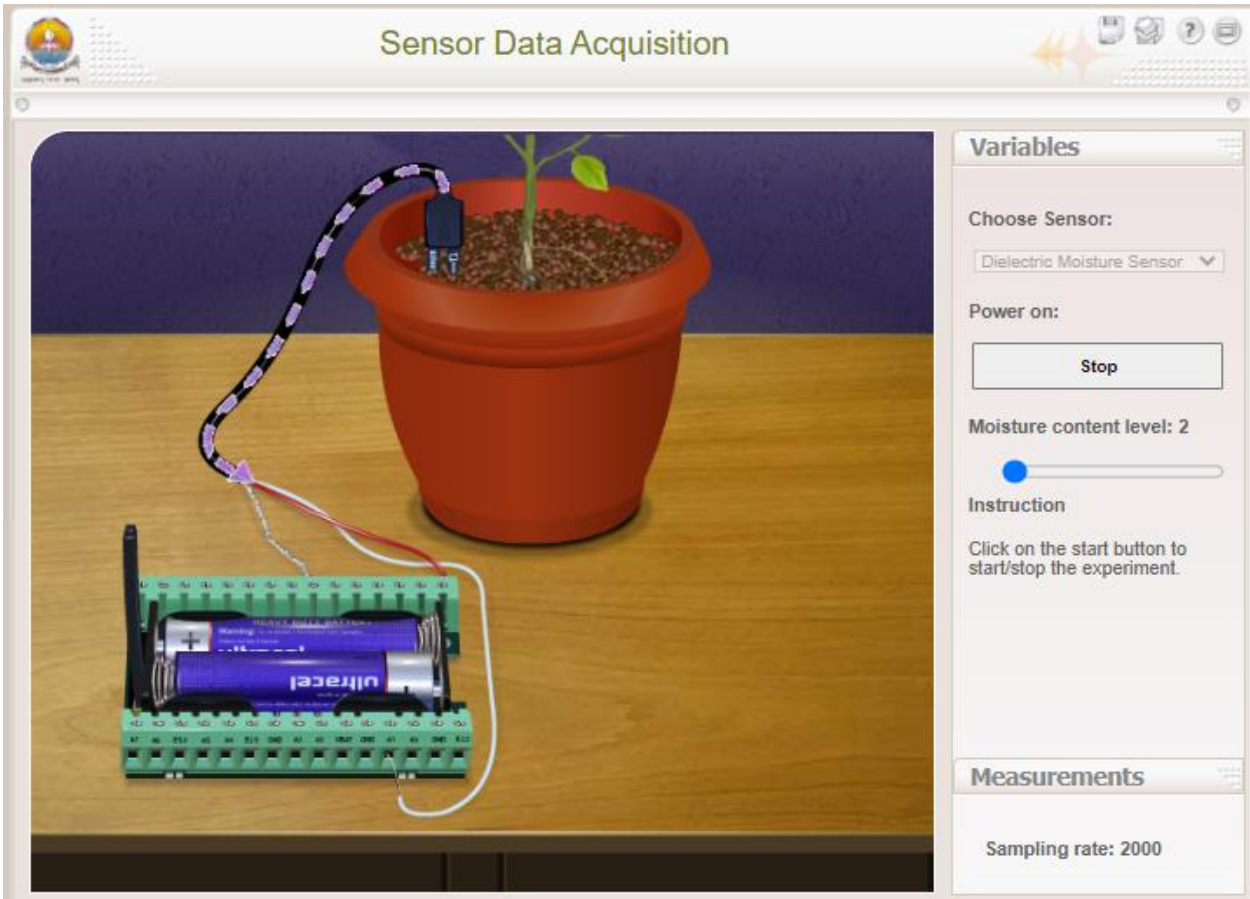
Power on:
Start
Moisture content level: 2
Instruction
1. Drag the mote to the Acquisition board.
2. Click on the Acquisition board to connect the wires.
Measurements

On clicking the board-





Questions:

1. Explain AWS IoT Greengrass concept.

AWS IoT Greengrass is a service provided by Amazon Web Services (AWS) that enables physical objects to perform tasks remotely while still using the cloud for management, monitoring, and lengthy archiving[1]. It is a technology feature that links localized equipment to cloud functions, allowing devices in data gathering and analyses closer to their source, speedier reaction times, and encrypted communications across local stations[1]. The set of this equipment is referred to as the Greengrass group.

AWS IoT Greengrass expands AWS to edge devices so they may process data locally while continuing to use the cloud for administration, and storage. Greengrass creates a safe link to the cloud by enabling local device communications via the MQTT protocol. Devices can then connect to the AWS Greengrass Core via the AWS IoT. IoT AWS by authorizing the device information to be filtered, Greengrass may be configured to let just the necessary information be broadcast back into the cloud[1].

AWS IoT Greengrass enables devices to operate in the presence of network latency and quickly adjust to community events. It will help reduce the cost of transferring data to AWS Greengrass enabling you to develop custom software and AWS Lambda. Greengrass also offers features such as Lambda@edge, Device Shadows, Stream Manager, and Over-the-air updates[1].

The AWS IoT Greengrass Core is a locally deployed software that acts as a local data aggregator for your connected devices, sensors, or other local connectors. The Greengrass core communicates to local devices in their native protocol such as OPC-UA, LoRa, or Zigbee using AWS IoT Connectors. Data is sent back to the cloud via MQTT, a lightweight messaging protocol, and then routed through AWS IoT Core, an AWS managed service for managing your device connections to the cloud[3].

AWS IoT Greengrass is an open-source Internet of Things (IoT) edge runtime and cloud service that helps you build, deploy and manage IoT applications on your devices. You can use AWS IoT Greengrass to build software that enables your devices to act locally on the data that they generate, run predictions based on machine learning models, and filter and aggregate device data[4].

In summary, AWS IoT Greengrass is a service provided by Amazon Web Services that enables physical objects to perform tasks remotely while still using the cloud for management, monitoring, and lengthy archiving. It allows devices in data gathering and analyses closer to their source, speedier reaction times, and encrypted communications across local stations. It also offers features such as Lambda@edge, Device Shadows, Stream Manager, and Over-the-air updates.

Outcomes: CO3 Realize design process of IoT applications and IoT challenges

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Conclusion:

In this trial, I constructed a wireless sensor network (WSN) to capture data from a sensor board and a simulated dielectric moisture sensor. By establishing a wireless connection between the sensor board and a central hub, while simulating the external sensor, I gathered real-time data. Upon examining this data, I discovered correlations between temperature, humidity, and soil moisture, showcasing the WSN's capacity to unify various sensors for data collection. This technology has potential applications in agriculture and environmental monitoring.

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of faculty in-charge with date

References:

https://www.vlab.co.in/

Books:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

2. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1stEdition, VPT, 2014.

3. Dr. Ovidiu Vermesan, Dr. Peter Friess, “Internet of Things - From Research and Innovation to Market Deployment”, River Publisher, 2014