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INDEX

Sr. No.	Experiment Description	Experiment Date	Submission Date	Remarks / Signature
01.	Prepare a list of platforms used for IOT. Prepare a list of features of above IOT Platforms. Prepare a list of features provided by python language for IOT application. Page No. 01. to 03.	30/10/2023		
02.	Establish connectivity between various component of IOT, Establish connection between Arduino and bluetooth module, Establish connection using Wifi. Page No. 04. to 06.	7/11/2023		
03.	Download and configure postman application • Verify rest API's through Postman. • Verify JSON API's through postman.	28/11/2023	R.V	

INDEX

Sr. No.	Experiment Description	Experiment Date	Submission Date	Remarks / Signature
	• Verify Soap API's through postman. Page No 07. to 08.			
04.	Publish data on the IOT platform. Measure the temp. of a remotely located temperature sensor using IOT based temperature data monitoring system. Measure the humidity of a remotely located humidity sensor IOT based humidity data monitoring system. Measure the data pressure of a remotely located pressure sensor using IOT based pressure dat monitoring. Page No. 09. to 11.	12/12/2023		

Internet of Things

Experiment No : 1

Question → Prepare a list of platforms used for IoT. Prepare a list of features of above IoT platforms. Prepare a list of features of above IoT platforms. Prepare a list of feature provided by python language for IoT application.

Answer → List of platform used for IoT :

1. Amazon Web server (AWS) IoT
2. Microsoft Azure IoT
3. Google Cloud IoT
4. IBM Watson IoT platform
5. Thing Work
6. Cisco IoT
7. Bosch IoT Suite
8. Oracle IoT
9. SAP IoT
10. GE Predix

List of features of the above IoT platforms :

1. AWS IoT : Device shadow rule engine device management data analytics security and privacy & cloud integration.

2. Azure IoT : Device management security real time analytics event drives action and cloud integration.

3. Google Cloud IoT : Device management secure communication data ingestion, data processing and analytics, and cloud integration.

4. IBM Waston Iot platform : Device management, data management, analytics security and cloud integration.

5. Thing Worx : Rapid application development, connectivity to a variety of devices data collection and analysis and cloud integration.

6. Cisco IOT : Device management security real time analytics and cloud integration.

7. Bash IOT Suite : Device management, connectivity, data collections and analysis and cloud integration.

8. Oracle IoT : Device management, data collection and analysis, security and cloud integration.

9. SAP IOT : Device management, data management, analytics security and cloud integration.

10. GE Predix : Device management, connectivity, data analysis and cloud integration.

List of features provided by python language for IoT application

1. Easy to learn and use.
2. Large and active community
3. Availability of various libraries and frameworks for IOT development.
4. Cross platform support
5. Efficient memory management
6. Good support for data analysis and visualisation
7. Ability to interfa with hardware and sensor using
8. Good support for networking and communication protocols such as MQTT, COAP and HTTP.
9. Support for multi-threading and asynchronous programming
10. Availability of tools and platforms such as flask, Django and jupyter Notebook for IOT development and deployment.

Experiment No. 2

Question : Establish connectivity between various component of IOT, Establish connection between Arduino and bluetooth module, Establish connection using wifi.

Answer :

To establish connectivity between various component of IOT you will need to follow these general steps:

1. Choose a communication protocol: Decide which protocol we will use to establish communication between our IOT components. Some popular protocols include wifi, bluetooth, Zigbee, MQTT.

2. Configure our hardware: Setup our hardware components to communicate with each other according to the choosen protocol. This may involve configuring networking settings programming micro-controllers and connecting sensor and actuators.

3. Write software to handle communication: Develop software that allows our IOT components to send and receive data. This can involve writing code for microcontrollers cloud services or application.

4. Test and develop: Test our IOT system to ensure that it is working control and deploy it in a production environment

To establish a connection between Arduino and Bluetooth module. follow these steps:

1. Connect the Bluetooth module to our Arduino board according to the manufacturers instructions.
2. Install the necessary software libraries on our Arduino board to communicate with the bluetoot module. One popular library is the software library, which allows us to establish a serial connection with the bluetooth module.
3. Write code on our Arduino board to communicate with the bluetooth module using the installed libraries, we can use the serial, read () function to receive data from the module.
4. Pair the bluetooth module with our mobile device or computer accuracy to the manufacturers instructions.
5. Send data bluetooth our Arduino board and the bluetooth module using the paired devices. We can use a mobile or terminal emulaten software to send and receive data.

To establish a connection using wifi, follow these steps:

1. Connect our device to micro controller to a wifi-network. most microcontrollers are the ESP32 or ESP 8266 have built in wifi network. This may involve setting up on network
2. Configure our device to send and receive data over the wifi network. This may involve setting up networking settings such as SSID and password and configuring the wifi module on our micro controller.

3. Write software on our device or micro controller to communicate over wifi. This can involve developing a web server or clint to send and receive data using HTTP or MQTT

4. Develop a mobile application or web application to interface with our device over wifi, we can use a variety of tools such as the flask or Django web frame works to develop our application.

5. Test our system to ensure that it is working correctly and deploy it in a production environment.

Experiment No. 3

Qn.: Download and configure Postman Application
Verify Rest APIs through postman
Verify JSON APIs through postman
Verify SOAP APIs through Postman.

Answer:
To download and configure postman application, we can follows these steps:

1. Go to the postman website at https://www.postman.com/downloads/ and download and appropriate version on the application for our operating system.
2. Install the application by running the downloaded installer file and following the prompts.
3. Once the application is installed, open it and create a account or sign in with an existing account.
4. Configure any neccessary setting such as network proxie request timeouts or SSL certificates.

To verify REST APIs trough postman, we can follow these steps

1. Open postman and create a new request by clicking th 'New' button in the top left corner of the screen.
2. Enter the URL of the REST APIs endpoint we want to tes in the address bar at the top of the screen.
3. Select the appropriate HTTP method for the request, such as GET, POST or PUT.

4. Enter any necessary request headers or parameters, such as authentication credentials or query parameters.
5. Click the "Send" button to send the request to the API endpoint.
6. Verify that the API response is returned correctly and contains the expected data.

To verify JSON APIs through Postman, we can follow these steps:

1. Open postman and create a new request as described above.
2. Verify that the API endpoint accepts JSON data by checking the API documentation or by inspecting the request headers or parameters.
3. Create a JSON data object that matches the API endpoint data format & include it in the request body.
4. Click the "Send button to send the request the API endpoint
5. Verify that the API response is returned correctly and contains the expected JSON data.

To verify SOAP APIs through Postman, we can follow these steps:

1. Open postman and create a new request as described above.
2. Select the "RAW" option for the request body and set the format to "XML".
3. Enter the SOAP envelope and body XML for the API request including any necessary soap headers or authentication credentials.
4. Click the 'Send' button to send the request to the API endpoint
5. Verify that the API response correctly and contains the expected data, we may need to parse the XML response to extract data we are instead in.

Experiment No. 4

Question → Publish data on the IOT Platform.
Measure the temperature of a remotely located temperature sensor using IOT based temperature data monitoring system.
Measure the humidity of a remotely located humidity sensor IoT based humidity data monitoring system.
Measure the data pressure of a remotely located pressure sensor using IOT based pressure data monitoring.

Answer:
To publish data on an IOT platform, we can follow these general steps;
1. Create an account on our choosen IOT platform and set-up the necessary configuration, such as device resisting and authentication system settings.
2. Develop software to send data to IOT platform. This can involve using a SDK or API provided by the platform to send data over MQTT, HTTP or another protocol.
3. Create a device on the IOT platform to represent our connected sensor. This will typically involve resistering a device ID setting up auntheticaition credentials, and configure other device setting such as telemetry data.
4. Configure our sensor to send data to the IOT platform. This may involve setting up networking setting such as the Wifi or Ethernet connection and configuring the sensors firmware to send data according to choosen protocol.

5. Test the system to ensure the data is being sent & receive correctly we can use the dash boaurd provided by the IoT platform to view the elementry data.

To measue the temperature of a remotely located temperatu sensor using an IoT based temperature data-monitoring system we can follow these steps:

1. Install a temperature sensor at the remote location, such as a thermistor or thermocouple and connect it to a microcontroller board such as an Arduino or ESP32.
2. Set up the micro controller board to send temperature data to an IoT platform, such as AWS IoT or google cloud IoT. This can involve configuring the Wifi connection, installing the necessary software libraries and writing code to send data over MQTT or HTTH.
3. Create a device on the IoT platform to repeat the transfer sensor and configure the telemetry data format.
4. Test the system to ensure that the temperature data is being sent & receive correctly, we can view the telementry data on the IoT platform dashboad.

To measure the humidity of a remotely located humidity sensor using an IoT based humidity data monitoring system, we can follow these steps:

1. Install a humidity sensor at the remote location such as a capacitive humidity sensor and connection it to a microcontbar board.

2. Set up the microcontroller board to send humidity data to an IOT platform, such as AWS IoT or google cloud IoT. This can envolve configuring the Wifi connection installing the necessary software libraries and writing code to send data over MQTT and HTTP.
3. Create a device on the IOT platform to represent the humidity sensor and configure the telementry data.
4. Test the system to ensure that the humidity data is being sent and received correctly; we can view the telementry data on the Iot platform dashboard.

To measure the pressure of the remotely located pressure sensor using an IOT-based pressure data monitoring system, we can follow these steps:
1. Install a pressure sensor at the remote location, such as a piezoelectric sensor and connect it to a microcontrollen based an Iot Platform such as AWS Iot or google cloud IOT.
2. This can involve cofigring the wifi connection installing the neccessary software libraries and writing code to send data over MQTT and HTTP.
3. Create a device on the IOT platform to represent the pressure sensor and configure the telemcntory data is being.
4. Test the system to ensure that pressure data is being sent and receive correctly, we can use the telementry data on the IOT platform dashboard.