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Low Power Technologies For Iot Applications

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ABSTRACT: - *The advances of emerging technologies have broadened the meaning as well as applications of the Internet. With smart connectivity, physical objects are networked and will gain the ability to communicate with each other. The vision of "Internet of Things (IoT)"promises to enhance the capabilities of objects and forms a smart environment so that people will benefit from the IoT revolution.As the global population grows the resources on earth are depleted quickly. In order to have sustainable earth, governments around the world put a lot of efforts to advocate the reduce the consumption of energy.This project works on the principle of client-server model. It adopts the concept of the "Internet of Things" to efficiently manage the labs which will realize the idea of energy-saving by properly managing the lights, fans and air conditioners. The objective of the project also includes the proper attendance management of the students entering the labs.*
KEYWORDS:- *IOT, Light , Power , Network,*

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I. INTRODUCTION

The advances of emerging technologies have broadened the meaning as well as the applications of the Internet. In other words, almost every ―object can be part of a network. With smart connectivity, physical objects are networked and will gain the ability to communicate with each other. The vision of ―The Internet of Things (IoT) promises to enhance the capabilities of objects and forms a smart environment so that people can benefit from the IoT revolution. The IoT applications cover the building of smart cities, the set up of smart environment, the provision of smart public services, the plan of e-Health, and the building of smart home/office, etc.

This project provides an idea about energy saving by proper management using IoT. It deals with the monitoring and controlling of the computers, fan, light, air conditioners etc in the lab in order to minimize the undesired use of power. It is based on client-server model. Raspberry pi is used as the broker between the server and client. RFID card is used to enter the data, and the RFID reader extracts the data and send it for further processing. Node MCU establishes Wi-Fi connection for the purpose of fetch or uploading data. Amazon AWS server provides on demand cloud computing platform for individuals. Relays are used as status buttons or switches and LEDs are used for an indication.

II. BLOCK DIAGRAM EXPLANATION

2.1.1 Raspberry Pi

The Raspberry Pi is a series of small single-board computers. It does not include peripherals (such as keyboards, mice and cases). However, some accessories have been included in several official and unofficial bundles.

Fig 2.1.1: Raspberry Pi

Several generations of Raspberry Pi's have been released. All models feature a Broadcom system on a chip (SoC) with an integrated ARM compatible central processing unit (CPU) and on-chip graphics processing unit (GPU). Processor speed ranges from 700 MHz to 1.4 GHz for the Pi 3 Model B+; on-board memory ranges from 256 MB to 1 GB RAM. Secure Digital (SD) cards are used to store the operating system and program memory in either SDHC or Micro SDHC sizes. The boards have one to four USB ports. For video output, HDMI and composite video are supported, with a standard 3.5 mm phono jack for audio output. Lower-level output is provided by a number of GPIO pins which support common protocols like I²C. The B-models have an 8P8C Ethernet port and the Pi 3 and Pi Zero W have on-board Wi-Fi 802.11n and Bluetooth.

2.1.2 Circuit Diagram

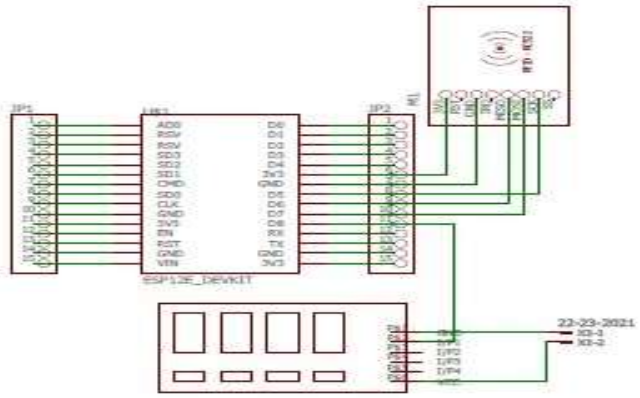


Fig 2.1.2 : Circuit Diagram

III. WORKING

The project is working on the basis of Internet of Things. It is a client-server model. It is used to provide monitoring and controlling of lab equipments like computers, fans, lights, air conditioners etc to reduce the undesired energy wastage. It can be achieved by using Raspberry pi, Wi-Fi module, RFID card and reader, Amazon AWS server, relays ,and LEDs.

When the RFID card is swiped the data is read out by the RFID reader and it sends the same for further processing. The data includes individual ID, date, time, and time stamps. Wi-Fi module NODE MCU8266 is used to establish the Wi-Fi connection and it connects the all individuals to a network. Network of devices and the RFID reader are connected to NODE MCU. The RFID reader and NODE MCU are directly connected with wires while Raspberry pi and NODE MCU are connected through a common Wi-FI.

The RFID card gets its operating power of 3.3V from NODE MCU . MOSI and MISO pins of RFID reader is connected to the GPIO D7 and D6 pins respectively. SDA and SCK pins of the reader is connected to D4 and D5 of the NODE MCU respectively.

NODE MCU publishes the topic and Raspberry pi subscribes that topic. Raspberry pi act as the centralized data sender. It is the broker between the client and server. It act as the server for the NODE MCU and while as the client for the AWS server. Data from all the clients will be send to the broker and is then upped to the cloud for further computing. Python and IDE are the programming languages used in Raspberry pi and node MCU. The AWS server is responsible for the cloud computing process. The devices connected can be monitored and controlled from the server manually by giving control commands in the subscribed topic. The status of the action performed can be displayed in both Raspberry pi as well as in the server. The Raspberrypi screen is obtained using the Mobaxtreme software.Status button includes relays and LEDs, where relays are acting like switches and LEDs are used for an indication. These devices can be controlled anywhere from this world.The protocols used in this project are MQTT, SPI, PAHO and Mosquito.

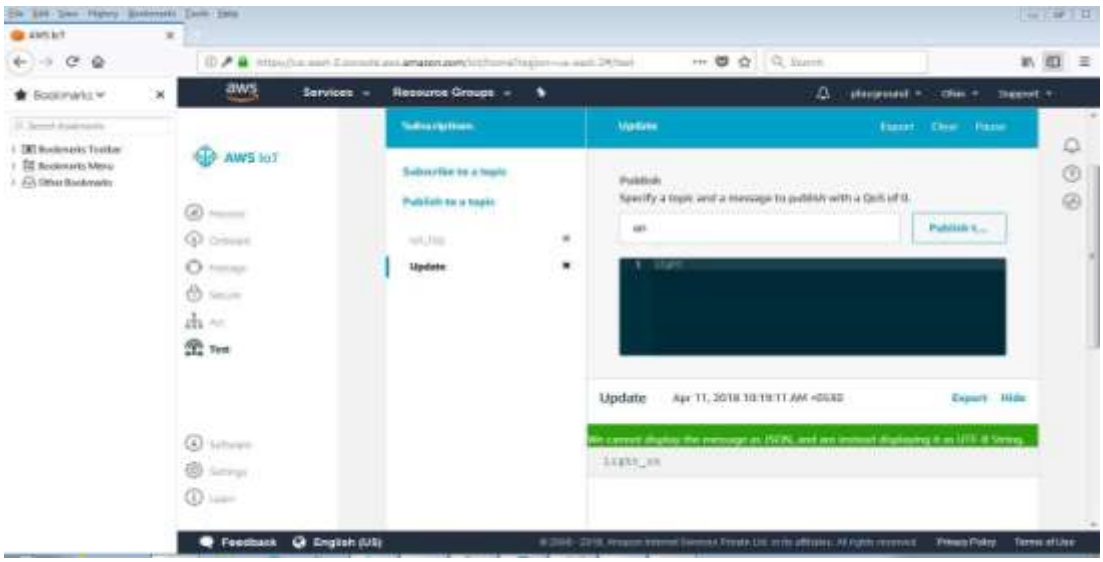


Fig 3.: AWS server screen-light on condition

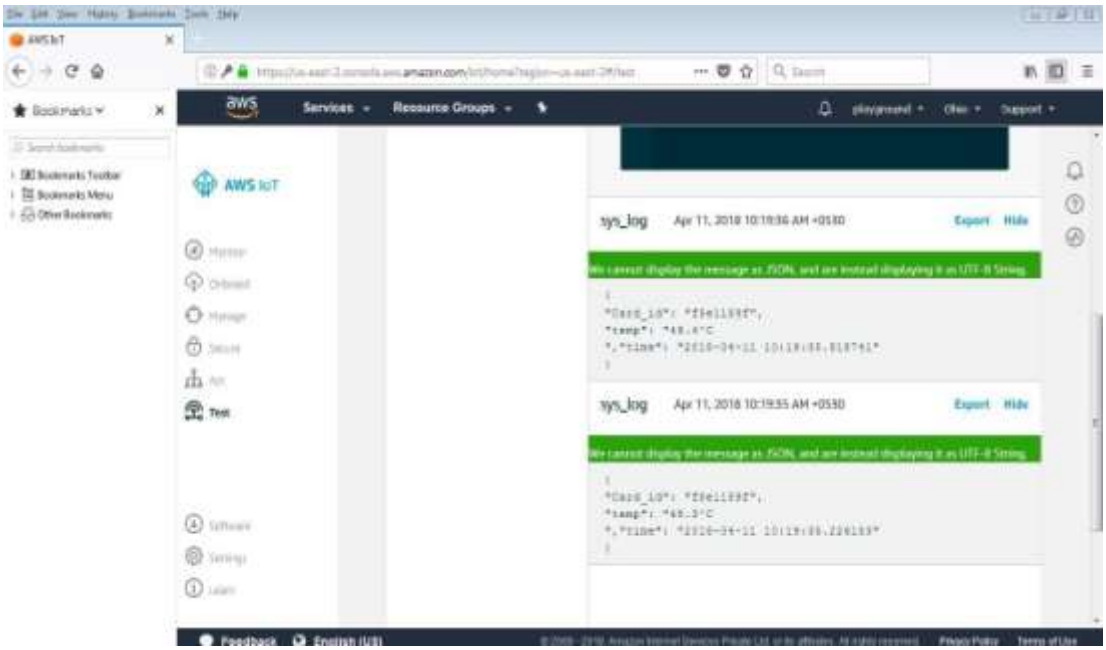


Fig 3.1: AWS server screen-when RFID card is swiped

IV. HARDWARE SECTION

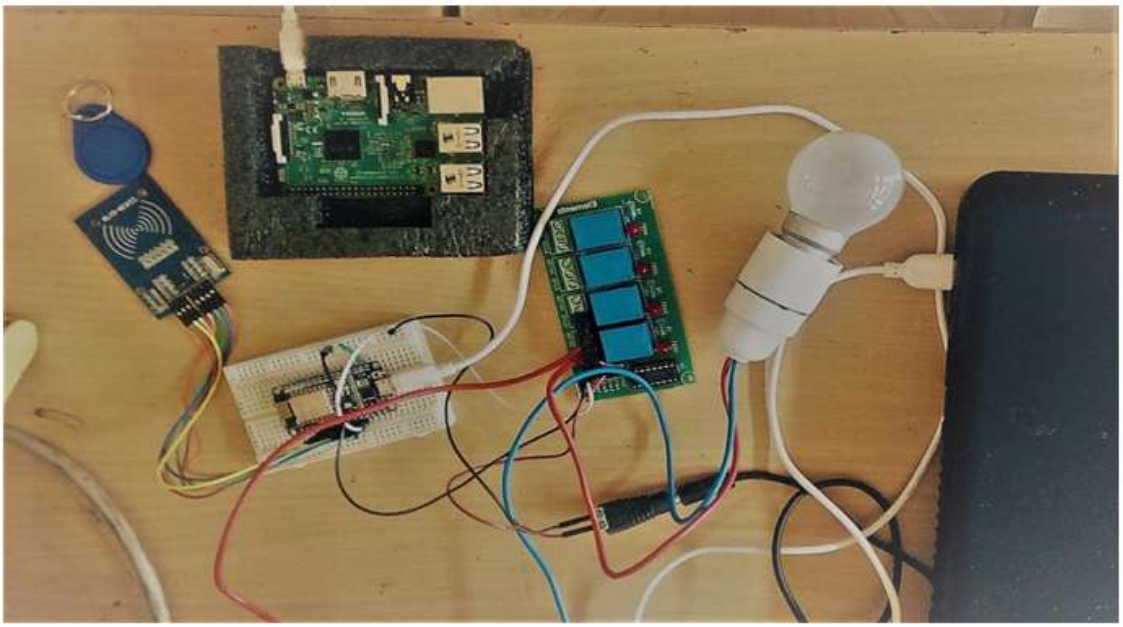
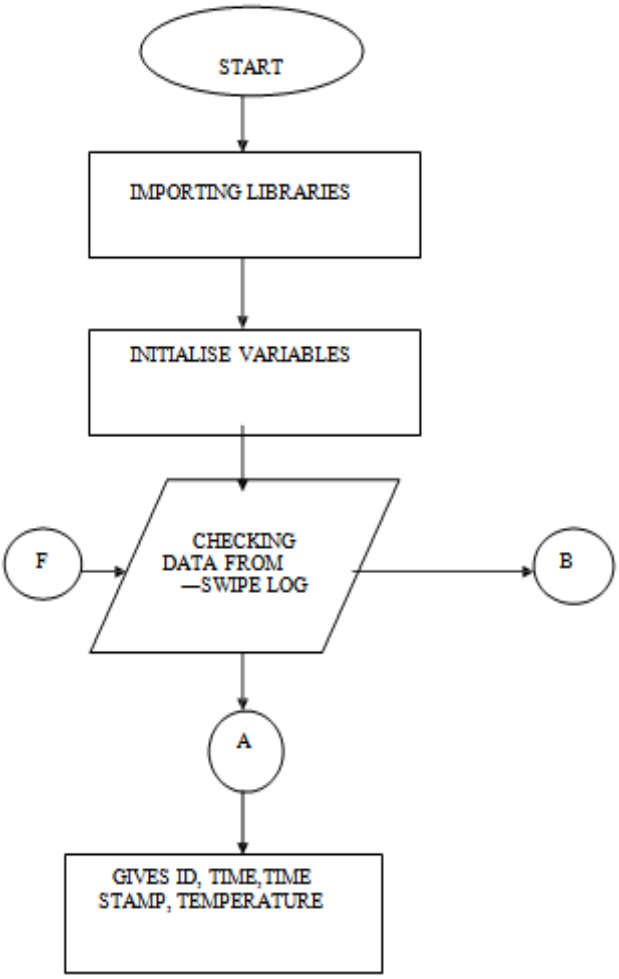
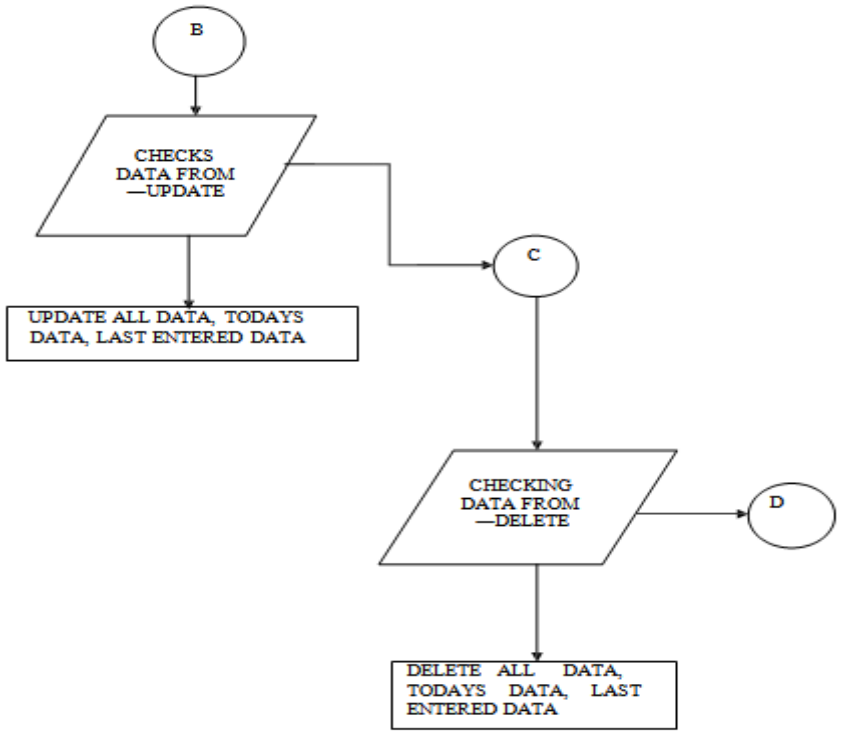
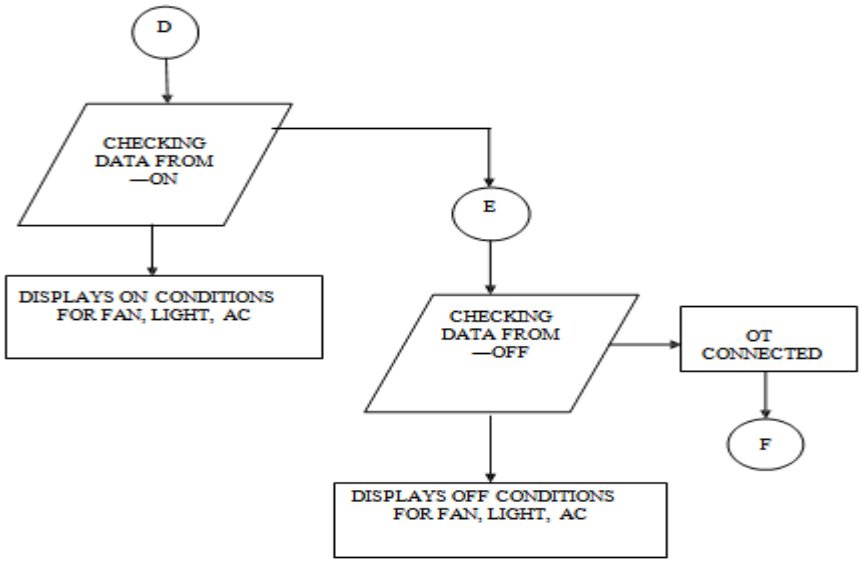


Fig 4. Hardware section

V. FLOW CHART







VI. FEATURES

6.1 Adavantges

Easy to setup and use.
Attendance management.
Energy Conservation.
It can be controlled and monitored from anywhere of the world.

6.2 Disadvantages

Costly.
Not automatic.

6.3 Future Scope

Useful in offices, hospitals.
Autonomous system.

VII. CONCLUSION

This project adopts the concept of the ―Internet of Things‖ to construct efficient lab management which will realise the idea of energy saving. The object of our work includes lights, fans and air conditioners. RFIDs , WiFi module and Raspberrypi are used to build up the wireless network. The contributions delivered by this project include: The attendance of the students entering the lab the can be efficiently managed. The use of lights, fans and air conditioners are monitored and controlled. This project shows how to build up the IoT to manage the labs in institutions. This project can be further extended to an automatic system by integrated more sensors and required circuits.

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