

# Overview on Power Efficient IoT based System

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**Abstract** - The IoT (Internet of Things) is the network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators and network connectivity that enable these objects to collect and exchange data. Home automation is one of the example of IoT based system. To create the power efficient IoT based system is one of the main issue in existing system. So the proposed system provide power efficient IoT based services. The system will continuously work in power saving mode. When certain limit of units of electricity is crossed, then the system will enters into the red zone. In proposed system, all electronic devices such as light, AC, fan, etc. are controlled and accessed by user from remote location using mobile application. There is wireless communication between mobile application and the system through GPRS (General Packet Radio Service).

**Key Words:** IoT, GPRS, Power Efficient

## 1. INTRODUCTION

IoT is the latest technology in recent digitization world. Where IoT is the inter-network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators and network connectivity that enable these objects to collect and exchange data. IoT is the technology of today which is touching and transforming the every aspect of our real life. IoT gives the concept of Machine to-Machine (M2M) communication and machine to human communication. IoT is mostly used in home automation and building automation system where every convenience will be taken care of by the interconnected devices on IoT. Home automation is one of the important application of IoT based system.

But present IoT home automation systems are not considering power saving. In recent IoT based system the large number of sensors are replaced by few number of sensors and this is put together to consume power and energy. For this type of systems context aware systems are used to control all IoT appliances effectively. Various models are used to design the context aware systems. But this systems consume more power[1]. There is lots of research going into IoT based power management systems. The increase in power requirement has pushed the researchers and industrialist to design low power systems. Many image processing techniques are also used to reduce the wastage of

power[2]. Some system use a cheaper method to reduce the wastage of power by distributing all load. For this, system uses thermal sensing and required hardware. This type of system use the novel method to reduce the wastage of power[3].

So considering all this fact the proposed system will demonstrate the power efficient IoT based system which reduces the wastage of power and which helps the user to effectively use the IoT devices in their home. The proposed method in which the system will continuously work in power saving mode. Also The proposed system increase the independence and give a greater control on home environment i.e. electronic devices. Proposed system increase power efficiency and allows the user to monitor the home appliances remotely.

## 2. PROPOSED SYSTEM ARCHITECTURE

A Remotely Control Home Appliances System is a system which provides various services to control home appliances, such as microwave oven, TV, and garage door etc. through remote devices such as mobile phone, desktop and palm-top. The proposed Remotely Control Home Appliances System allows remote and mobile control of various home appliances by clicking on option in mobile application. In this project Remotely Control Home Appliances System receives commands from remote devices (Mobile) that are manipulated by user. The system in turn dispatch commands to respective appliances that will perform the actions. The proposed system is one of the example of Home automation IoT based system which provide easy interaction of user with day to day electronic appliances.

Figure-1 shows the proposed system architecture. The proposed system consist of various component such as user mobile, Cloud, Raspberry-PI, Relays and various electronic devices.

**1] User Mobile :** The main goal is to control the IoT devices remotely by using mobile application. So that, this mobile application is installed on user mobile. Then user mobile is used to give the command to IoT devices.

**2] Cloud :** Cloud is used to process the user input. So that, PubNub cloud is used. PubNub is a global Data Stream Network (DSN) and real time infrastructure-as-a-service

(IaaS) company based in San Francisco, California. The company makes products for software and hardware developers to build real time web, mobile and Internet of Things application.

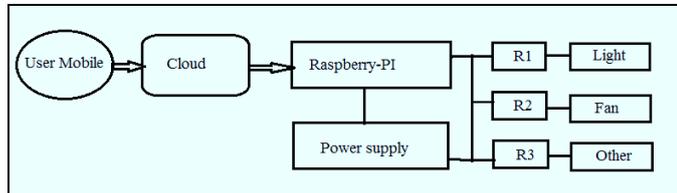


Figure -1: Architecture of System

**3] Microcontroller :** A microcontroller is a small computer on a single integrated circuit. In modern terminology, it is System-on-chip. Here, Raspberry-PI used as a microcontroller to control electronic appliances[5]. Where Raspberry-PI is a dynamic microcontroller that is capable of just about anything a computer is. It runs with Python programming language. It has the ability to run multiple programs at a time. This feature is not available in Arduino.

**4] Relays and Electronic appliances :** A relay is an electrically operated switch[7]. In figure, R1, R2, R3 are the relays. One relay is used for one electronic device. In proposed system, rest all electronic appliances are connected to the microcontroller (Raspberry-PI). Each electronics appliance have sensor connected to it.

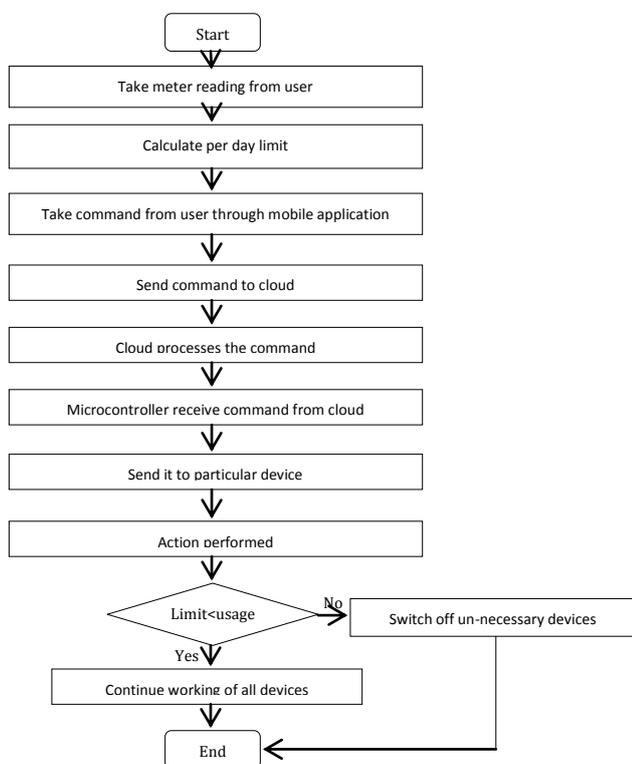


Figure -2: Flow chart of proposed system

The proposed system will continuously work in power saving mode. Power saving mode means all unnecessary devices which are switched on are going to switch off. When system crosses the per day limits of electricity then unnecessary lights are closed and system enters into red zone. Before going into red zone system first gives the notifications to the user about the system has nearer to the red zone. These are the various steps to build the proposed system as shown in the figure-2.

**Flow chart of proposed system-**

- 1) First user has to give the meter reading to the system at the start of month.
- 2) Based on this input, system calculate the per day limit of electricity.
- 3) The input from user is taken through mobile application.
- 4) This input is send to the cloud.
- 5) Cloud process this input and related output is send to microcontroller to control the IoT devices.
- 6) Microcontroller receive this command and send to particular device.
- 7) Then based on this command, microcontroller either switch on or switch off IoT devices.
- 8) If calculated limit is less than usage of devices then all devices are continuous their working.
- 9) Otherwise switched off all un-necessary devices which are switch on.
- 10) End.

Following figure shows the partial graphical user interface for proposed system which is on the user mobile to give the ON/OFF input to system remotely.



Figure -3: GUI to control IoT devices

### 3. TECHNICAL REQUIREMENTS

The software requirement for proposed system are Android for mobile application development and python as a back end language. Python programming language is used to do the programming for Raspberry-PI.

The hardware requirement for proposed system are various type of electronic appliances such as light, fan etc., micro-controller(Raspberry-PI), sensors[6] such as temperature sensor, light sensor and relays.

### 4. CONCLUSIONS

The present IoT based system provide all services but not energy efficient. This proposed system provide power saving mode which reduce wastage of energy, it provide easy installation also the maintenance cost is very less. These system provide easy interaction of user to day to day object (electronics appliances). Also provide the facility to control system remotely.

### 5. FUTURE SCOPE

Currently the system is semi-automated and also after interval of time user has to give the meter reading manually. So there is a scope to make the system fully automated by taking it's own decisions based on user context and also takes the meter reading from meter itself without human intervention.

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