# CONTROLLING AND MONITORING OF SMART HOME APPLIANCES USING IoT

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## ABSTRACT

*In the competitive environment and fast world, home automation technology is required for every person. IoT conceptualizes the idea of remotely connecting and monitoring real world objects through the internet. When it comes to our home, this concept can be aptly incorporate to make it smarter, safer and comfortable life. This IoT project focuses on building a smart wireless home automation using android application over internet. The practical goal of this paper is used to create a virtual, but practically usable, android home automation system by control and monitoring the status (ON/OFF of the home appliances) using multiple ways such as The Internet, Electrical switch and UART. The android mobile is used to send the commands to the Arduino to control all the home appliances. The advantage of this technology is low cost, user friendly, easy installation and also wastage of electrical power is reduced by proper monitoring of home appliances.*

*Keywords: Internet of things, Home appliances, Arduino UNO, Smart phone.*

## I.    INTRODUCTION

Internet of Things also referred to as the Internet of Everything. It consists of all web-enabled devices that collect, send and act on data they acquire from their surrounding environments. These devices, often called "connected" or "smart" devices, can sometimes talk to other related devices. IoT devices are a part of the larger concept of home automation also known as domestics.The internet has become a common interface that many devices use in order to simplify the daily life of many people. The internet has given people the ability to search for information, store their own information in the cloud while also giving them better ways of managing information.

Smart phones have allowed people to connect to the internet without the need for the computer while still offering the same functionality but through different means. A field that is recently gaining popularity is home automation which can also use Smartphone as information or functionality hubs. Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. Due to its user friendly nature it has greater importance than other technologies. Large smart home systems utilize a main hub or controller to provide user with a central control or all their devices.This project aims to develop a

prototype of a product capable of controlling and monitoring of a home appliance, with an emphasis on low cost and open source configurability. The end goal beyond this project would be a product that would hopefully allow people many other devices through Wi-Fi. The main prototype where the Arduino UNO acted as a central device, it was used to control the device. The server manages users and devices, and handles the communication between the application and the central device. Users and devices are stored in a database on the server. The application is a frontend which presents the user with a list of devices to interact with.

## II.    LITERATURE SURVEY:

Several researchers have come up with the idea of Home Automation system by using different technologies. [1]Yuksekkaya, Tosun, Oscan, Alkar proposed a GSM based interactive home automation system in IEEE Transaction. This paper mainly proposed how the home sensors and devices interact with the home network and communication through GSM and SIM (subscriber

identity module).The system use transducer which converts machine function into electrical signals which goes into microcontroller. The microcontroller analysis all signal and convert them into command to understand by GSM module. The main advantage of this paper is extensive coverage and the disadvantage is electronic interference due to pulse transmission technology.

[2]Kaphungkui proposed a Home automation using RF module in International Journal of Innovative Research in Electrical, Electronic and Instrumentation and Control Engineering. This paper describes RF remote is combined to the microcontroller on transmitter side that sends ON/OFF signals to the receiver where devices are connected. By operating the stated remote switch on the transmitter, the load can be turned ON/OFF globally using wireless technology. One of the main advantages of RF based remote control is that it can operate the appliances without the requirement of line of sight within its specified range efficiently. The drawback is it covers only specified range and the cost is high.

[3]Piyare and Tazil proposed Bluetooth based home automation using cell phone in IEEE 15th International Symposium on Consumer Electronics (ISCE).In this paper home appliance are connected to the Arduino BT board at input output ports using relay. It provides authentication where password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. In this system python script is used. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device. The main disadvantage of this paper is coverage distance, it covers only 10m.

[4]Gill yang and Yao proposed a ZigBee based home automation system in IEEE Transaction on Consumer Electronics. In this the device performance is record and store by network co coordinators. For this WIFI network is used with 4 port switch port standard ADSL modern router. The network SSID and security WIFI parameters are preconfigured. Over Zigbee network, Zigbee controller sent message to the end. The safety and security of all messages that are received by the virtual home algorithm. To reduce expense of the system and the intrusiveness of respective installation of the system Zigbee communication is useful. But the major drawback is easily attacked by unauthorized people, not secure and it cannot be used in outdoor appliances only indoor is possible.

[5]Pavithra D and RanjithBalakrishnan has proposed a Iot Based Monitoring And Control System In Home Automation in IEEE Conf. Global Conference on Communication Technologies (GCCT) 2015. The paper describes the Internet of Things is the latest and emerging technology, which will enable physical objects used in day to day life to connect to the internet and exchange data. In this paper, Smart home control system using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from any-where around the world, an automated home is sometimes called a smart home. This system uses PIC controller interfaced with ESP 8266 using at commands and sensors that enables wireless communication and remote control of various electrical appliances with in their home. This system also provides security systems with low cost RFID technology.

## III.    OBJECTIVE:
The main objective of this paper is to create a virtual, but practically usable Home automation system using IoT. IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

## IV.    SYSTEM ARCHITECTURE:
In our proposed system we are using several components such as Arduino UNO, Wi-Fi module, LCD, Relays, UART convertor, Current sensor, Light sensor, Bulb and Fan (output device).The below figure 1 shows the block diagram of Controlling and monitoring of smart home appliances using IoT.
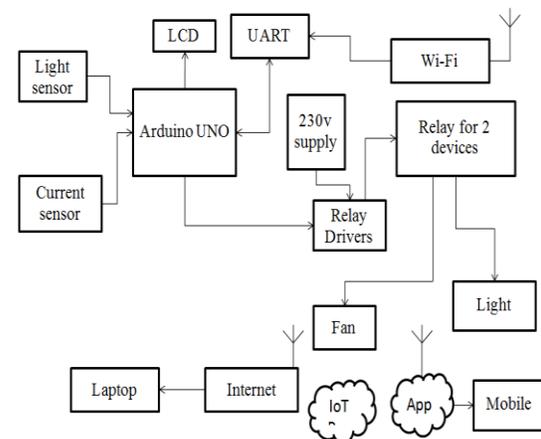


Fig.1. Proposed Block diagram

## V.    SYSTEM DESCRIPTION:
**ARDUINO:**

Arduino is an open-source and single-board microcontroller board based on Atmel's AT mega 328 microcontroller is shown in the figure 2.The board has 14 digital I/O pins of which 6 can be used as PWM outputs,6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains both physical programmable circuit board and software or IDE, which is connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The board can operate on an external supply of 6 to 20 volts. The board is unstable, if the pin is supplied with less than 7V.If using more than 12V,it may damage the board. However, the board should be operated in between 7to12 volts. The AT mega 328 provides UART TTL serial communication over USB and appear as a virtual com port to software on the computer. It also supports I2C(TWI) and SPI communication. The Arduino microcontroller is programmed in C/C++ by using Arduino IDE or by using a text editor and manually compiling and linking the source code. The IDE is open source software that can be written in Java and it is also known as cross-platform. The below figure 2 shows Arduino UNO.



Fig 2.Arduino UNO

### ANDROID:

Android is a software stack for mobile devices that include mobile operating system, middleware and key applications. There are many tools are available to develop android applications such as Android SDK, MIT app inventor, Intel SDK and etc. In this system we use android SDK for developing android app. The Android SDK provides the tools and APIs necessary to begin developing applications on the android platform using Java. The Android SDK compiles the code along with any data and resource files into an Android package, an archive file with an .apk file extension. All the code in a single .apk file is considered to be one application and Home automation using android system is the file that can be installed in any Android devices.

### UART CONVERTOR:

Universal synchronous receiver transmitter is the USB_RS232 cables are a family of USB to RS232 levels serial UART converter cables incorporating FTDI's FT232RQ USB to serial UART interface IC device which handles all the USB signaling and protocols. The cables provide a fast, simple way to connect devices with a RS232 level serial UART interface to USB.Each USB_RS232 cable contains a small internal electronic circuit board, utilizing the FT232R, which is encapsulated into the USB connector end of the cable. The integrated electronic also include the RS232 level shifter plus Tx and Rx.LEDs which give a visual indication of traffic on the cable.

### CURRENT SENSOR:

In this project we uses ACS712 Current sensor shown in the below figure 3 which is based on Hall Effect sensor it measures both AC and DC and it is proportional to the current through the measured path. This sensor is interfaced with Arduino for measuring AC and DC.It provides various features such as high response time, noise cancellation and ability to tackle output error.



Fig.3.Current Sensor (ACS712)

### LIGHT SENSOR:

A Light sensor is a device that detects the current ambient level of the light. In this project we used light sensor to monitor the intensity of the light. Depending upon the current ambient level, the Arduino can either

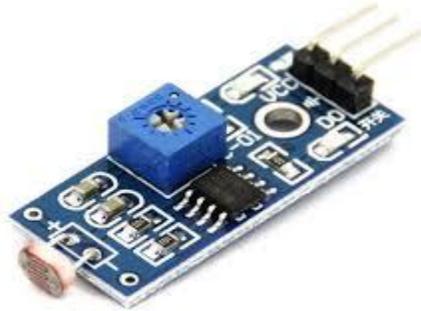turn ON or OFF the light. The below figure 4 shows Light Sensor.



Fig.4.Light Sensor

## VI.     CONCLUSION:

This system provides highly scalable, flexible, efficient and commercially available Smart Home system, which is universally accessible, low cost and auto configurable. The appliances can be controlled and monitored byusing Arduino UNO and Worldwide web. It reduces the effort of the person of the house especially for physically challenged people control the appliances. It also reduces the wastage of electrical energy by proper monitoring of the appliances. The system is sustained for long time operation with good response.

**REFERENCES:**

[1] N.K.Suryadevara, S.C.Mukhopadhyay, S.D.T.Kelly and S.P.Gill,"WSN-based smart sensors and actuators for power management in intelligent buildings,"IEEE/ASME Transactions on Mechatronics, vol.20, no.2, pp.564-571, 2015

[2] Pavithra.D and Ranjith Balakrishnana,"IoT based Monitoring and Control system for Home Automation," in Proc.IEEE Conf. Global conference on Communication Technologies(GCCT),2015.pp.169-173

[3]Piyare R., Tazil M.,"Bluetooth based home automation system using cell phone", Consumer Electronics, IEEE 15th International Symposium on, vol.45, no.3, pp.192-195.

[4]Javale D., Mohsin M., Nandanwar S., Shingate M., (2013),"Home automation and security system using Android ADK,"International Journal of Electronics Communication and Computer Technology, vol.3, pp.382-385.

[5]M.N.N.A.Asghar, M.H.,"Principle application and vision in internet of things," in Communication Technologies (GCCT), 2015 Global Conference.