# Smart Lights Using Internet of Things

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*Abstract- The Aim of this project is to design smart lights that can lit with the help of voice commands issued from an Android application and with the response from humanoid-sensors. The system will control lights in a house with voice commands issued from outside of the home within the range of 50 Meters. Within the house the lights will be operated with the help of humanoid-sensors with less human intervention. The electric lights of present days should be operated manually and no automation of this kind is introduced in them. If the lights were not switched off while leaving home it is not possible to switch off them till the time of arrival. There are few smart apps in use these days where a person can operate home devices using mobiles like Samsung smart home app, Amazon Alexa App, Google Assistant, the devices connected by these apps must be within the range of 18 Meters, whereas Arduino Bluetooth App will be operated within wide range of 50 Meters.*

*Indexed Terms- Arduino Bluetooth, Humanoid sensor, Energy efficient, Automatic control.*

## I. INTRODUCTION

The Internet of Things, or IoT, refers to the billions of physical devices around the world that are now connected to the internet, all collecting and sharing data. Thanks to the arrival of supercheap computer chips and the ubiquity of wireless networks, it's possible to turn anything, from something as small as a pill to something as big as an airplane, into a part of the IoT. Connecting up all these different objects and adding sensors to them adds a level of digital intelligence to devices that would be otherwise dumb, enabling them to communicate real-time data without involving a human being. The Internet of Things is making the fabric of the world around us smarter and more responsive, merging the digital and physical universes. The IoT promises to make our environment our homes and offices and vehicles smarter, more measurable, and chattier. Smart speakers like Amazon's Echo and Google Home make it easier to play music, set timers, or get information. Home security systems make it easier to monitor what's going on inside and outside, or to see and talk to visitors. Meanwhile, smart thermostats can help us heat homes before we arrive back, and smart lightbulbs can make it look like people were home even they are out.

## II. SMART HOMES

Smart home technology, also often referred to as home automation or domotics (from the Latin "domus" meaning home), provides homeowners security, comfort, convenience and energy efficiency by allowing them to control smart devices, often by a smart home app on their smartphone or other networked device. A part of the internet of things (IoT), smart home systems and devices often operate together, sharing consumer usage data among themselves and automating actions based on the homeowners' preferences. Examples of smart home technologies: Nearly every aspect of life where technology has entered the domestic space (lightbulbs, dishwashers and so on) has seen the introduction of a smart home alternative:

- Smart TVs connect to the internet to access content through applications, such as on demand video and music. Some smart TVs also include voice or gesture recognition.
- In addition to being able to be controlled remotely and customized, smart lighting systems, such as Hue from Philips Lighting Holding B.V., can detect when occupants are in the room and adjust lighting as needed. Smart lightbulbs can also regulate themselves based on daylight availability.

Nowadays, people are using remote controls for television sets and other electronic systems, which have made our lives real life easy. Technology is advancing with every passing day and owning smart home is becoming a necessity. In the past, smart homes were considered to be part of a luxurious life style but today they have become an important part of our lives.

### III. EXISTING SYSTEM

For normal people it is very convenient to on/off lights in their houses, but for disabled people it is somewhat difficult to them. Also, in these days people are looking for more simpler ways as they are busy in their day life schedule. In order to overcome those problems, this project idea is evolved. Thus, it decreases the human intervention in operation of lights.

### IV. PROPOSED SYSTEM

This project is aimed at designing smart lights that can automatically control on/off operation of lights with the help of voice commands issued from an android application and also with the response from humanoid-sensors. This system can be implemented using Arduino uno, Bluetooth module, humanoid- sensors and a phone. The System will control lights in a house with voice commands issued from outside of the home within the range of 50 meters. Within the house the lights will be operated with the help of humanoid-sensors. The android application is connected with Bluetooth device. The android application converts voice commands into electrical signal and sends it to Bluetooth devices using radio waves once set-up is ready, commands are given through android application. Then the operation of lights is performed based on given commands. The interface in the application is very easy to understand and operate it by the people who have minimum knowledge of using smart phone.

### V. ARCHITECTURAL DESIGN

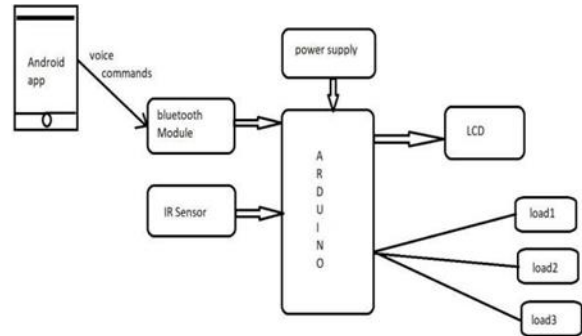The pictorial representation of our model is given below:



Fig: 1. Architecture Diagram

### VI. CIRCUIT COMPONENTS

1. *Arduino Nano*



Fig: 2. Arduino Nano Board

An important feature of the Arduino is that you can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable connection to the PC, and the program will still run from the top each time you push the reset button. Remove the battery and put the Arduino board in a closet for six months. When you reconnect the battery, the last program you stored will run. This means that you connect the board to the host PC to develop and debug your program, but once that is done, you no longer need the PC to run the program.

2. *Bluetooth HC-05 Module*

Fig: 3. Bluetooth HC-05 module

Bluetooth is a technology for wireless communication. It is designed to replace cable connections. It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART). Usually, it connects small devices like mobile 11phones, PDAs and TVs using a short-range wireless connection to exchange documents. It uses the 2.45GHz frequency band. The connection can be point-to-point or multi-point where the maximum range is 10 meters. The transfer rate of the data is 1Mbps. HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth.
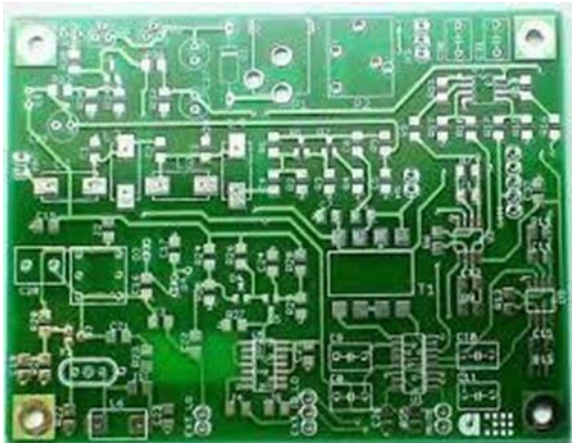
*3. Printed Circuit Board*



Fig: 4. Printed Circuit Board

A printed circuit board (PCB) mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non- conductive substrate. Components are generally soldered onto the PCB to both electrically connect and mechanically fasten them to it. Printed circuit boards are used in nearly all electronic products and in some electrical products, such as passive switch boxes. PCBs can be single-sided (one copper layer), double-sided (two copper layers on both sides of one substrate layer), or multi-layer (outer and inner layers of copper, alternating with layers of substrate). Multi-layer PCBs allow for much higher component density, because circuit traces on the inner layers would otherwise take up surface space between components. The rise in popularity of multilayer PCBs with more than two, and especially with more than four, copper planes was concurrent with the adoption of surface mount technology. However, multilayer PCBs make repair, analysis, and field modification of circuits much more difficult and usually impractical.

*4. Smart Phones*



Fig: 5. Smart Phones

A smartphone is a cell phone that allows you to do more than make phone calls and send text messages. Smartphones can browse the Internet and run software programs like a computer. Smartphones use a touch screen to allow users to interact with them. There are thousands of smartphone apps including games, personal-use, and business-use programs that all run on the phone.

*5. LEDS*

LEDs are smart and effectively manageable when integrated with IoT technology. With IoT, it is easier to keep track of data, like the number of operation lights and power consumption of each light fixture.
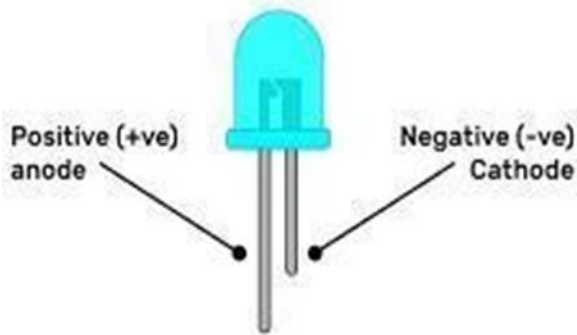
Fig: 6. LEDs

A facility manager can also operate luminaires and control an entire power grid remotely. Thus, with the help of IoT technology, the face of LED lighting is being revolutionized. LED lighting is very different from other lighting sources such as incandescent bulbs and CFLs.

LEDs are available in a wide range of shapes, colours and various sizes with different light output intensities available, with the most common (and cheapest to produce) being the standard 5mm Red Gallium Arsenide Phosphide (GaAsP) LED. LEDs are also available in various "packages" arranged to produce both letters and numbers with the most common being that of the "seven segment displays" arrangement. Nowadays, full colour flat screen LED displays, hand held devices and TVs are available which use a vast number of multicoloured LED's all been driven directly by their own dedicated IC. LEDs are extremely energy efficient and consume up to 90% less power than incandescent bulbs. Since LEDs use only a fraction of the energy of an incandescent light bulb there is a dramatic decrease in power costs. Also, money and energy are saved in maintenance and replacement costs due to the long LED lifespan.

### 6. Connecting wires

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum.

Connecting wires provide a medium to an electrical current so that they can travel from one point on a circuit to another. In the case of computers, wires are embedded into circuit boards to carry pulses of electricity.
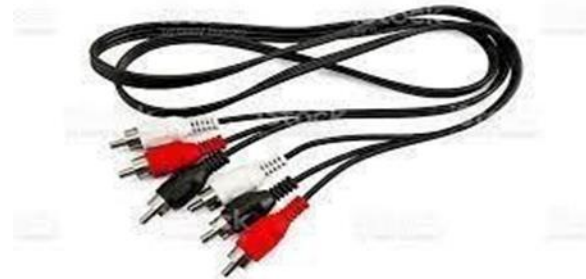


Fig: 7. Connecting Wires

### 7. IR Sensor



Fig: 8. IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

### 8. Liquid Crystal Display (LCD)

It is a type of display that uses the liquid crystals for its operation. Here, it will accept the serial input from the computer and upload the sketch to the Arduino.

The characters will be displayed on the LCD. An LCD consists of a multi-layered flat panel composed of a matrix of tiny cells containing a liquid crystal material. When a voltage is applied to a cell, the liquid crystals within it align themselves with the electric field, and acquire the ability to polarize light passing through it.
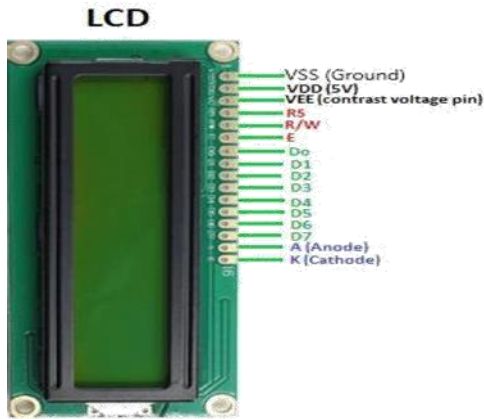


Fig: 9. LCD

They work by using liquid crystals to produce an image. The liquid crystals are embedded into the display screen, and there's some form of backlight used to illuminate them. The actual liquid crystal display is made of several layers, including a polarized filter and electrodes. The library that allows us to control the LCD display is called Liquid Crystal Library, which is discussed below: The library is declared as: #include D:

## VII. WORKING PRINCIPLE



Fig 10: Click on connect robot

The working of our model is very simple. The supply is given through the jack. Firstly, the user has to turn on Bluetooth and connect to HC-05 which will be appeared in the given list of options. Later the user has to install "BT Voice Controller App for Arduino" which is available in the play store. After installing the

Application, go to the notifications that can be seen on the home screen. In that choose connect robot, later it will show a possible option to connect. Choose HC-05. A text message will be displayed as connected to HC-05.

Now using the Mic icon, user can give commands like outside light on, outside light off, inside light on, inside light off for the operation of lights.

The Internal Principle is communication between Bluetooth HC-05 and Arduino nano that performs the tasks based on the commands given.
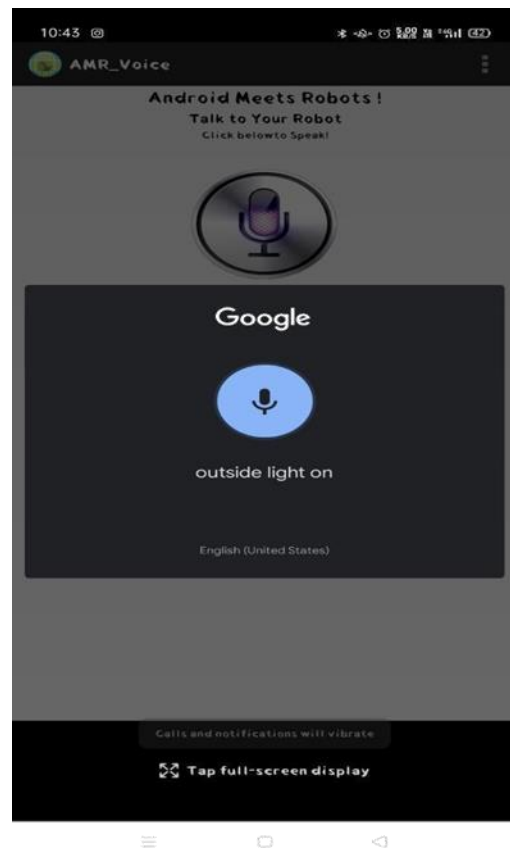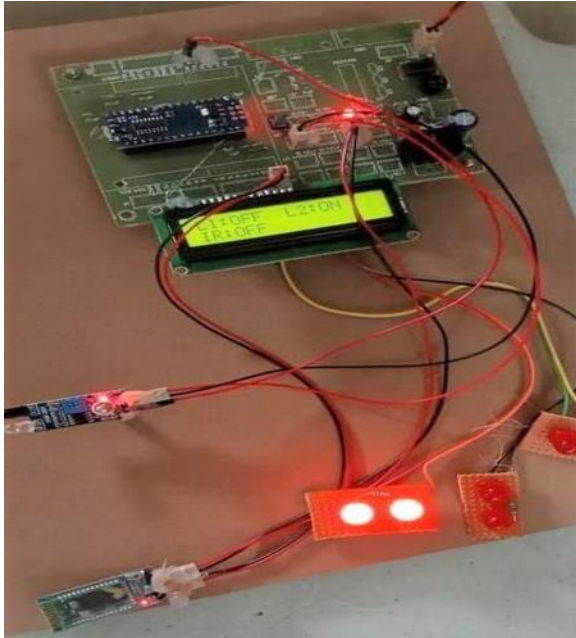


Fig 11: Giving command "Outside Light On "

Fig: 12. Outside Light is On and status change in
LCD Screen.

By using IR Sensor, whenever a human is detected
near the range of sensor the lights will be
automatically turned on otherwise the lights will be
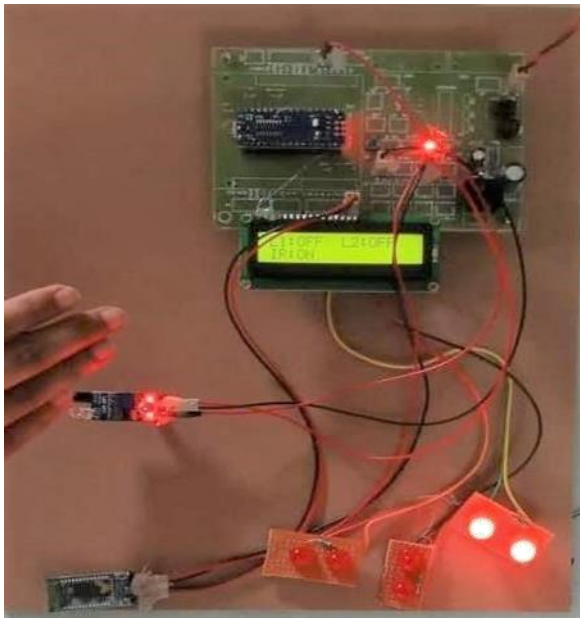turned off. The status of light on/off can be stated on
LCD screen.



Fig 13: IR Sensor responding to Human detection.

CONCLUSION

Controlling the home lights via voice is just an
amazing step forward towards the development in IoT
sector, as this involves totally a wireless medium to
create the connection. There are many Android-based
applications which have been developed to initiate the
working on this technology which also includes voice-
controlled wheelchair, Ac'S, Fan etc. Without a doubt,
this technology will bring revolution in the people's
life if that is implemented on the larger scale. But
according to all the existing technology, this is
something new in a number of aspects and it is worth
to be accepted by a wide number of people because of
its advantages towards the elderly and differently
people. Controlling the lights in the wireless medium
is absolutely an outstanding progress in this century,
vulnerabilities and security issues are still under
concern to make this technology even better than ever
before. Unlike the other ones, User can also operate
lights with the help of IR sensor. Within the range of
sensor, lights can automatically turn on otherwise off.

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