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Iot- Based Room Light Controller with Visitor Counter

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Abstract:

This paper presents the design of an IoT model that helps in remote monitoring of the number of people in rooms and remote control of appliances such as lights and fans in the room. For entrance and exit detection, this system uses two infrared (IR) sensors coupled to an Arduino UNO. This ensemble records the total number of people who enter and exit the premises. The count is sent to a remote web server to be monitored and an android application is used to monitor and operate appliances such as lights and fans according to the presence of people in the room. The Arduino controller contains two relays that are used to control a light and a fan via a mobile app. When the number of people exceeds a specific threshold, the system sends a notification to the app holder about it. The app features two switches that can operate the light and fan from a distance, and the people count is displayed on the mobile app. This model makes it easier for Room Automation systems to follow the Standard Operating Procedure (SOP) through the use of the Smart Counter in their facility.

Keywords: *Internet of Thinks, Ardunio, Smart Counter, Bylink Application*

INTRODUCTION

The digital era has brought in its wake, the increasing popularity of automation devices, commonly referred to as smart devices. The advent of the Internet of Things (IOT) in 2013 has resulted in new technologies that make smart devices smarter than before. The IoT technology has enabled the automation of common household devices such as televisions, heaters, air conditioners, washing machines, security systems and other electronic and electrical equipment, which, until the 1990s,weremanuallycontrolled.Such automation has resulted in the emergence of the smart home, taking IoT beyond the initial expectations of building smart cities and digital farm building. The primary goal of IoT is the establishment of a virtual link between a hub or network and electronic or electrical objects or things. This virtual link enables the control, tracking, and location of connected objects. IoT comprises multiple layers. The first layer is the sensing layer that is primarily used to collect data. The network layer that is utilized for information transmission and processing is the second layer. The third application layer is used for storage and decision-making. Progresses in device-to-device connectivity and the development of smart sensors, in conjunction with advanced communication technologies like Wi-Fi, Bluetooth, etc., and cloud computing advancements have resulted in the proliferation of IOT devices that are intelligent, interactive, and efficient [1-4].

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BLOCK DIAGRAM

This paper reports a simple model for the design and use of IoT in a household application – automatic fan and light controller. The block diagram of the proposed model is shown in Figure 1. NODE MCU is the main controller. The input of NODE MCU are IR sensor radiations to sense some aspects of the surroundings), and BYLYNK app virtual inputs (To control the speed and rotation of fan).The sensor is connected via digital port of the Node MCU. The fan is connected to the node MCU via motor driver that can be controlled virtually from a mobile phone. ESP8266Arduino core is considered as Arduino UNO.

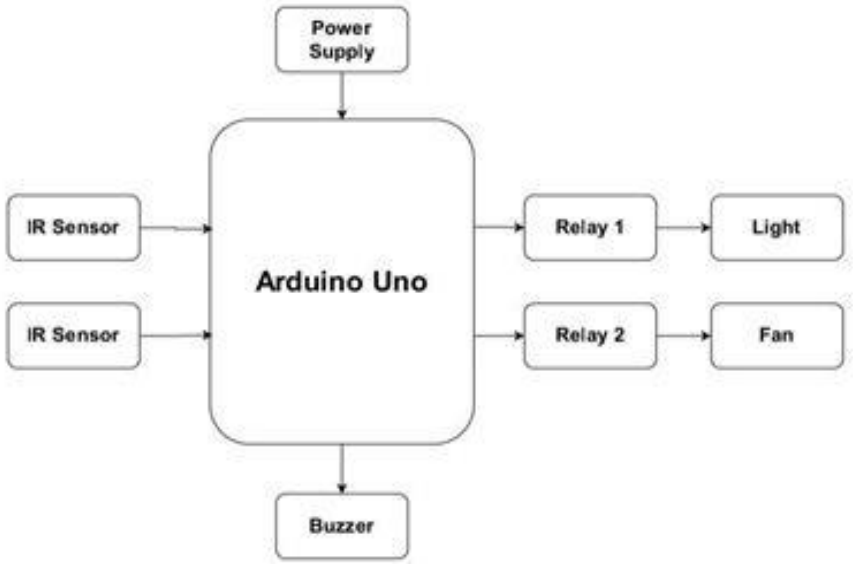

Fig.1Blockdiagram

CIRCUIT DIAGRAM

The circuit diagram of the proposed model is shown in the figure 2. The system uses an EPS8266 Arduino core for monitoring, a relay for external circuit switching, an LCD display board to show who is in the room, and finally IR Sensors. The components needed to construct the model are,

- ESP8266 Arduino core
- LCD Display
- Infrared sensor
- Relay

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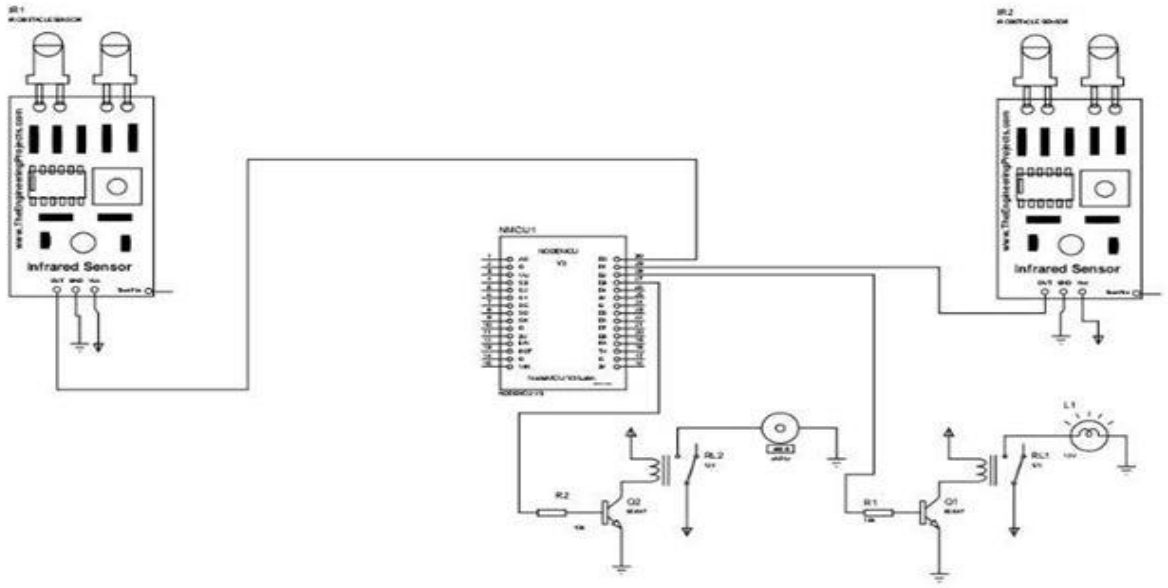

Fig.2 Circuit diagram

HARDWARE REQUIREMENTS

A. ESP8266ArduinoCore

As Arduino.cc started producing new MCU boards based on non-AVR processors, such as the ARM/SAM MCU used in the Arduino, new MCU boards based on non-AVR processors, such as the ARM/SAM MCU, were available. Due to this, changes had to be made to the Arduino IDE in order to support different tool chains and compile Arduino C/C++ for these new CPUs and are shown in figure.3.

Fig.3 ESP8266Arduinocore

The Board Manager and the SAM Core were introduced for this purpose. The Board Manager and the Arduino IDE need a "core" to compile an Arduino C/C++ source file to the target MCU's machine language. The "ESP8266 Core for the Arduino IDE," as it is known among ESP8266 aficionados, is an Arduino core for theESP8266 WiFi SoC. This has quickly become the most popular software development environment for ESP8266-based modules and development boards, including Node MCUs.

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B. Liquid Crystal Display (LCD)

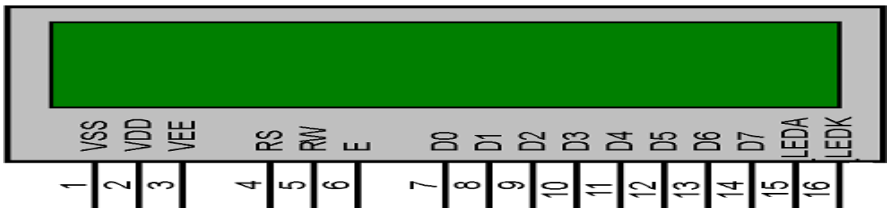

Fig.4 LCD Display Board

The term 162 LCD arises from the fact that the LCD contains 16 columns and two rows. There are numerous options, such as 8×1, 8×2, 10×2, 16×1, and so on. However, the16*2LCD is the most frequently used, therefore was used here. A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulation properties of liquid crystals; the light that is emitted by liquid crystals is indirect. There are 16 columns and 2 rows on this LCD display board, which measures 16x2. LCD Display Board is shown in figure.4.

C. Infrared sensors

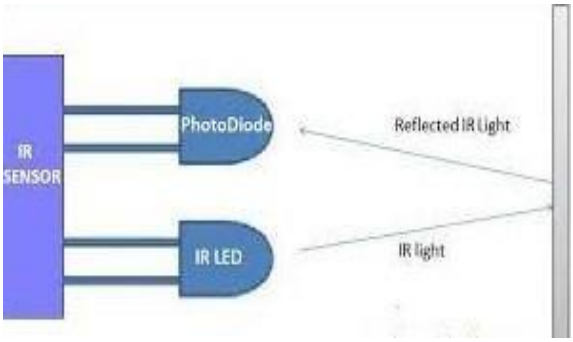

Fig.5 IR Sensor Working

Depending on the sensor's design an infrared (IR) sensor is used to identify objects in the robot's track or to distinguish between colours. The emitter, detector, and related circuitry make up an infrared sensor. The emitter circuit and the receiver circuit make up an IR sensor. IR Sensor working is shown in figure 5.In our model, the emitter was as impel infrared LED (Light Emitting Diode), and the detector was a simple infrared photo diode that detects infrared light of the same wavelength as the IR LED. When infrared light strikes a photodiode as a result, the output voltage changes in accordance with the magnitude of the IR light. A sample IR sensor is shown in figure.6.

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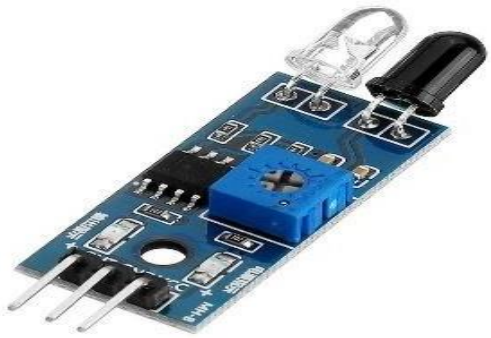

Fig.6 IR Sensor

D. Relay

A relay is shown in figure 7, a switch that can be turned on and off by electricity. An electromagnet is commonly employed to mechanically activate a switch in relays, but other working principles, such as solid-state relays, are also used. Relays are employed when a low-power signal (with perfect electrical isolation between the control and controlled circuits) is required to control a circuit, or when numerous circuits must be controlled by a single signal. The early relays were employed as amplifiers in long-distance telegraph circuits, repeating and re-transmitting the signal from one circuit to another. To conduct logical processes, relays were commonly used in telephone exchanges and early computers.

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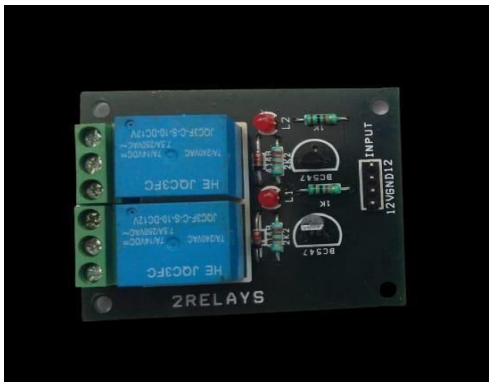

Fig.7 Relay

A small copper "shading ring" can be crimped to the end of the solenoid if the coil is designed to be energized with alternating current (AC), providing a small out-of-phase current that raises the minimum draw on the armature during the AC cycle.

E. BLYNKAPPLICATION

The Blynk website describes Blynk as “a platform with IOS and Android apps to operate Arduino, Raspberry Pi, and the likes over the Internet." It is a digital dashboard where widgets

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can be dragged or dropped to create a graphic interface for the project, which makes it user-friendly. It can support both Arduino and Raspberry Pi over Wi-Fi, Ethernet, or an ESP8266 chip, it. Blynk was created with the Internet of Things in Mind. It can remotely manage hardware, display sensor data, virtualizes it, and perform a variety of other fascinating things. The platform is made up of three primary components: In our model, the Blynk server was responsible for all communications between the smart phone and the hardware. The links for the Blynk application were Android Blynk App and IOS Blynk App.

THE WORKING OF THE PROPOSED MODEL

The planned automation model satisfies the particular demands of a rising number of people who rely on public and private spaces. The most significant benefit of our approach is the ease with which it can regulate the performance of a wide range of electrical and electronic equipment. It is difficult to control what happens at home from office or elsewhere. It can be tough to be at work and at home at the same time due to our hectic lives and traffic. One of our model's features enables remote access to our home systems from elsewhere. Another advantage of our proposed model is that it allows for the remote control of lights, fans, and other electronic and electrical devices when they are not in use, which helps manage the home's energy use. Smart devices must be connected to a main server to be amenable to remote control. The user can modify the status of any appliance using his or her login id and password, saving time, energy, and money.

FLOWCHART

The work flow of the proposed model is provided in the following flow chart in figure8.Itshows the code and case conditions for the LCD display.

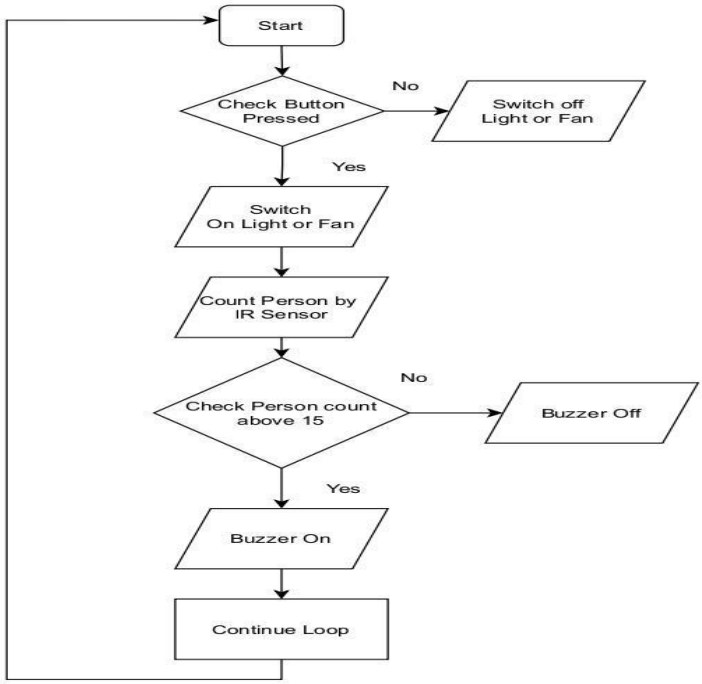

Fig 8.FlowChart

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SIMULATION RESULT

In this project, Proteus software was used for simulations. The circuit was created on a work pad. The microcontroller required a hex file to execute the program, which was acquired by compiling our Arduino program file. The simulation output is shown in figure 9.

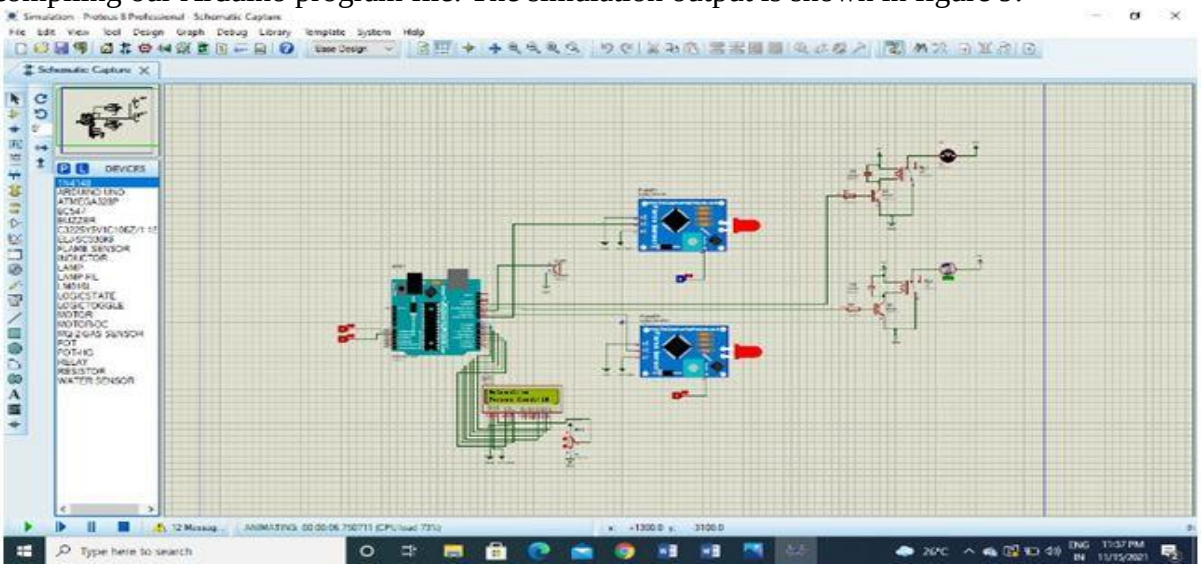

Fig.9 Simulation output

EXPERIMENTAL RESULT

The proposed model was tested through experimentation, under the following cases:

Case (i):

If no one is in the room, the room appliances are turned off, which conserves energy and prevents wastage. The circuit connection is shown in figure 10, and the appearance with the LCD display is shown in figure10.

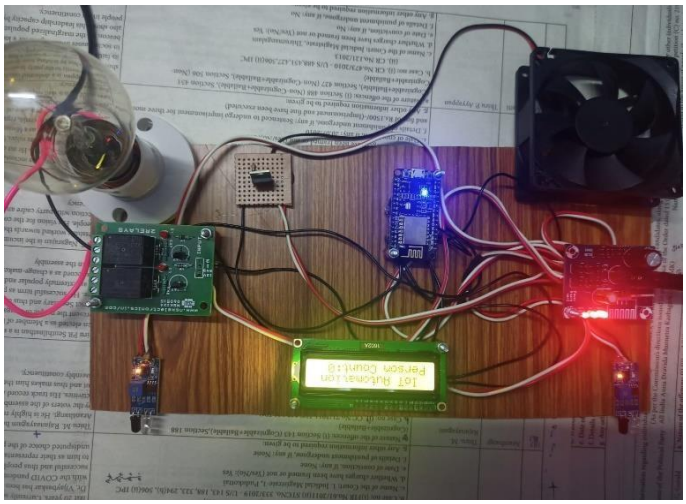

Fig.10 Circuit connection when relay is OFF

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Case (ii):

As soon as a person enters the room, the room appliances are turned on. Figure 11 shows a visual representation of the circuit as well as the circuit connection.

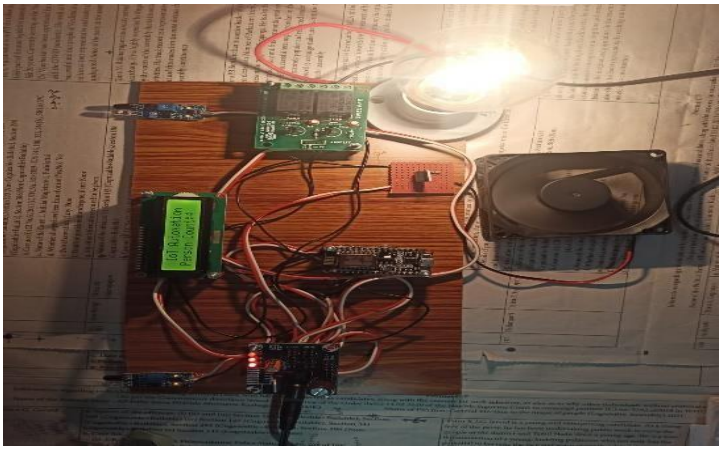

Fig.11.Circuit connections when relay is ON.

Case (iii):

The person count in the room increases or decreases depending on entry or exit of multiple people into and from the room, a pictorial representation is shown in figure12.

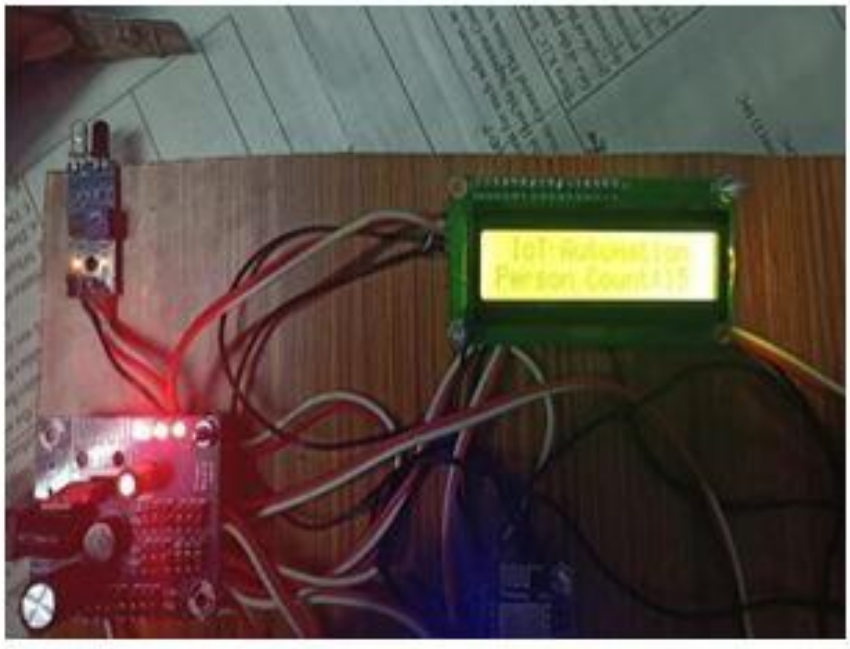

Fig.12 LCD display person count when they entered and leaved

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Case (iv):

By using the BLYNK app, control the brightness of the light and speed of the fan and also display the number of people in the room. A pictorial representation is shown in figure 13.

Fig.13 BLYNK app controller

When the number of people in the room exceeds the critical number, an alert is sent to the phone. This is shown in figure14.

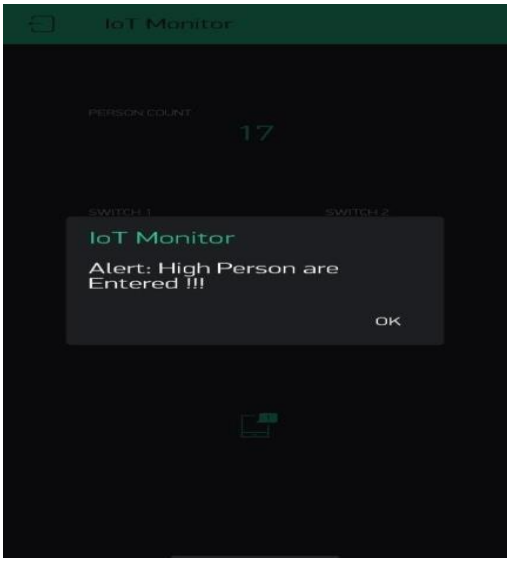

Fig.14 Alert message

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The output of the model is a count of the number of people who entered or exited the room. A pictorial representation is shown in figure 15.

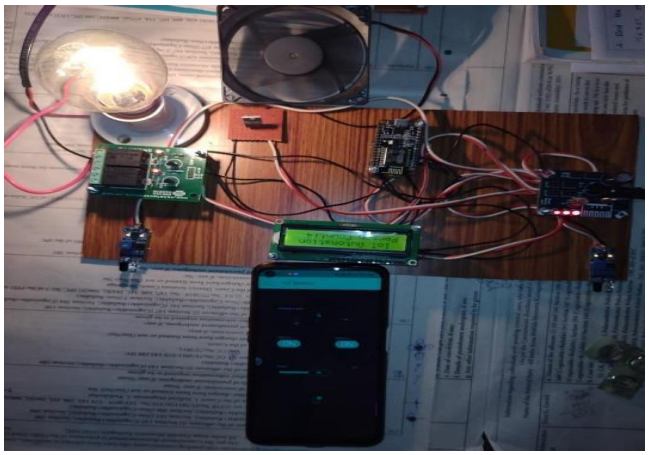

Fig.15 Project output

CONCLUSION

In this work, developed a technique to remotely operate or control equipment, machinery and other electronic and electrical appliances through an app on the smart phone. This particular model created a system for home automation in which appliances such as light and fan can be controlled remotely, and the number of people who entered or exited a room can be monitored. Testing of the model showed 100 percent efficiency.

REFERENCES

1. Weimei Zhang, “Study about IOT’s application in Digital Agriculture construction”, Electrical and Control Engineering (ICECE), 2011, International Conference, Yichang.
2. Mircea Murar and Stelian Brad, “Monitoring and controlling of smart equipments using Android compatible devices towards IoT applications and services in manufacturing industry”, Automation,Quality and Testing, Robotics.
3. TakeshiYashiro, Shinsuke Kobayashi, Noboru Koshizukaand Ken Sakamura, “An Internet of Things(IoT) Architecture for Embedded Appliances”.
4. Keertikumar M.J, Shubham M. and R.M.Banakar, “Evolution of loT in Smart Vehicles: An Overview”.

 https://doi.org/10.37896/pd91.5/91539