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Home Automation with Intruder Detection and Energy Control

M. Niharika¹, P. SaiChandana², M. K Vaishnavi³, CH. Sathyanarayana⁴

^{1,2,3}B.Tech Student, ⁴Assistant Professor, ECE Department, Sreenidhi Institute of Science and Technology, Hyderabad, Telangana, India

Abstract: In previous project we made a home automation system, where we can control our appliances through Blynk app and Google assistant with the help of IFTTT. As an extension we will provide feedback to user whether the appliance is on or off. We will also use sensors like LDR for measuring light intensity in this project to make it smart. We will also include security system where in we have sensors to doors and windows and give buzzer along with an alert message to the user. On a whole we will provide a smart home automation system.

Keywords: Blynk app, IFTTT

I. INTRODUCTION

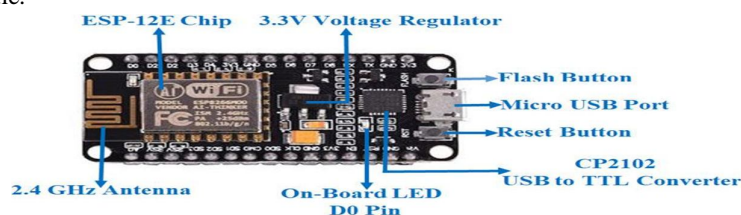
We live in a world where everything is possible, mechanization where the majority of the frameworks are getting computerized, like modern robotization, home and other business. Frameworks for home automation are progressing to the next level automation measures Human efforts are required, along with equipment gear, to work various burdens in dwellings. It entails the automated control of household machines via workstations, PCs, PDAs, or tablets, utilizing numerous innovations and regulators. A home automation framework improves the efficiency of various household machines while also conserving energy. Home robotization or building mechanization, which is based on the energy-saving concept, has made life extremely simple in recent years. It comprises the automated control of all electrical and technological devices in the household, as well as remote control via remote correspondence. With this framework, integrated control of lighting, cooling and heating, sound/video frameworks, security frameworks, kitchen machines, and any other hardware used in home as shown in the diagram, this framework is primarily executed by sensors, controlling devices, and actuators. The sensors detect light, movement, temperature, and other detecting elements, and then transfer that data to the main controlling devices. Thermocouples or indoor regulators, photograph identifiers, level sensors, pressure sensors, current transformers, IR sensors, and other sensors that require additional sign molding equipment to communicate with the fundamental regulator are examples of these sensors.

Controllers can be PCs/workstations, contact cushions, advanced cells, and other devices that are attached to controlling devices such as programmable controllers that receive data from sensors and regulate actuators based on the programme. Depending on the load actions, this programme might be adjusted. The programmable controller allows for the connecting of various sensors and actuators via various information and yield modules, both simple and complex. Actuators are the final control devices like cut-off switch, controller, engine, and other control instruments It, at long last, has authority of the home equipment Correspondence takes on a significant role part in this home mechanization framework for far off admittance to these kinds of activity This clever house structure likewise does persistent checks using video reconnaissance with camera, planning, energy-saving works. Which is, in any case, the finest arrangement for the old and the young impaired to put people to work the gear. Home automation frameworks are changing the way individuals live and deal with their homes. There are numerous sorts of home mechanization frameworks and controls accessible on the lookout and every one of them handles various undertakings inside the home.

II. COMPONENTS USED

A. NodeMCU Development Board

NodeMCU is an open-source Lua-based firmware and development board that is primarily targeted at IoT applications. It includes firmware that handles abrupt spikes in demand for Espressif Systems' ESP8266 Wi-Fi SoC, as well as equipment that relies on the ESP-12 module.



B. Channel Relay

C. Serial Adaptor for Arduino

Serial communication uses TTL logic levels on pins TX/RX (5V or 3.3V depending on the board). When connected directly to an RS232 serial port, these pins operate at +/- 12V and can damage your Arduino board. To link the Arduino board to a computer or other devices, serial connection is utilized. Every Arduino board has at least one serial port (also known as a UART or USART): Serial. It connects to the computer through USB and digital pins 0 (RX) and 1 (TX) (TX). As a result, if you utilize these routines, you won't be able to access pins 0 and 1 for digital input or output.



Figure: Ft232rUsb to Ttl

D. Power Supply Circuit Board

The source of recharging for electronics systems and circuit boards is power supply circuits. Some boards have power supply sub-circuits; however, PCBs are frequently used as power suppliers as well. These boards function as converters, converting an energy source into an output that fulfils the needs of a load, system, or circuit. Regardless of the source and load requirements, it is critical to include the construction of your board in the PCB layout design for your design. Let's start with a discussion of the many sorts of power supply circuits, and then describe the foundations of power supply design that should be used in their construction. There are certain frequent concerns when designing an SMPS or a linear power supply circuit board. Thermal issues, EMI or noise, and, depending on the power level, copper weights are among them. The power supply filter design is another crucial factor to consider. Although your individual design needs will dictate specific design choices, there are several general principles of PCB power supply design that should be followed at all times, as noted below. Selecting the optimum component values for filter components, inductance, capacitance, and resistance is critical to the performance of your filtering circuits.

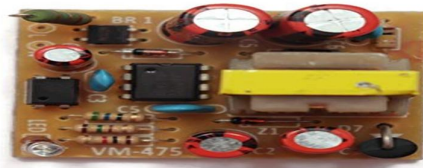


Figure: PCB 2A 220V AC to 5V DC SMPS

E. Light Dependent Resistors

To detect the presence or amount of light, light dependent resistors, also known as LDRs or photoresistors, are often used in electrical circuit designs. These electrical components are known as the light dependent resistor, LDR, photoresistor, or even photo cell, photocell, or photoconductor. While other electrical components such as photodiodes or phototransistors can be used, LDRs or photo-resistors are particularly beneficial in many circuit designs. They cause a significant variation in resistance in response to changes in light level. Because of its low cost, ease of production, and ease of use, LDRs have been used in a wide range of applications. LDRs were once utilized in photographic light meters, and they are currently utilized in a number of applications where light levels need to be detected.



Figure : LDR

F. PIR Sensor

PIR sensors are probably something you use every day, despite the fact that they look like something out of a spy movie. This sensor is used in most current security systems, automatic light switches, garage door openers, and other applications where the activation of an electrical item is only required when humans are present.

Infrared radiation is emitted by all objects with a temperature greater than Absolute Zero (0 Kelvin / -273.15 °C), including human bodies. The hotter something is, the more radiation it emits.

The PIR sensor was particularly designed to detect such large amounts of infrared light. A pyroelectric sensor and a Fresnel lens that focuses infrared signals onto the pyroelectric sensor are the two main components. A Pyroelectric Sensor, in reality, is made up of two rectangular slots made of a substance that allows infrared radiation to pass through.

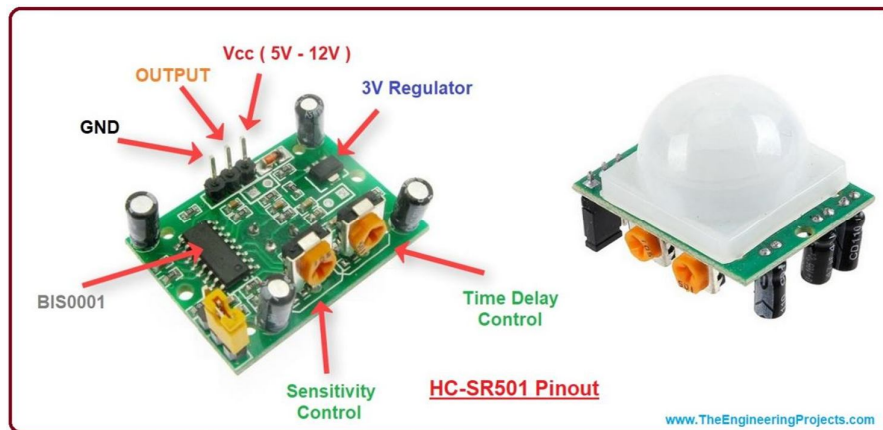


Figure: PIR sensor

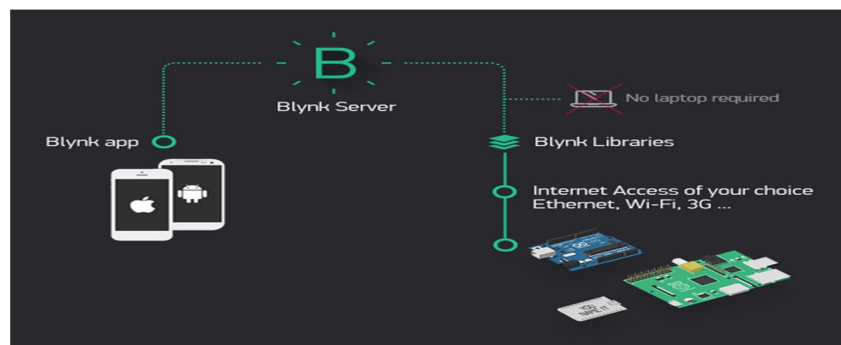
G. Software Required

1) Blynk App: Principle Parts of Blynk

a) *Blynk Application*: Here we can modify the interface to suit our plan. The Blynk application incorporates various gadgets for this.

b) *Blynk Worker*: The Blink worker is utilized to convey project equipment with the Blink application introduced on the PDA. You can utilize Blynk cloud for that. This is Blynk cloud open-source and can handle a large number of gadgets through it.

c) *Blynk Library*: The Blynk library is utilized to speak with the equipment stage Blynk worker utilized with the Blynk application and to handle approaching and active orders.



2) *IFTTT*: The word IFTTT comes from the programming constraint "assuming this, that." What the company offers is a product platform that connects programmes, gadgets, and administrations from various designers to trigger at least one computerization that includes those apps, gadgets, and administrations. Applets, which are comparable to macros and connect many apps to conduct automated tasks, are used to refine the robotizations. You can use IFTTT's website or mobile apps (as well as the IFTTT gadgets in the mobile apps) to kill on or an applet. You can also use IFTTT's simple, straightforward interface to create your own applets or build variations of current ones. IFTTT is simple to use. You download the portable

application, create a free account, and you're up and running with machines in minutes. Because there are so many different types of applets to choose from, IFTTT generously provides new users with robotization suggestions to try. Its Collections combines applets for a variety of platforms – including iOS, Android, and voice assistants – and covers everything from news and climate administrations to home automation.

3) **Arduino IDE:** Arduino is an open-source gadgets platform based on easy-to-use hardware and programming. Arduino sheets can take inputs like light on a sensor, a finger on a catch, or a Twitter message and turn them into outputs like starting a motor, turning on a light, or sharing anything on the internet.

III. CIRCUIT DIAGRAM

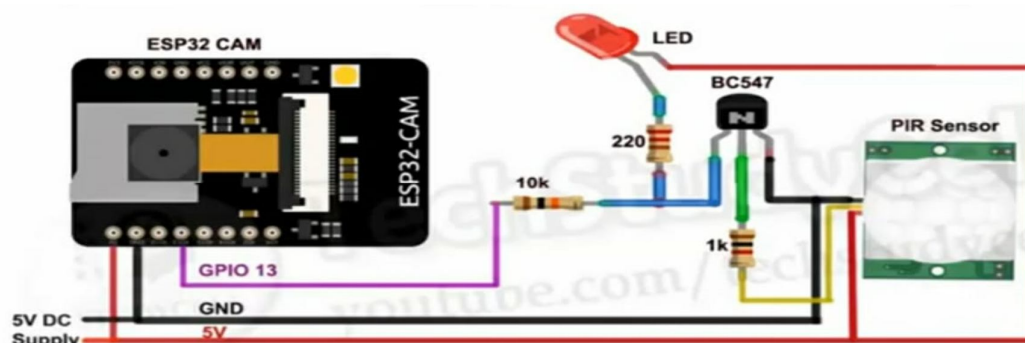


Figure: Connections for intruder detection

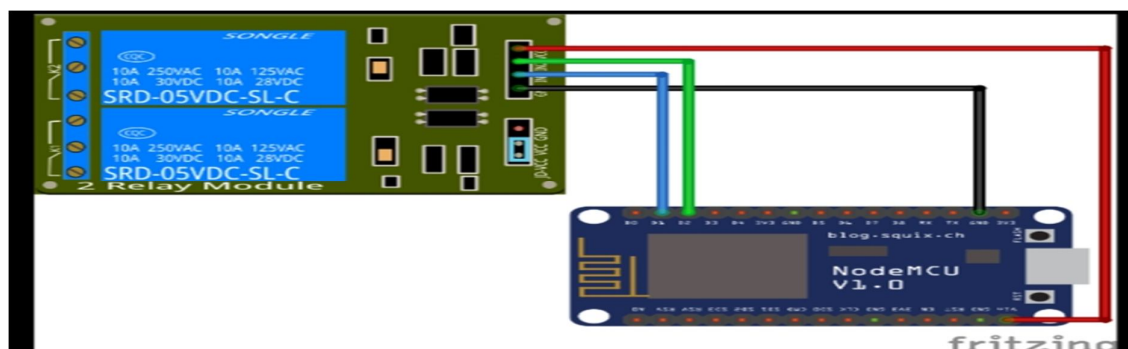
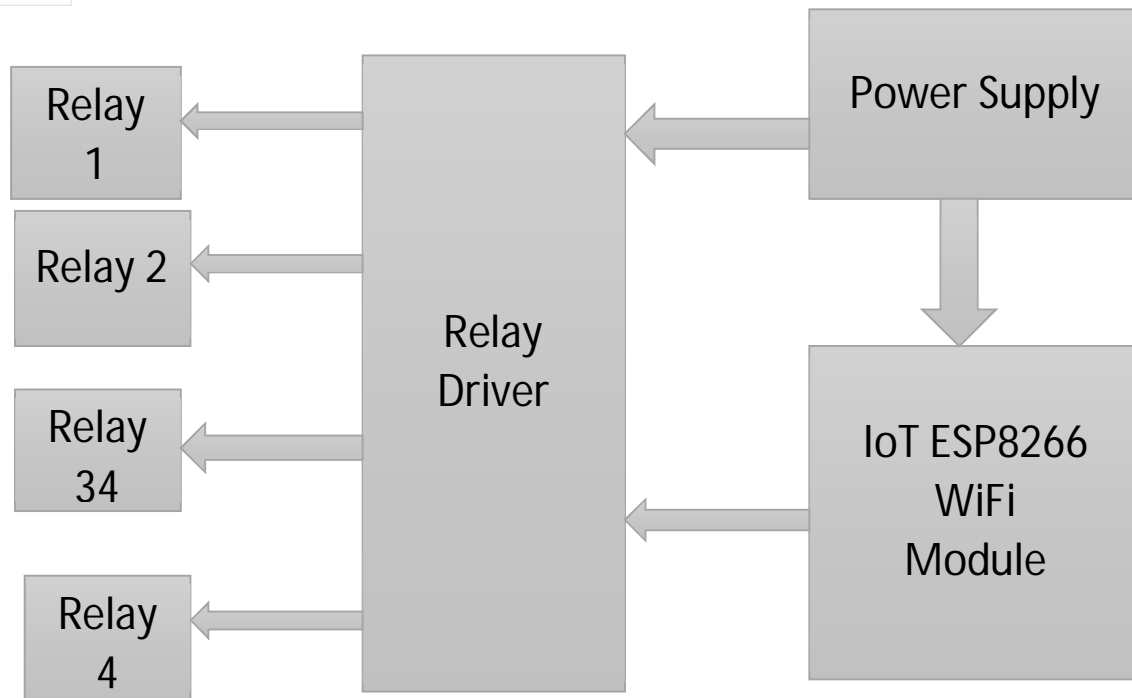


Figure: Circuit for energy control

IV. METHODOLOGY

In this project, we are controlling our electrical appliances by using nodemcu and telegram bot with which we can control our devices and also get the feedback about the on/off condition of the device. By this technique we are trying to save energy by controlling our appliances remotely. Also, we are providing a security system to our project by using PIR sensor and ESP32 Camera module which will send us the pictures of the person at our gateway to the blynk app so that we can know if an intruder is trying to enter our home.





V. MODELING AND ANALYSIS

A. Advantages

- 1) *Safety*: Being able to operate small devices and lighting with your fingers from anywhere in the house will increase your home's security. You can make sure that devices are turned off when they should be and on when they should be.
- 2) *Security*: Perhaps the most appealing feature of home automation is the ability to lock the door with your phone. This will offer you a sense of security in knowing that the door is near and that you are not speculating. The ability to be notified each time someone enters your house also allows you to keep track of who is entering your house on a regular basis, especially when you are not around.
- 3) *Convenience*: It's convenient to be able to control anything with your fingers. You never leave the home without your wallet, keys, and a high-tech cell phone. With our modern mobile phone away with us, we can surely monitor and manage our house with the swipe of a finger.
- 4) *Saves Time*: Because we live in such a fast-paced environment, we don't have time to be concerned about our home. With home robotization, we may save time coming home and ensuring that everything is in order, such as when the kids lock the door from school or turn on the lights when you get home.
- 5) *Save Money*: This is the most significant advantage of home automation. The ability to manage the light, whether dimming or turning on/off at a certain time, will save the mortgage holder a significant amount of money. With suitable computerization in window covers and a robotized indoor regulator, you may save money by controlling your family's temperature. You may also conserve gas by avoiding driving back home if you forgot to turn off the appliances or lock the door.

B. Disadvantages

Cost of insight it is widely accepted that better administrations always come at a lower cost. That is why it is simpler to appreciate why the sticker costs for spectacular homes are more than those for other types of houses that are readily available on the market. The primary reason for this increased level of innovation is that some of the technology used in these types of homes is nearly new and only seldom available.

The cost of some of the repairs that developments may necessitate, as well as support, utilities, and routine expenditures in smart homes, can be quite costly. The remote cameras, focused touch screen, and computerized frameworks, as far as light sensors, are the absolute most advanced and widely used highlights in smart houses. One of the most major disadvantages of home automation in the expense of these homes.

Technology expectation to learn and adapt If you have a smart house, it merely suggests that you must first find out how to effectively use your house and get the most out of all of the advantages it has to offer in contrast to traditional standard houses,

you should acquire accustomed to ethnology interfering with your personal space and modify the developments that are taking place in your home. The smart houses will be useful for an innovation-oriented family, but other families will undoubtedly need to devote a significant amount of time and effort to figure out how to get the most out of the innovation that you have paid for.

Video Surveillance This is certainly one of the most major disadvantages of a smart house that you should be concerned about. In many circumstances, video surveillance may be really beneficial; but, consider the potential that your innovation slips into the wrong hands, putting your own security in jeopardy. If the framework falls into the wrong hands, your sensitive houses will be easily seen by others who have found out how to hack it and are planning to use this opportunity against you or grab delivery from you.

VI. RESULTS AND DISCUSSION

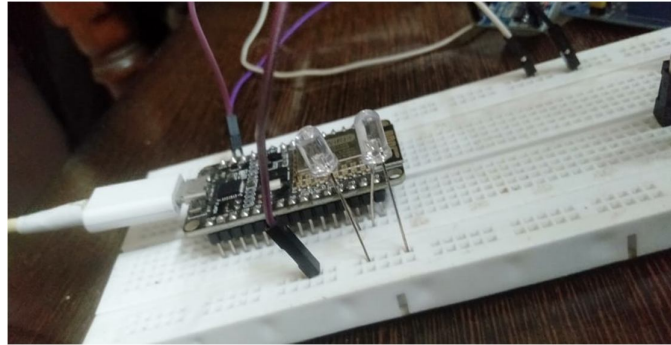


Figure: Both the appliances are off

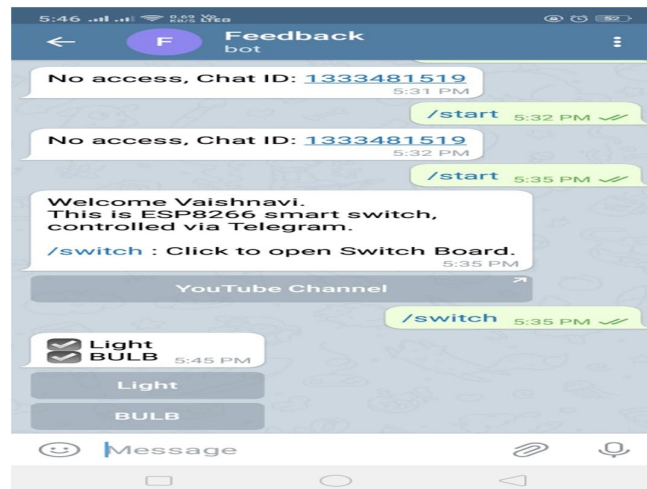


Figure: Feedback showing that both are off

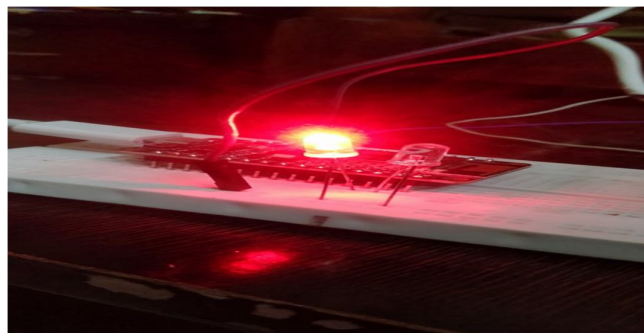


Figure: One of devices are on



Figure: Feedback showing that one of the devices are on

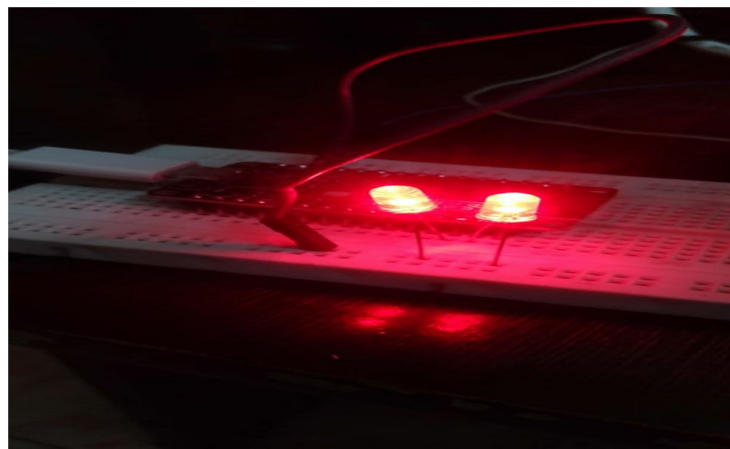


Figure: Both devices are on

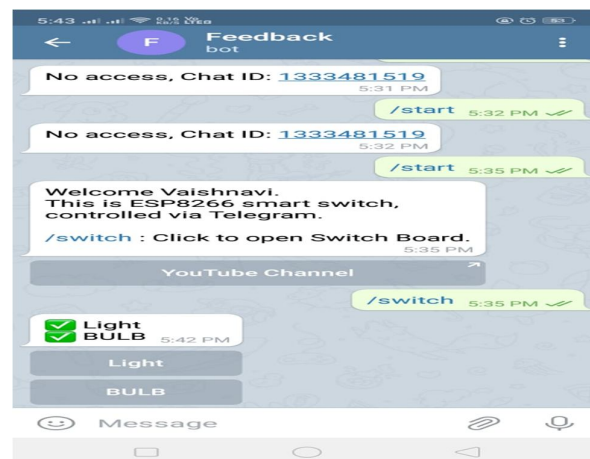


Figure: Feedback showing both are on

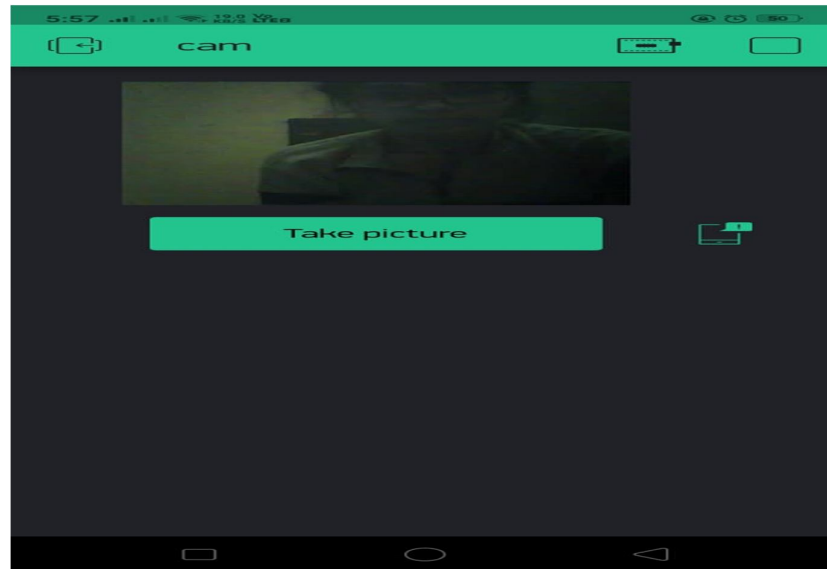


Figure: Picture sent to blynk app by camera module

VII. CONCLUSION AND FUTURE SCOPE

We created a home robotization framework in this project, where we can control our equipment using the Blynk application and Google associate with the help of IFTTT. We will offer feedback to the customer whether the machine is on or off as an expansion and part of future work. In order to make this project amazing, we will also use sensors such as LDR to estimate light force. We'll also include a security system with sensors installed on doors and windows, as well as a ringer and an alarm message sent to the customer. On the whole, we'll provide a smart home automation framework.

We can increase the number of appliances that can be controlled. We can have an automated entryway and door access framework. We can include temperature control as well, a mechanized blinds framework help make a liveable home by overseeing indoor temperature. Like machine control frameworks, mechanized water system control frameworks help lessen water utilization

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