HOME INTRUSION ALARM SYSTEM

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ABSTRACT

Recently, home security has been among the main issues where the crime rate is increasing globally. Most homeowners want to get information immediately. There are many alarm systems available in the market. However, it can only send information to the user without any proof of intrusion [3]. Therefore, an alarm system that uses the IoT (internet of things) system has been designed where notifications are sent to the user through messages included with images as evidence for any intrusion occurring through the Blynk application on the user's mobile phone [1]. Therefore, it enables the user to take the next step immediately. At the same time, the buzzer will sound and the warning light will flash inside the brought in house. The idea of this project is to meet upcoming challenges in the development of modern technology.
Keywords: IoT (Internet of Things), messages, picture, warning light

1. Introduction

Malaysian residents convey a solid culture of returning to their hometowns during happy seasons. Not only that, most guardians won't be at home during working hours and some of them complete night shifts. Besides, some families will not be at home when they go out for family trips. Furthermore, during this covid-19 pandemic time, we know that many of them lost their jobs and this situation leaves a very bad impact on their daily routine. Therefore, in this hard time, some of them will do anything including robbing and intruding the house in order to get their meals and so on. Thus, this situation will prompt brilliant freedoms for burglars to intrude houses. Hence, a security alarm system is a most ideal approach to conquer this issue from happening. A home security alarm system is one line of defense that may give confidence to the resident and could stop burglars from intruding into houses. An alarm system can be off or armed while residents are at home, and armed while residents are away from their homes. Existing alarm systems are difficult to operate, for example, GSM [2]. This system can send information to the user but the transmission of the information is incomplete because it can only send notification information to the user but it does not send evidence of what happened in the situation and also cannot be programmed according to the user's needs. So, we design a home security system that is safe and easy to use by users, develop a system that can inform any alert to the user immediately and also develop a system that uses a control system that can be programmed repeatedly according to user requirements. It is suitable and safe for use by consumers on all types of homes and at all times required. This alarm system notifies the user through messages and also with picture evidence of what is happening in the current situation through a platform called Blynk app on their mobile phones when there is any intrusion detected [4][5], at the same time the buzzer will

sound and there will be warning lights blinking in the house to warn intruder. The control system, it can be programmed repeatedly by the user using Esp32 Cam and Arduino Nano. The prototype of the house cross section using a home intrusion alarm system that was shown in figure 1.
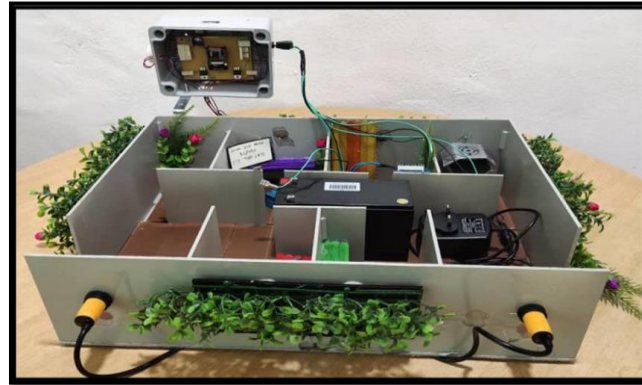

Fig. 1. Home Intrusion Alarm System

There are system specifications that lead to the construction of this alarm system shown in table 1.

Table 2. Specification of system

No.	Description	Specification
1	Name	Home Intrusion Alarm System
2	Mechanism	ESP32 Cam, Arduino Nano, infrared sensor, buzzer, warning light
3	Target Customer	Anyone who has a property such as a house or an office
4	Sending information process	ESP32 Cam, Arduino Nano, infrared sensor, Blynk app
5	Material	PVC enclosure box, PCB UV board, acrylic
6	Safety	PVC enclosure box to guard the control box
7	Sensor	Infrared sensor programmed to detect intruder
8	Warning	Buzzer and warning light to warn intruder
9	Cost	Approximately RM240

2. Methodology

The methodology is the methods or procedures used to implement a project in detail. These steps are very important in implementing this project to ensure that this project is successfully completed on time. In producing a project, there are several steps that need to be passed before the project is completed. These steps need to be done with great care to produce a quality project shown in figure 2. To produce this alarm system, the first step is choosing a concept and design. Then the technical drawing is completed by using autocad software for the house cross section shown in figure 3 and using proteus software for the electronic schematic circuit to get PCB layout shown in figure 4.
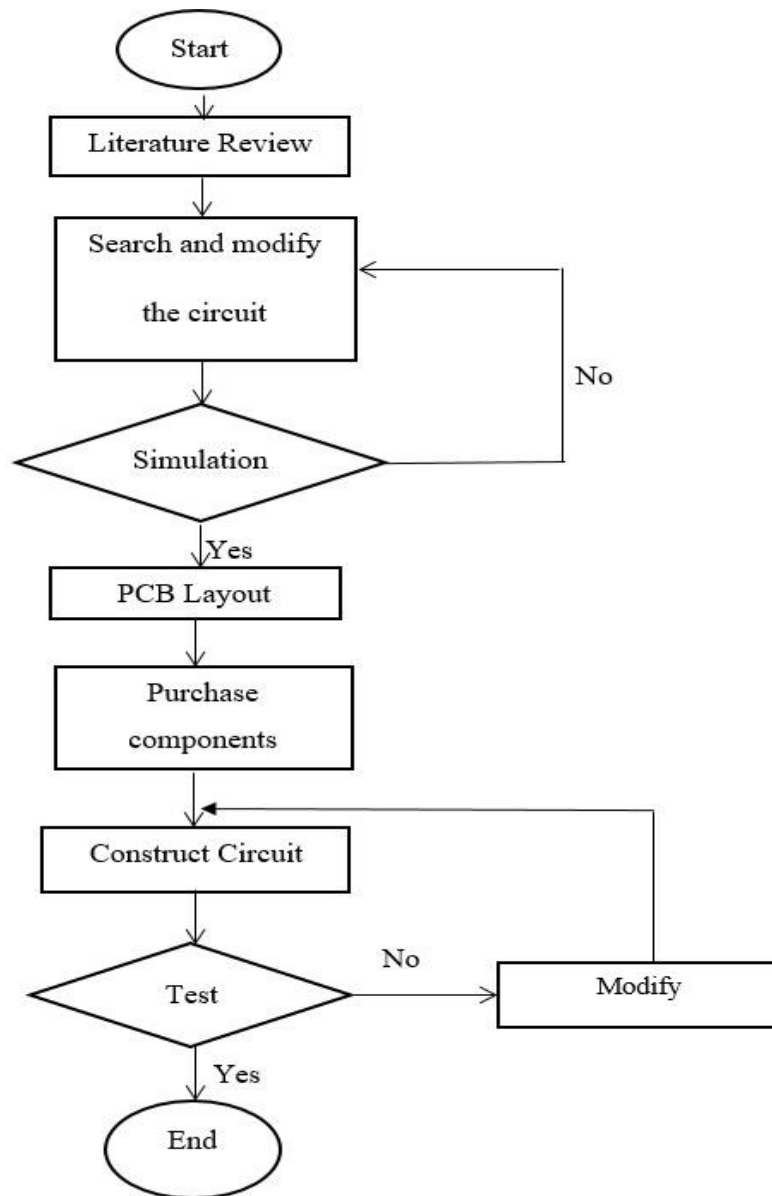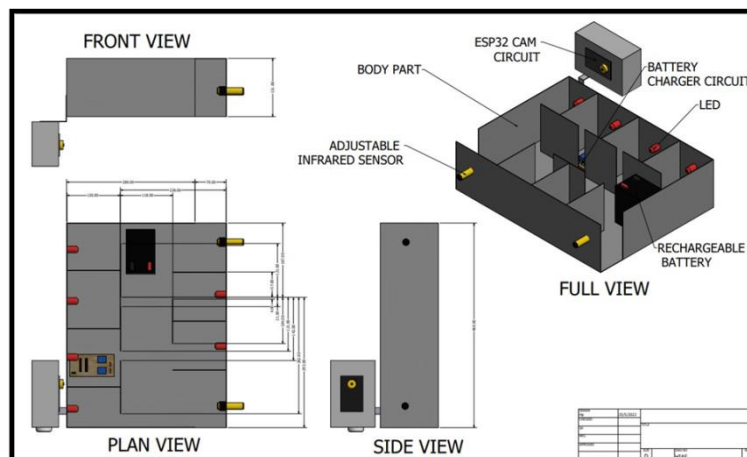
Fig. 2. Project Flowchart
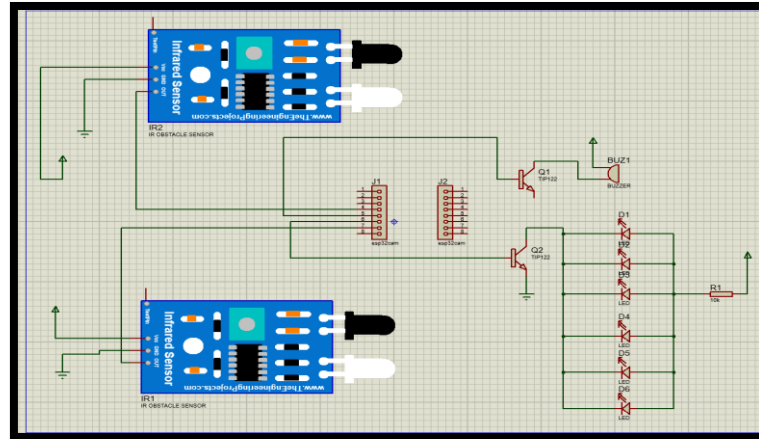

Fig. 3. Ortographic Drawing

Fig. 4. Schematic diagram of Alarm system circuit using Proteus Software

Blynk was designed for the Internet of Things (IoT) interrelated systems. This application was used to control the system remotely. The ON/OFF button for the Alarm condition can capture the image, delivered message and notify whether the system was online or offline. There are three major components in this platform which are Blynk Apps which allows the creation of usability interfaces for projects using various widgets, and Blynk Server is responsible for all the communications between the smartphone and hardware, Blynk Libraries is an extension that runs on the hardware which included Blynk app, cloud and hardware. The programming used to perform ESP 32 is Arduino IDE.

3.   Result and Discussion

In the Battery Charger Circuit (figure 5), two resistors with the value of $R_1 = 100k\Omega$ and $R_2 = 10k\Omega$ which both have the same tolerance of 5% were used. This means the value of resistors might change. Therefore, in order to find the V_{out}, the formula of the Voltage Divider Rule was used. The total voltage supplied by the 12V rechargeable battery is proximately $12.6\,V$. This value is obintiained when measured using a multimeter.
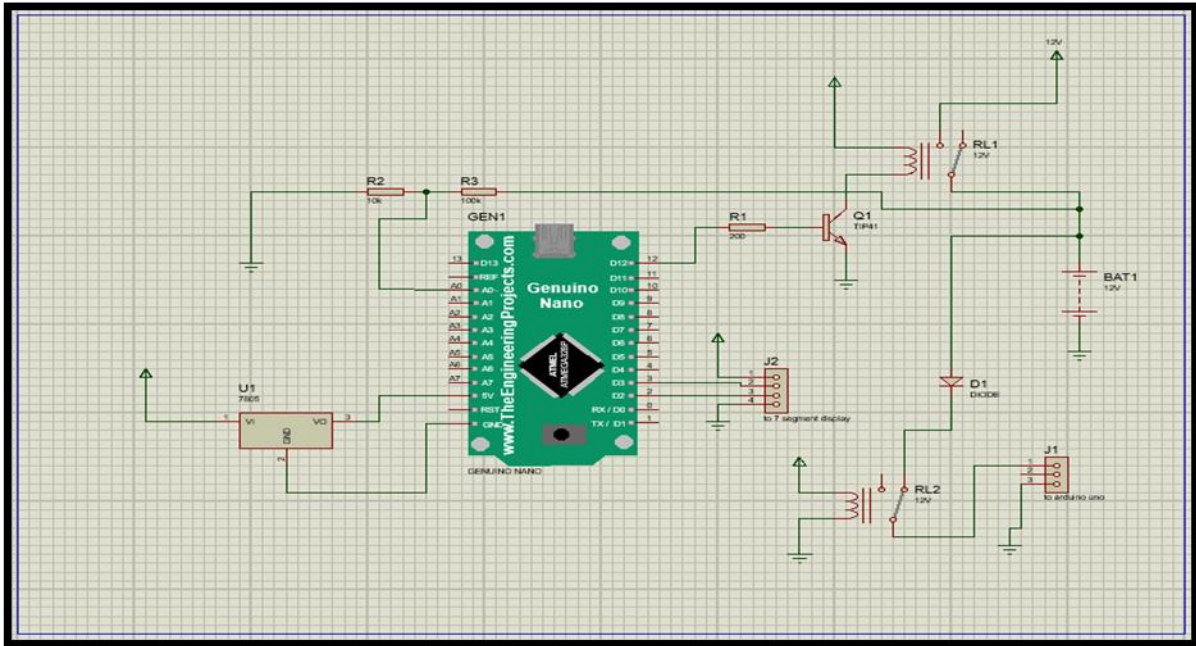
Fig. 5. Schematic diagram of Battery Charger circuit

$$V_{out} = \frac{R_2}{R_1 + R_2} \cdot (V_{in})$$
$$V_{out} = \frac{10k\Omega}{100k\Omega + 10k\Omega} \text{ x } (12.6V)$$
$$V_{out} = 0.0909 \text{ x } 12.6V = 1.145V$$
$$Calculated, V_{out} = 1.145V$$
$$Measured, V_{out} = 1.12V$$

Basically, this Battery Charger Circuit used a voltage input ADC. In this case, a reference voltage and the signal will be measured. It has one output, a 10-bit or $2^{10} = 1024$, the digital word that represents the input value. Generally, the reference voltage V_{ref} is the maximum value that the ADC can convert. In this circuit, the reference voltage $V_{ref} = 5V$. Besides, after turning on the power supply, the signal or the voltage measured at the node or at the A0 pin at the Arduino Nano were 1.12V. This means, the ADC can be calculated as below.

$$ADC = \frac{1024}{5V} \text{ x } 1.12V$$
$$ADC = 229V$$

Hence, in order to find the Voltage Unit (x) for this Battery Charger Circuit

$$V_{in} = ADC \cdot (x)$$
$$12.6V = 229V \cdot (x)$$
$$\frac{12.6V}{229V} = x$$
$$x = 0.055V$$

Thus, once the ADC value is obintiained, to prove the value of V_1, I had calculated the actual voltage which will appear in the Seven Segment Displays to show us the state

of charge of the 12V rechargeable battery. In order to do this, I have done this calculation.

$$State\ of\ Charge, V_1 = 229V \times 0.055V$$
$$State\ of\ Charge, V_1 = 12.6V$$

The status of a component can be detected by its operation when it operates not as it is supposed to be. The process of troubleshooting must follow systematic steps such as symptom analysis, examining the tool, examining the spoiled part, examining the spoiled component, checking the placement of the component and changing the spoiled component. There are some suggestions to help people who do their projects. Before starting all the work, we have to confirm that the circuit can function. We have to do the simulation first before starting to implement the full project. After that, we have to survey whether all the components are available or not.

4. Conclusion

The Home Intrusion Alarm System can be marketed and become one of the most renowned alarm systems in the future despite various advanced and highly technological alarm systems in the market. This project can be further improved by adding more surveillance cameras to the house to get a complete view of all surroundings in the house. A closed circuit television (CCTV) can record the footage of an intruder. Therefore, the intruder can be traced down easily once reported to the authorities if the intruder manages to escape from the residence. Also, more sensors can be added to each surrounding to make the house more secure and safety to detect any intrusion. Therefore, we would recommend to improvise this system by applying door locks together, so that when the sensor detects any intrusion, the doors will lock automatically. Keypad locks is one of the system can that be considered to add on to this project. This explains that, user with keypad pins only can unlock the door by inserting the pins in the keypad. In order to achieve this, we just need to do more researches and reviews. This project can become a competitor to the other home alarm systems available in the market currently.

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