IOT BASED SECURITY SYSTEM USING ULTRASONIC SENSOR

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ABSTRACT:
Internet of Things (IoT) consists of smart devices to solve real-world challenges and issues. This project presents an IoT-based security system by buzzer sound and a phone call. Hence, in this study, the device is equipped with a Ultrasonic sensor which can detect an object and provide alert sound and a phone call that says object movement is ocurred. The device consist of three main components, which are NODEMCU (esp8266), Ultrasonic sensor, and Buzzer. This Ultrasonic sensor detects an object and produce alert buzzer sound with the help of NODEMCU which is of model esp8266 connected with data cable and using the latest technology of IFTTT services which joins mobile applications, produces a phone call saying object motion is detected. This application is beneficial, and the system can be easily managed by all users such as organization and small business holders.
Keywords : NODEMCU , ultrasonic sensor, Buzzer, Arduino IDE, IFTTT application.

I.INTRODUCTION

Basically security system provides security to all like homes, shops etc here the system is setup of ultrasonic sensor.so we are taking an example of jewellary shop. There are many jewellary shops which is one of the demanding business in the world and no matter what time of the year it is, the risk for jewellary store crime is always high. Burglary is one of the most difficult challenges that is faced by jewellary businesses. Though, there are survaillence cameras around the shop they cant prevent from burglary mainly during the nights. So, there is a need to built a secured system for the jewellary shops.

Here, we are going to detect if there is any movement of a person near the shop. If the movement of the person is found with some threshold distance to the shop then the ultrasonic sensor which is used sends a signal where the buzzer sound which leads to the alert in surrounding habitat and a phone call that says motion of an object is detected is received and the burglary can be stopped.
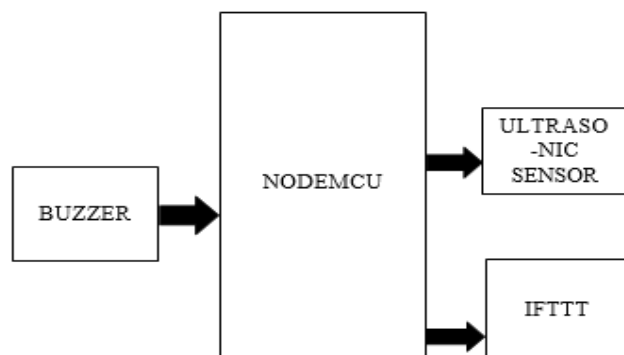
II.SYSTEM ARCHITECTURE

Figure.1. System block diagram

III. HARDWARE DESCRIPTION
1 NODEMCU:

Nod MCU" could refer to the NodESP development board, which is an Internet of Things (IoT) platform based on the ESP8266 Wi-Fi System-on-Chip (SoC) manufactured by Espressif Systems. It is designed for rapid prototyping of IoT applications and projects.

The NodESP board features a small form factor, onboard Wi-Fi, and a variety of integrated sensors and peripherals, making it easy to connect to the Internet and collect data from the physical world. It can be programmed using the Arduino IDE or the Lua programming language, and it supports a range of software frameworks and libraries for IoT development.

Overall, the Nod MCU is a powerful and versatile development board for building IoT applications, and it is popular among hobbyists and professionals alike.

The **NodeMCU ESP8266 development board** comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects.

NodeMCU ESP8266 Specifications & Features

- Microcontroller: Tensilica 32-bit RISC CPUXtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- UARTs: 1
- SPIs: 1
- I2Cs: 1
- Flash Memory: 4 MB
- SRAM: 64 KB
- Clock Speed: 80 MHz
- USB-TTL based on CP2102 is included onboard,Enabling Plug n Play
- PCB Antenna
- Small Sized module to fit smartly inside your IoTprojects
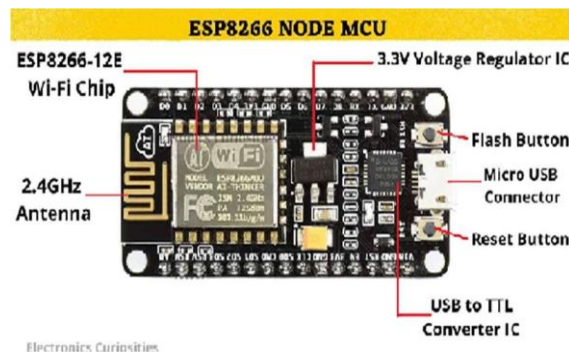
NODEMCU ARCHITECHURE2.BREADBOARD:

The breadboard is a white rectangular board with small embedded holes to insert electronic components. It is commonly used in electronics projects.

3.ULTRASONIC SENSOR

An ultrasonic sensor is a type of electronic equipment that emits ultrasonic sound waves and converts the reflected

sound into an electrical signal to determine the distance of a target item Ultrasonic sensors are an excellent solution for detecting clear objects. The transmitter, which generates sound using piezoelectric crystals and the receiver, which encounters the sound after it has traveledto and from the target, are the two primary components ofultrasonic sensors.

4.DATACABLES:

This cable is used to interface any of the NODEMCU with your computer, you can also connect your USB printer, scanner, and more to your computer. These cables Transmits data at high speeds with the error-free, high-performance transmission.

5. JUMPER WIRES :

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

6.BUZZER:

Buzzer is a kind of voice device that converts audio model into sound signal. It is mainly used to prompt or alarm. According to different design and application, it can produce music sound, flute sound, buzzer, alarm sound, electric bell and other different sounds.

IV. SOFTWARE DESCRIPTION

Arduino IDE

The arduino integrated development environment - or arduino software (ide) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. it connects to the arduino hardware to upload programs andcommunicate with them.

IFTTT Application:

IFTTT is an online service that automates Web-based tasks so that when user-specified events occur, follow-up tasks are triggered and handled.

## V. HARDWARE AND SOFTWARE USED

i. Hardware used:
1. Nodemcu
2. Bread board
3. Ultrasonic sensor
4. Data cable
5. Jumper wires
6. buzzer

Software used:
7. Arduino IDE
8. IFTTT Application

VI. RESULT:

- When there isn't any obstacle observed by the sensor in it's range,then the Arduino UNO doesn't activate the system i.e.,it doesn't activates the buzzer and LED.Until the sensordetects any movement.
- When the sensor gets any obstacle at the range of it,the receiver of the sensor sends the signal in which the Arduino UNO automatically activates the buzzer activates and alert call ismade as shown below.
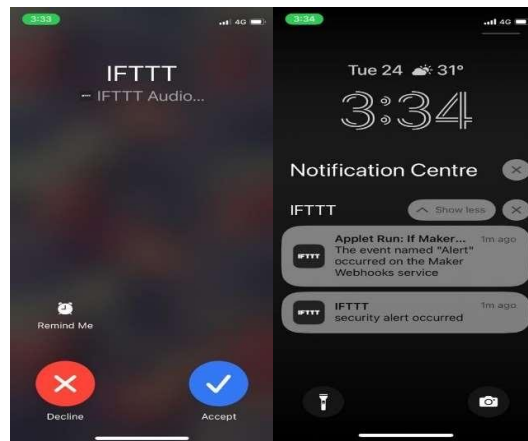
IFTTT generated call and notification

VII. ADVANTAGES :

An IoT based security system that uses an ultra-sonicsensor can offer several advantages, including:

1. High Accuracy: Ultra-sonic sensors have a high level of accuracy when detecting motion or changes in an environment. This makes them an ideal choice for security systems, as they can detect even small movements and trigger alerts when necessary.

2. Low Power Consumption: Ultra-sonic sensors use very little power, making them energy-efficient and cost-effective. This means that the security system can be left running for long periods without the need for frequent battery replacements.

3. No Physical Contact Required: Ultra-sonic sensors donot require physical contact to detect movement or changes in an environment. This means that they can detect intruders without being triggered by accidental contact, such as from pets or other non-threatening movements.

4. Easy Installation: Ultra-sonic sensors are relatively easy to install and do not require any complex wiring. This makes them an ideal choice for DIY security systems or for use in rental properties where permanent installations may not be possible.

5. Compatibility with IoT Devices: Ultra-sonic sensors can be easily integrated with other IoT devices, such as cameras, alarms, and smart locks, to create a comprehensive security system. This allows users to monitor and control their security system remotely, fromanywhere in the world.

VIII. APPLICATIONS

An IoT-based security system using an ultrasonic sensor can be used for various applications such as intrusion detection, proximity sensing, and object detection. Here are some examples:

1. Intrusion Detection: An ultrasonic sensor can detect any movement in a specific area and alert the security system if there is any unauthorized access. For example, if someone tries to enter a restricted area, the ultrasonicsensor can detect the motion and trigger an alarm.

2. Proximity Sensing: An ultrasonic sensor can also be used to detect the presence of a person or an object in the vicinity of the sensor. This can be useful in applications such as parking lots or garages where the sensor can detect if a car is present and trigger the opening of the gate.

3. Object Detection: An ultrasonic sensor can also be used to detect the presence of an object in a specific area. For example, in a manufacturing plant, the sensor can detect if a particular machine is operating or not and alert the operator in case of any abnormalities.

4. used in home security systems

5. used in military security purposes

IX. FUTURE SCOPE

The future scope of an IoT-based security system usingultrasonic sensors is quite promising. Here are a few

potential areas of growth and development: **1.Enhanced Security:** IoT-based security systems using ultrasonic sensors can provide enhanced securityfeatures to ensure the safety of homes, offices, and public spaces. With the use of artificial intelligence and machine learning algorithms, the security system can learn and adapt to different environments and situations to identify and prevent potential security breaches.

2.Smart Home Automation: IoT-based security systems using ultrasonic sensors can be integrated with smart home automation systems to provide a seamless and secure experience for homeowners. For instance, the system can detect an intruder and automatically lock the doors and windows or turn on the lights in thehome.

3.Industrial Automation: IoT-based security systems using ultrasonic sensors can be used for industrial automation to ensure the safety of workers and machinery. For instance, the system can detect the presence of workers in hazardous areas and alert themto potential danger or shut down machinery if necessary.

4.Healthcare: IoT-based security systems using ultrasonic sensors can be used in healthcare to monitor patients and ensure their safety. For instance, the system can detect falls or other accidents and alert healthcare professionals to provide assistance.

5.Environmental Monitoring: IoT-based security systems using ultrasonic sensors can be used for environmental monitoring to detect and prevent environmental hazards. For instance, the system can detect gas leaks or other potential hazards in the environment and alert authorities to take necessary action.

Overall, the future scope of an IoT-based security system using ultrasonic sensors is vast, and it has the potential to revolutionize the security industry and other areas of development

CONCLUSION

The main objective of this security system to make it more innovative, user friendly,more efficient than the existing system. Maintaining the security of small jewellery shops during the nights become too difficult these this can know take care of this problem. IoT works in different domains of security to improve protection and makes human life much easier. These invension of gadgets where human life are already controlled . Thus the "IoT based Security system using ultrasonic sensor" has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. The sensors monitors the movement around the place. If any movement is caused then the Nodemcu will trigger the alarm and generates a call for mobile device saying motion of object is detected .Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

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