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ARDUINO BASED SMART HOME WARNING SYSTEM

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I.ABSTRACT

The need for smart home warning systems is in high demand, nowadays as they are used to alert & warn owners about undesired situations that could happen while they are far away from their homes. This model aims to present the design and implementation of an Arduino based smart home warning system. In this system, Arduino Uno microcontroller has been used with several compatible sensors (DHT11, MQ2, and LDR Sensor), actuators (buzzer and relays with attached DC motor, DC fan, and light bulb), and GSM as a wireless communication medium to enable the interaction between users and the proposed system. The experimental results of using the proposed system show that a variety of undesired events can be detected efficiently. Light condition, gas leakage, and over temperature situations can be detected and users get notified about them via SMS. Besides, some proper actions can also be performed by the proposed system including temperature control via DC fan and decreasing gas concentration via DC motor. The proposed system is very useful to prevent loss of resources and human life caused by unwanted events.

II.INTRODUCTION

Nowadays, sensor-based smart home systems (e.g., warning systems) are in high demand and widely used due to the advent and evolution of microcontrollers, sensors, and actuators technologies. These systems are used to monitor indoor environments to give homeowners live updates about undesired activities and unwanted conditions that could happen when they are far away. The aim of smart home warning systems is to interpret the sensory data gathered from the surrounding environment in order to perform some proper actions. For example, fire in houses could occur for many reasons such as the burning of materials, gases, and electric circuits and it could cause severe accidents [1]. To remain safe from fire, a fire alarm system is a must for every residential house. Fire alarm systems are very useful to warn users

about this unwanted event and to prevent losses in, resources and human life that could happen as a result of it. Another example is gas leakage. The Liquefied Petroleum Gas (LPG) is the most used gas for cooking in houses. It is used in cylinders and may blast because of leakage [2]. Residents in many cases do not know that there is gas leaking. Thus, they may light up a fire which causes blast. This situation can be avoided by installing a gas leakage detection system. Also, crime is rampant these days. Therefore, installing security systems in houses is crucial [3]. Such systems can detect any movements that could happen due to a thief entering a house. The fire and gas leakage detection systems are required alongside the motion based security system. This type of automatic home safety and security warning systems can save people from dangerous accidents. The components of any home warning system are a microcontroller with some compatible sensors, actuators, modules, and shields [4]. Usually, such systems start with monitoring the surrounding environment and then perform some proper actions in response to the aforementioned unwanted events that could happen while owners away. The monitoring process is achieved via sensors such as temperature sensors, gas sensors, and motion sensors. While performing proper actions are performed using actuators such as buzzers, lights, and relays. To interact with smart home warning systems, a communication medium Wireless is required. communication (e.g., GSM, Bluetooth, and WiFi) is vastly used in this context. Of course, selecting the appropriate communication medium is subject to several factors including cost, range, and availability [5]. In this paper, an Arduino based smart home warning system that can detect safety and security unwanted situations is proposed and implemented. The system can notify users about house fire, gas leakage, and housebreaking. Also, it can perform some proper actions as a response to the aforementioned unwanted situations to prevent losses in human life and resources.

III.PROPOSED SYSTEM

The monitoring process is achieved via sensors such as temperature sensors, gas sensors, and motion sensors. While performing proper actions are performed using actuators such as buzzers, lights, and relays. To interact with smart home warning systems, a communication medium is required. Wireless communication (e.g., GSM, Bluetooth, and WiFi) is vastly used in this context. Of course, selecting appropriate communication medium is subject to several factors

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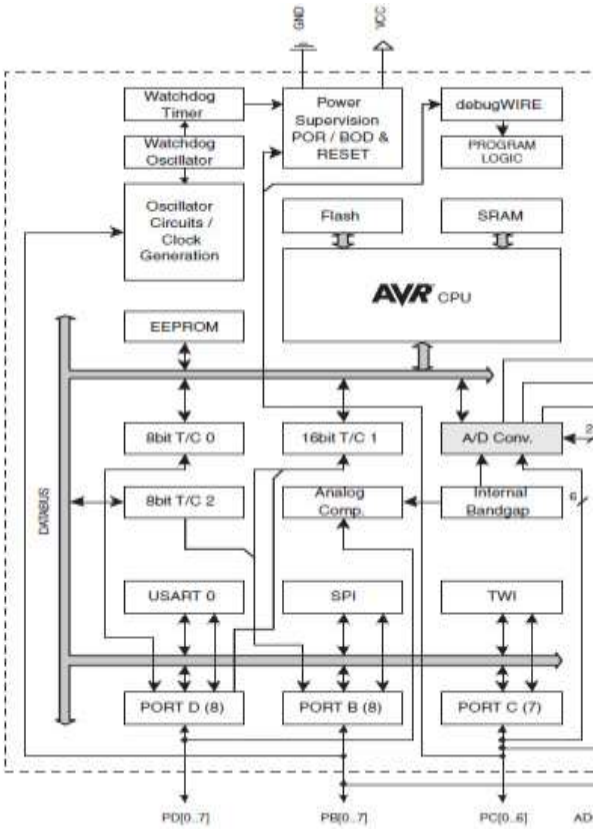

Fig.1: Block Diagram

The system cans notiry users about house fire, gas leakage, and housebreaking. Also, it can perform some proper actions as a response to the aforementioned unwanted situations to prevent losses in human life and resources. Fig.1: Block Diagram in a GSM network, the user terminal is called a mobile station. A mobile station is made up of a SIM (Subscriber Identity Module) card allowing the user to be uniquely identified and a mobile terminal. The terminals (devices) are identified by a unique 15-digit identification number called IMEI (International Mobile Equipment Identity). Each SIM card also has a unique (and secret) identification number called IMSI (International Mobile Subscriber Identity). This code can be protected using a 4-digit key called a PIN code. The SIM card therefore allows each user to be identified independently of the terminal used during communication with a base station. Communications occur through a radio link (air interface) between a mobile station and a base station. All the base stations of a cellular network are connected to a base station controller (BSC) which is responsible for managing distribution of the resources. The system consisting of the base station controller and its connected base stations is called the Base Station Subsystem (BSS). Arduino is a prototype platform (open source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board. The GSM (Global System for Mobile communications)

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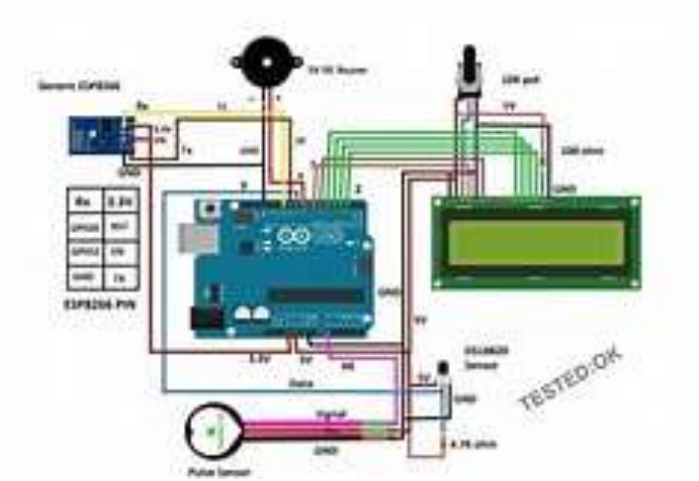
network is at the start of the 21st century, the most commonly used mobile telephony standard in Europe. It is called as Second Generation (2G) standard because communications occur in an entirely digital mode, unlike the first generation of portable telephones. When it was first standardized in 1982, it was called as Group Special Mobile and later, it became an international standard called "Global System for Mobile communications" in 1991. In Europe, the GSM standard uses the 900 MHz and 1800 MHz frequency bands. In the United States, however, the frequency band used is the 1900 MHz band. For this reason, portable telephones that are able to operate in both Europe and the United States are called tri-band while those that operate only in Europe are called bi-band. The GSM standard allows a maximum throughput of 9.6 kbps which allows transmission of voice and low-volume digital data like text messages (SMS, for Short Message Service) or multimedia messages (MMS, for Multimedia Message Service).

IV. SCHEMATIC DIAGRAM



The key features are:

- By sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions
- Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into

a more accessible package. After learning about the main parts of the Arduino UNO board, we are ready to learn how to set up the Arduino IDE. Once we learn this, we will be ready to upload our program on the Arduino board.

V.RESULT

An Arduino-based smart home warning system provides a cost-effective and customizable solution to enhance home security and safety. Using sensors such as motion detectors, gas sensors, temperature sensors, and smoke detectors, the system can monitor various environmental factors and detect potential hazards like intruders, fire, gas leaks, or temperature fluctuations. The Arduino microcontroller processes signals from these sensors and activates warning mechanisms, such as alarms, notifications, or visual indicators (e.g., LED lights or display screens). For example, when the system detects smoke, it can trigger an alarm and send a notification to the homeowner's mobile device. In the case of unauthorized movement or unusual temperature changes, the system can alert the user in real time.The system can also be integrated with other smart home devices, such as lighting and door locks, to provide additional security features, like automatically locking doors or turning on lights when suspicious activity is detected.

VI. CONCLUSION

In this paper, we discussed GSM based home warning system that provides a simple and easy way of detecting intrusion. The UART communication between the hardware and the user of this system has been successfully established. The transmission of the phone calls is dependent on the state of the sensors. From the test conducted, the user gets real-time alerts through the technology employed, thereby making the system localization genuinely independent. We have designed a system with sensors using arduino such as smoke detector, temperature sensor and photoresistor sensor. This controls reinterpreted many features to make an ideal home.

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