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ARDUINO AND IOT INTEGRATION FOR HOME AUTOMATION AND SECURITY SYSTEMS

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ABSTRACT: The need for quick and simple answers to everyday problems, technical improvements, and an increasing reliance on smartphones have all contributed to the creation of technologies capable of managing IoT applications in both residential and commercial settings. Our paper, "Sensing and controlling the environment using Arduino and IOT," concentrates on Arduino while also exploring embedded technologies and the internet of things. To do this, embedded blocks, script programming, and sensors such as flex, accelerometer, flame, magnetic, and WI-FI modules are used.

This paper describes a home automation and security plan. The sensors will establish communication with the Arduino. The status of our residential appliances will be transferred to a cloud-based platform via a wireless module. It is recommended that we connect our system and mobile device using the same wireless network. Our sensors will have the ability to enable or disable user-controlled sensors. The flex sensor detects finger movements to activate the appliances. A magnetic sensor will improve security against door breaches. All of this data is available to consumers via cloud platforms such as THINKSPEAK. This article will demonstrate how Internet of Things applications can improve the quality of life.

KEYWORDS: Arduino, Flex Sensor, Wireless Module, Flame Sensor, Internet of things (IOT) , ThinkSpeak

1.INTRODUCTION

Currently, a growing market for internet services necessitates the efficient collection and exchange of data. From this standpoint, the internet of things (IoT), which connects physical objects to electronic sensors and the internet, has the potential to improve data storage and interchange. Surprisingly, the Internet of Things (IoT) has become a fundamental component of daily life and has transformed civilizations worldwide. This paper uses a variety of sensors, as well as the basic concepts of Arduino, to facilitate the administration of our domestic appliances. This is accomplished by combining microcontroller-based devices with sensors such the Arduino UNO, Flex, accelerometer, magnetic, and flame detectors. The cloud platform delivers real-time information on our equipment's condition, as indicated by sensor values.

Components And Software Used

The kit includes a DC motor, an LDR, an Arduino UNO, a WiFi module, an accelerometer, a motor driver integrated circuit, a 7805 power supply, the Arduino IDE, and a DC motor.

Block Diagram

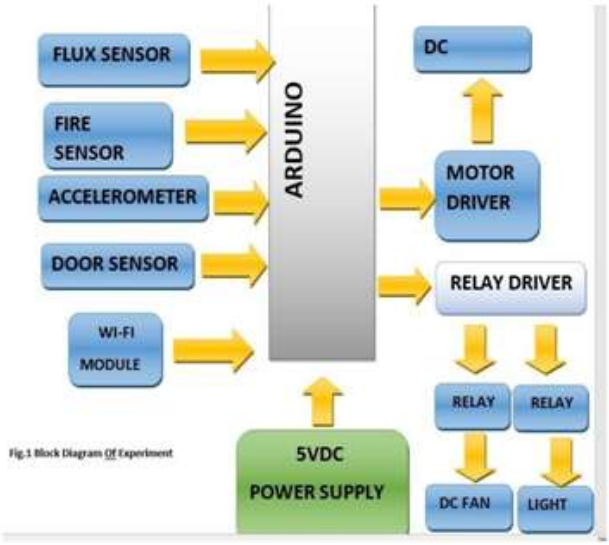

Fig.1 Block Diagram Of Experiment

2. SPECIFICATION OF COMPONENTS

Arduino UNO Board

The Arduino movement began in Italy with the goal of creating inexpensive communication design hardware. Arduino UNO is an excellent choice for developing Internet of Things applications because of its customizable programming, which can be changed to meet unique needs. The Arduino UNO board serves as the control device in this demonstration.

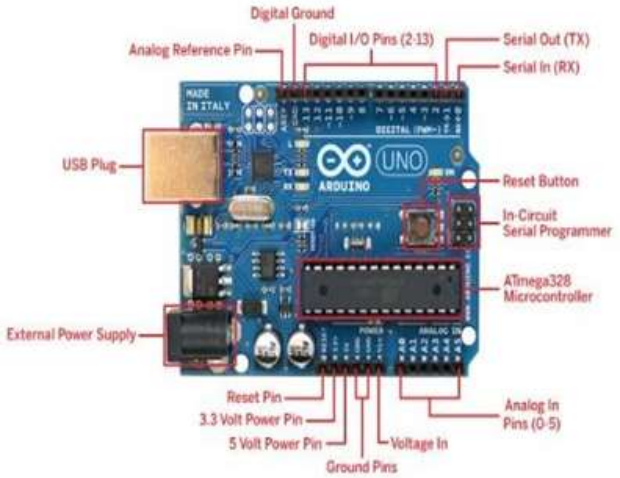

Fig.2 Arduino UNO Board

5V Relays

A relay is an electrically driven valve of the relay type. In addition to solid-state relays and a number of different working principles, relays use an electromagnet to mechanically activate a switch. Relays are used when numerous circuits must be controlled by a single low-power signal, or when a single low-power signal has to control more than one circuit.

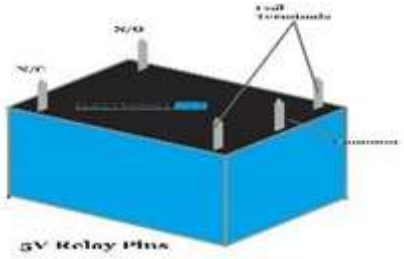

Fig.3 5V Relay

DC Motor

When a conventional DC motor is extended, a geared DC motor is created. A geared DC motor is built with a gear assembly attached to the motor.

Fig.4 Geared DC motor

Flex Sensor

Flex or bending sensors measure the amount of deflection or bending. This flex sensor sets variable resistors apart. As the body of the component deforms, the flex sensor's resistance increases. As part of our endeavor, we utilize this sensor to switch on the lights in our home.

APPLICATION

- Human Machine Interface devices
- Securitysystem

Fig.5 Flex Sensor

Wi-Fi MODULE

The self-contained SOC ESP8266 WiFi Module uses an integrated TCP/IP protocol stack to link a microcontroller to a WiFi network. The ESP8266 can either host an application or outsource all Wi-Fi networking functions to another application processor.

Fig. 6 WI-FI Module

Reed Relay SENSOR

An applied magnetic field activates the reed switch, which is an electrical switch. In this experiment, we used the sensor to prevent door breaches. A beep will sound if the door is breached.

Fig.7 Reed Relay Sensor

Flame Sensor

The polarity of power carried through a flame is converted to DC by flame rectification; a flame sensor "senses" a weak DC signal in the AC power provided to the ignitor. This sensor is used in our experiment to detect a house fire and then sound an alarm to alert passersby.

Fig.8 Flame Sensor

Acclerometer

Accelerometers are instruments that measure acceleration, which is the rate at which an object's velocity changes. Metric units include meters per second squared (m/s2) and G-forces (g). The values are represented by X, Y, and Z coordinates. These settings control the rotational motion of the motor.

Fig.9 Accelerometer

Arduino IDE

It is simple to write and upload code to the Arduino board using the open-source Arduino Software (IDE). It's compatible with Windows, Mac OS X, and Linux. The Java-based environment is built with Processing and other open-source tools. It runs on your computer and is used to create and upload code to the board.

LDR (LIGHT DEPENDENT RESISTOR)

Photoresistors, or LDRs, are light-dependent resistors that are commonly used in circuits that sense light intensity or presence. For this project, light control was automated with an LDR. This indicates that the brightness controls whether the light is on or off.

Fig. 11 Light Dependent Resistor (LDR)

3.EXPERIMENTAL SETUP OF HOME AUTOMATION SETUP

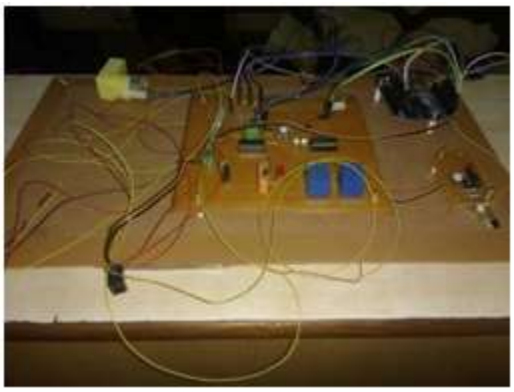

Fig. 12 Experimental Setup

This study has three major sections: sensing, monitoring, and control systems. Sensors like as flex sensors and accelerometers are used during the early stages of tracking. The cloud platform manages the monitoring, but our Arduino UNO microcontroller unit handles the control.

The Arduino UNO serves as an interface for the Wi-Fi module, sensors, and appliances. The state of our appliances changes in response to sensor readings. The flex sensor controls the appliances using finger movements. The accelerometer controls the mechanism used to open and close the door. When the door lock malfunctions, the magnetic sensor alerts us. In the event of a house fire, we will pay special attention to the flame sensor. Our appliances' status updates are posted to a cloud-based platform, which customers may access via personal computers and cellphones. The Arduino UNO determines how to regulate the appliances based on sensor data.

4.CONCLUSION

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