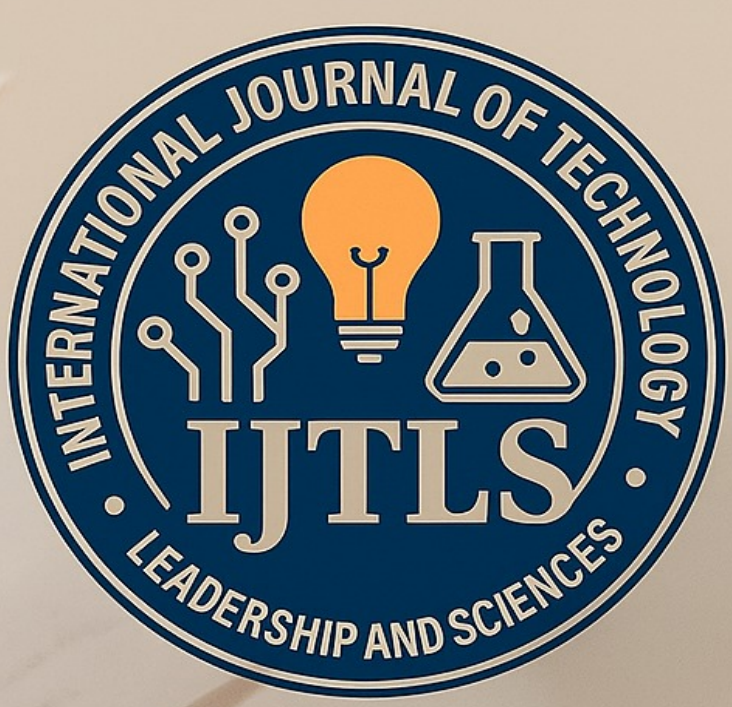

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SMART HOME AUTOMATION SYSTEM USING ARDUINO AND IOT

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ABSTRACT: Intelligent methods for finishing tasks swiftly and efficiently, with a focus on optimizing the utilization of time and resources, are becoming more apparent as technology advances. An IoT-based system for managing home and business operations is detailed in this article, with a focus on home automation. The system uses Arduino, sensor scripting, and embedded technologies to control and monitor household water and appliance systems. Using a wireless module, devices can connect to the cloud for real-time status updates, and sensors like flow and fire detectors allow them to communicate with each other when paired with Arduino. With a flex sensor, for example, users can simply move their fingers to control the device. Cloud services, such as THINKSPEAK, make this data accessible. By streamlining processes and improving home management, this novel approach exemplifies how the IoT can improve people's quality of life.

KEYWORDS:Arduino,FlexSensor,WirelessModule,FlameSensor,Internetofthings(IOT), ThinkSpeak

1.INTRODUCTION

Enabling quick and easy data collection and sharing is critical because internet services are in high demand. With the help of online connectivity and electronic sensors, everyday objects can now exchange data with one another thanks to the IoT [10]. Transferring and storing data is made easier by this. Everyday life is being impacted by the Internet of Things (IoT), which is causing major societal shifts all over the globe [1], [5]. This article shows how basic Arduino concepts and a variety of sensors can make home appliance management easier. The system's integration of flex, gyroscope, magnetic, and flame detector sensors with microcontroller-based devices like the Arduino UNO enhances control and monitoring [7]. You can get up-to-the-minute device status information by accessing sensor data through a cloud platform [4]. This makes automation smarter and more efficient.

Components and Software Used

A DC motor, relays, WiFi module, accelerometer, flame sensor, motor driver integrated circuit, and the Arduino IDE make up the whole thing.

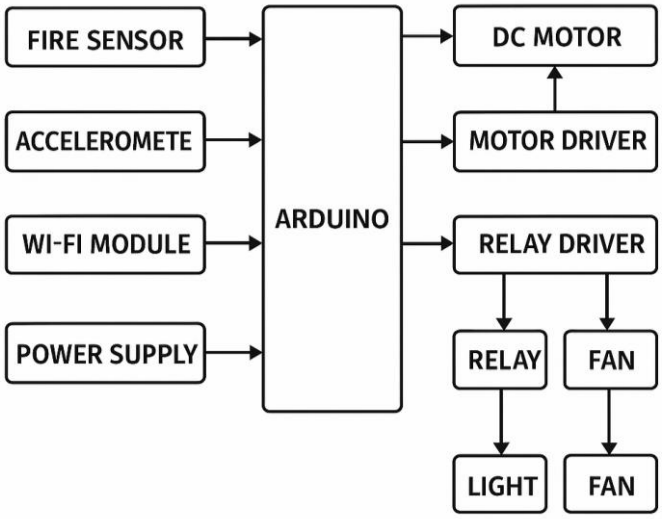

Figure1:Block Diagram of experiment

2. SPECIFICATION OF COMPONENTS

Arduino UNO Board

The Arduino Uno microcontroller board can be assembled according to the instructions provided in the ATmega328 microcontroller manual. There are sixteen digital I/O ports, six of which can generate PWM signals, a sixteen MHz ceramic resonator, and six analog inputs all packed into the package.

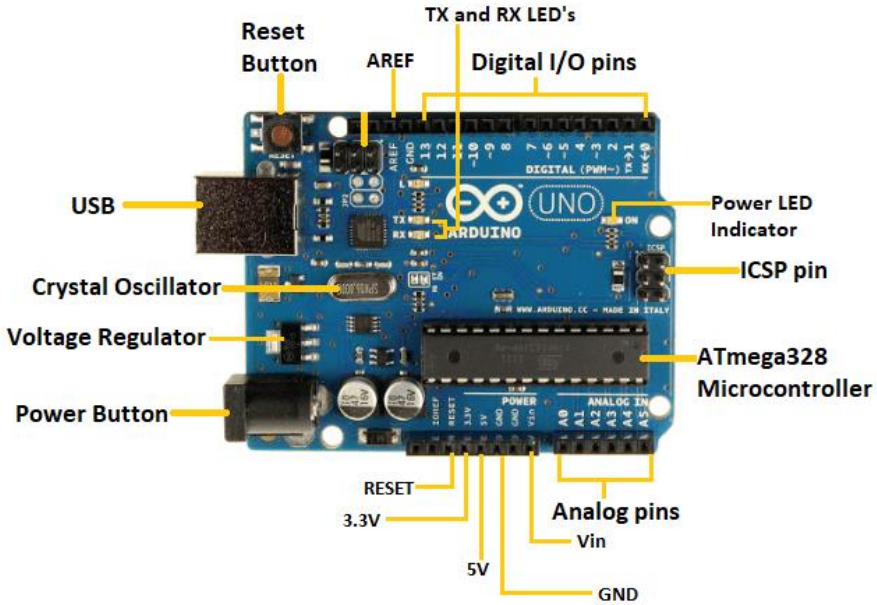

Figure2:ArduinoUNOBoard

The parts include the ICSP header, a power jack, a stop button, and a USB port. When it comes to electronics, the open-source platform Arduino has you covered with its user-friendly hardware and software [7]. A large number of inputs can be transformed into outputs on an Arduino board. An LED or a motor, for example, could be turned on. There are many examples of these, such as when someone presses a button, a screen detects a light, or a tweet is sent [1], [5].

5V Relays

Appliances like fans, lights, and heaters need an extra voltage of 120 to 240 volts. Among Arduino's many benefits is its compatibility with such devices [7]. The Arduino can only handle 5 volts of power, but with a 5 volt switch, it can regulate voltage between 120 and 240 volts. One sort of electrical switch is an arelay. Most of the time, electromagnetic fields are used mechanically to operate relays. This is not to discount the use of solid-state relays and alternative working principles. When controlling numerous circuits with a weak signal or controlling just one circuit at a time is required, a relay is used.

Figure3:5v Relay

Certain conditions are met, the Arduino can be programmed to turn on relays; for example, when the photoresistor's resistance falls below 400 Ohms or the thermistor's temperature rises above 30°C. You can turn the relay on or off using almost any kind of sensor.

FireSensor

Figure4:Firesensor

The igniter receives its alternating current (AC) power from the flame rectification process. From this power source, a flame sensor can pick up a weak direct current (DC) signal. The alternating current changes to a direct current as it flows through the flame. In order to make

sure that people in the area are alerted in the case of a house fire, we have included this sensor in our experiment [6], [9].

WI-FI Module

Any microcontroller can connect to a Wi-Fi network with the help of the SOC ESP8266 Wi-Fi module, which is a standalone unit that incorporates a TCP/IP protocol stack. The little ESP 8266 chip can handle the Wi-Fi networking needs of another app or run its own application[7].

Figure5:Wi-Fimodule

Accelero Meter

The rate of change of an object's velocity, or acceleration, can be measured. Both g and meters per second squared (m/s2) are units of measurement for G-forces. Three coordinates—X, Y, and Z—make up the numbers. You control the speed of the motor with these options [2], [3].

Figure6:Accelero meter

A mass attached to a spring that can only move in one direction is housed inside the accelerometer sensor. Platters that don't move are placed all over the outside. Therefore, when the plates or mass move in either direction, it will change the capacitance between them. A capacitance change proportional to the acceleration number will be reported by the accelerometer sensor.

DC Motor

Understanding how DC engines work is not too difficult. A simple direct current (DC) motor has just two wires that can be hooked up to a battery or any other power source that can handle the load. Finding the positive charge's power source termination is important. Here we can see the motor's rotational direction. We will use an H-Bridge motor driver to speed things

up.

We can now change the direction of a motor's rotation without disconnecting it thanks to this cutting-edge technology. It uses information from a microcontroller at the logic level to achieve this. In theory, the motor could spin in either direction. If you connect the Arduino directly to the DC motor, the microcontroller can handle most of the work [8].

Figure7:DCMotor

Motor Driver

Drivers are not regulated in any way and can do anything they want. Devices with a power consumption of 50 mA or higher often include this component. Disseminating currents between 10 and 20 mA is the microprocessor's limit. You can't run a motor coil on this. You might potentially ruin the microcontroller by hooking up the output transistor straight to the motor. Some kind of IDE that works with the Arduino platform

Making code and sending it to an Arduino board is a breeze with the free and open-source Arduino Software (IDE). Linux, Mac OS X, and Windows are all compatible with this program. The platform, which is based on Java, was developed using Processing and other free software. You can use your computer to write code and then upload it to the board [1].

Experimental Setup of Home Automation Setup

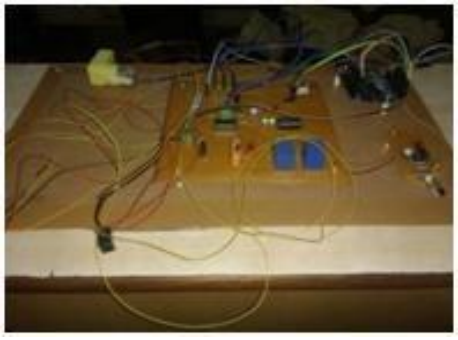

Figure8:ExperimentalSetup

Sensing, monitoring, and controlling tools make up the bulk of this work. In the early stages of tracking, alerts are implemented using flex sensors and accelerometers [3]. While the cloud platform keeps a detailed record of all activities, our Arduino UNO microcontroller unit manages the platform [7].

Through the use of the Arduino UNO, the various parts of the kit, including the Wi-Fi module and sensors, are able to communicate with one another [10]. Our appliances' status reports are based on data collected by their sensors. Simply by placing your fingers on the flex sensor, you can control the machines. The device that opens and closes the door receives instructions from the accelerometer. It will send out a magnetic alert if the door lock stops working. We will be checking the flame monitor in case of a house fire [6], [9]. It is possible to keep tabs on all four appliances from the user's desktop, laptop, or mobile phone once the data is saved to the cloud. By analyzing sensor readings, the Arduino UNO figures out how to run the appliances most efficiently [4].

3.CONCLUSION

People can do a lot of good things thanks to the Internet of Things (IoT). In this piece, we will discuss the possibilities presented by the IoT to create a public platform and services that can be used to build a wide variety of applications. Using the Internet of Things (IoT), this design offers a realistic and affordable way to manage, track, and sense systems in residential and commercial buildings.

The Internet of Things (IoT) will play a crucial role in our daily lives going forward. Our daily lives will be greatly improved by this post, and the rapidly expanding technology sector will also be significantly impacted. The ability to rearrange content on mobile devices would be useful for individuals.

REFERENCES:

1. Vinay Sagar K. N., Kusuma S. M., “Home Automation Using Internet of Things,” *IRJET*, Vol. 2, Issue M, Jan. 2015.
2. Vlad Bande, S. Pop, Ciascai Ioan, Dan Pitica, “Real Time Sensor Acquisition Interfacing Using MATLAB,” *IEEE*, Dec. 2012.
3. Kishore P. Jadhav, Santosh G. Bari, “Hand Gesture Based Switching Using MATLAB,” *IJIREEICE*, Vol. 4, May 2016.

4. Sharmad Pasha, "ThingSpeak Based Sensing and Monitoring System for IoT with MATLAB Analysis," *IJNTR*, Vol. 2, June 2016.
5. Angel Deborah S., "Home Automation Systems – A Research," *IJCA*, Vol. 116, April 2015.
6. Prof. (Dr.) Khanna Samrat Vivekanand Omprakash, "Wireless Home Security System with Mobile," *IJAET*, Vol. 2, Dec. 2011.
7. J. Chandramohan, R. Nagarajan, K. Satheeshkumar, N. Ajithkumar, P. A. Gopinath, S. Ranjithkumar, "Intelligent Smart Home Automation and Security System Using Arduino and Wi-Fi," *IJECS*, Vol. 6, March 2017.
8. Surinder Kaur, Rashmi Singh, Neha Khairwal, Pratyk Jain, "Home Automation and Security System," *ACII*, Vol. 3, July 2016.
9. Jayashri Bangali, Arvind Shaligram, "Design and Implementation of Security Systems for Smart Home Based on GSM Technology," *IJSH*, Vol. 7, 2013.
10. M. Wu, T. J. Lu, F. Y. Ling, J. Sun, H. Y. Du, "Research on the Architecture of Internet of Things," *Proceedings of the 3rd ICACTE*, 2010.