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IOT BASED LABORATORY AUTOMATION AND PROTECTION SYSTEM

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Abstract:

The automation of a laboratory is a one-of-a-kind system that allows for command and communication amongst all apparatus. In this context, "laboratory automation" refers to the coordinated operation of all domestic appliances and fixtures. Controlling and monitoring the home automation system is as simple as using a smartphone or web browser. Using a wide array of sensors, we construct a fire detection and alarm system. This system will notify authorities anytime it senses smoke or fire. Connected to it are a buzzer and an LED that may be used as a visual and audible warning. A smoke, fire, carbon monoxide, or other emergency alarm system that can detect its presence and alert people using visual and auditory devices. These alarms may be triggered either automatically by smoke and heat detectors or manually by devices like call points and pull stations. Motorized bells or wall-mountable sounders/horns are two examples of alarms. There is a pressing need to save energy in light of rising energy costs and a growing global population, hence these alerts may also be audio evacuation messages broadcast by speaker strobes installed within the building. One of the biggest causes of energy loss is that people are unable to access and manage the appliances from distant places. Users provide instructions to these devices through a web interface or an android app.

Key Words:*Microcontroller,IoT,Sensors,Servomotor,EM 18 Reader*

1. INTRODUCTION

Just lately have smaller office buildings and high-priced research facilities begun to use central automation for their building-wide systems. In the past, building automation was mostly used for lighting and was only available from a few strategically placed control points inside the structure, where it offered only the most basic control, monitoring, and scheduling capabilities. In the past decade, the 'Internet of Things' has allowed us to strive for pervasive computing across all areas of society. In light of this, making it easier for people to interact with machines is crucial. Automation is one field that aspires to both reduce complexity and maximize productivity. The purpose of the Laboratory Automatic Operating System (LAS) is to advance the cause of automation in the direction of simplicity. The "smart" components of lab automation are the Internet-connected gadgets that regulate the system. Several of the first forms of home automation were developed using the laboratory computer as the central control unit. Most modern laboratory automation systems have a dedicated device, similar to a security system's control panel, in each lab, as well as a user-friendly app interface that can be accessed from any Internet-connected computer, smartphone, or tablet. The purpose of this study is to conduct a comprehensive review of all such systems and to compare their respective functionalities.

All of the systems will be compared and contrasted, and their merits and shortcomings will

be analyzed in this study. The automation systems for laboratories come with many customizable features. The elevated levels of smoke are detected by the fire alarm system, which triggers the appropriate responses. Because of this, it is more than simply a sensor. When the detection system is triggered, an alarm attached to the sensor will sound. Some fire alarm systems are paired with sprinkler systems that will release water from the ceiling in the event of a fire. But even if you don't have it, the fire alarm will still let you know and the fire department know to get rid of the blaze.

2. LITERATURE SURVEY

"Remote control of sensors and actuators using GSM," IEEE 2002 28th Annual Conference of the Industrial Electronics Society IECON 02, vol. 3, Nov., 2002, authors A. G. Aranguren, L. Nozal, A. Blazquez, and J. Arias.

Using the Global System for Mobile Communications (GSM), this research presents a remote sensing and control system (GSM).

The system is highly suited for real-time monitoring in home security, as well as controlling and sensing in home automation with a large number of controlled devices.

Key in K.A. (2004). Security and Remote Management Through Short Message Service" Sarjana Muda's Thesis from Malaysia's KolejUniversiti Tun Hussein Onn.

Three goals were established, and they were all attained during the development of the prototype.

By sending a text message to the system, you may program it to automatically turn on or off the extension and light.

Research in the Fields of Science and Engineering, June 2020, Volume 11 Issue 6 ISSN 2229-5518 IJSER © 2020 Internet of Things-Based Home-Automation Solution A group of people named Diponkar Kundu, Md. Ebrahim Khallil, Tushar Kumar Das, Abdullah Al Mamun, and AhmmadMusha

All sorts of peoples (Spe-cially disabled folks) will benefit from the paper's system, which can be operated by a variety of control methods, including a voice control app, a Smart-phone, the internet, the World Wide Web, and an electrical switch. This system's ability to keep consumers safe and comfortable is made possible by the Internet of Things.

3. EXISTING SYSTEM

To our knowledge, no preceding initiatives have included safeguards for the laboratory. Human life is in risk and might be lost as a result of the high temperatures and toxic chemicals released in the laboratory. We're carrying out this effort to forestall any such outcome.

4. PROPOSED SYSTEM

These days, Android is the most popular open-source mobile platform OS in the world, and it can be readily customized to provide any desired functionality. This article on wireless laboratory automation with Android mobile smartphones explains how to set up this incredible system in our lab for pennies on the dollar using low-priced hardware. As a result, it provides solutions to several issues, including price, lack of adaptability, lack of security, etc. It will cut down on our energy bills and make the lab safer, and it will give a host of other benefits as well. Also, it is incredibly user-friendly and will enhance the coziness of our workshop.

4.1 RELATED WORK:

The portable devices serve as the interface for an automation system. Using an Internet gateway, they can talk to an automation network using low-power protocols like Wi-Fi to exchange data. Internet of Things (IoT) technologies are developing and can be used to better regulate energy use. Only a handful of the relevant studies are described here. A group of researchers led by Chandramana devised a smarter way to run lights and fans. In this case, the system is integrated with the thermostat and lighting. The primary parts of this automated light and fan control are a light dependent resistor (LDR) and a temperature sensor (LM35). The LDR regulates the lighting, while the LM35 manages the ventilation in this setup. In this paper, we offer an intelligent system design for a home energy control

services to customers and a sense of ease. In this study, we present a system that may be used with

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a smartphone. In order to keep tabs on and manage their household appliances remotely over the Internet, Pavithra.D et al. recommended an effective application of the IoT (Internet of Things). The purpose of this work is to allow users to command various household appliances from their smartphones via the use of a Wi-Fi network and a Raspberry Pi server. Here, the user interacts with the system in real time through a web interface while also being able to remotely operate household appliances such as lights, fans, and door locks. Appliances in the house may be managed by interfacing the server with relay hardware circuits. The interaction with the server enables the user to determine which gadget is most suitable. The user is able to choose the suitable gadget thanks to the server-user interaction. All necessary relays are kept in the loop by the server. Even if the server is offline or the internet connection is lost, the embedded system board will continue to control and run the appliances locally. The idea put out is cliche at its core and disregards basic design principles.

4.2 BLOCK DIAGRAM

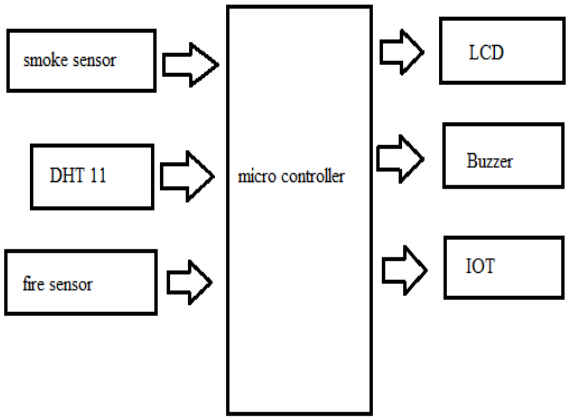

Fig -1: Block diagram of the paper

4.2.1EM 18 Reader

Radio-frequency identification, or RFID, is a method of wireless identification that detects the presence of RFID tags via the use of radio waves.

RFID readers are used to detect the presence of people, objects, and other such things in the same way as bar code readers are.

To read a barcode with a barcode reader, you have to physically hold the barcode up to the reader, but using RFID technology, you just need to bring the tags within range of the reader. In addition, barcodes may become damaged or unreadable, although this is seldom the case with RFID.

Among RFID's various uses is the attendance system, in which each employee will be outfitted with an RFID tag that will be read by a reader at the front desk.Several businesses now utilize RFID to provide access only to verified workers.

Putting a tag (with a unique ID) on an item is useful for keeping track of it, as well as in automated toll collecting systems on highways.

Fig -2: RFID

4.2.2 Fire sensor

The term "flame sensor" refers to a kind of light detector that is very sensitive to common indoor lighting. This sensor module is specifically designed for use in fire alarms. Flames with a wavelength between 760 nm and 1100 nm may be detected by this sensor. This temperature sensor is delicate and may easily be ruined by even moderate heat. To that end, this sensor may be set up some distance from the fire. A flame may be detected from a distance of 100 cm, with a detection angle of 600 degrees. This sensor may provide either an analog or digital signal as its output. These detectors may be found in fire-fighting robots and serve as both an alert and a smoke detector.

Fig -3:Fire sensor

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4.2.3 Smoke sensor

One common way to identify the presence of a fire is using a smoke detector. Smoke detectors include plastic housings that are normally a disk form, measuring around 150 millimeters (6 in) in diameter and 25 millimeters (1 in) in thickness, however this varies. It is possible to detect smoke either visually (photoelectrically) or physically (ionization). Any sensing technique might be used by a detector. Alarms with a high level of sensitivity may be installed in locations where smoking is prohibited to dissuade people from breaking the rule. All too often, smoke detectors in big office and factory buildings are not linked to a centralized fire alarm system.

Fig -4: Smoke Sensor

4.2.4Buzzer

The presence of smoke is often seen as an indication of a fire, hence there is equipment designed to detect it. A standard smoke detector has a plastic housing with a disk shape and measures 150 millimeters (6 inches) in diameter and 25 millimeters (1 inch) in thickness, however this varies depending on the manufacturer. There are two main ways to detect smoke: photoelectrically (by light) and physically (ionization). Both sensing techniques may be used by detectors. In order to prevent and detect smoking in restricted locations, sensitive alarms might be installed. Large commercial and industrial buildings often have their smoke detectors hardwired into a centralized fire alarm system.

Fig -5: Buzzer

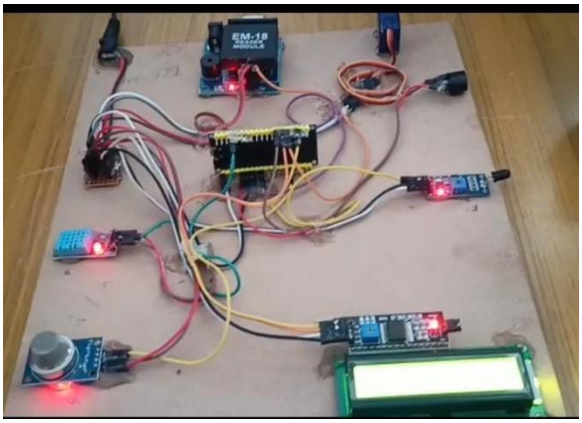
4.2.5 Servo Motor

A servo motor is an electric motor with precise rotational control, used for example, in a robotic arm.A servo motor is a DC motor equipped with a negative feedback system that can detect and correct for errors. In this way, the motor's angular velocity and location may be precisely controlled. It is sometimes necessary to employ alternating current (AC) motors.

In a closed-loop system, the shaft's motion and end position are controlled by negative feedback.Unlike regular AC/DC motors, it's not utilized for continuous spinning.There's a full 360 degrees of rotational freedom.

Fig -6: Servomotor

5. RESULT:



6. CONCLUSION:

Safety. When danger is detected, the electronics may be remotely turned off using a mobile smartphone. People's lives may be saved if an alarm is generated to tell everyone within the room to evacuate. Security. The room is restricted to only those with permission to enter. Even if you're not currently in the area, you may still get

notifications if something out of the ordinary occurs. Convenience. With a smartphone, one may keep tabs on lab readings and make adjustments with the flick of a finger. Cuts down on wasted time. If you have the right kind of automation in place, you can check in on things from anywhere using a mobile app.

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