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Laboratory Automated Operating System

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Abstract: ***Laboratory Automation is a unique system that can control and establish communication between nearly all aspects of your lab. Laboratory Automation is a term used to describe the working together of all household amenities and appliances. For example, a centrally microcontroller panel can have the capability to control everything from security system, lighting and overall electrical appliances. Laboratory automation can include controlling aspects of our lab remotely through a computer or any mobile equipment, programming electronics devices to respond automatically to some conditions or scenarios or centralizing the control of a variety of appliances in our lab into a single control center. For example, Control of lights in and around our laboratory from one central location so there is no need to get out of to that place or go to downstairs if we forgot to turn OFF or ON any appliances, just we can control remotely. It is essential that the different controllable appliances be interconnected and communicates with each other. The main purpose of Laboratory automation is to control or monitor signals from different appliances, or basic services. A smart phone or web browser can be used to control or monitor the home automation system. we build a fire alarm using multiple sensors. This project will send an alert whenever it detects fire and smoke. It has also connected with a buzzer and an LED which will act as a audio and visual indication for alert. A fire alarm system to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present. These alarms may be activated automatically from smoke detectors, and heat detectors or may also be activated via manual fire alarm activation devices such as manual call points or pull stations. Alarms can be either motorized bells or wall mountable sounders or horns. They can also be speaker strobes which sound an alarm, followed by a voice evacuation message which warns people inside the building not to use the elevators with the increase in consumption of energy and population, there is a grave need to conserve energy in every way possible. The inability to access and control the appliances from remote locations is one of the major reasons for energy loss. A web or an android application is used by the users to give instructions to these systems. This system can make use of a host of communication methods such as Wi-Fi, GSM, Bluetooth, ZigBee. Different controlling devices and configurations can be found in existing systems. Such systems have been found already in many places for a wide variety of applications. This paper presents a survey of all such systems.***

Keywords: Laboratory Automation, Android, Wifi module, Energy conservation, Electrical and electronics devices

Design Requirements

- Flame sensor
- Relays 5v
- Pcb mounted relay
- Relay driver IC ULN2003A
- LCD 16*2 alphanumeric display

I. INTRODUCTION

Until fairly recently, automated central control of building-wide systems was found only in larger commercial buildings and expensive labs. Typically involving only lighting, building automation rarely provided more than basic control, monitoring and scheduling functions and was accessible only from specific control points within the building itself. With the advent of ‘Internet of Things’ in the last decade, we have been pushing for ubiquitous computing in all spheres of life. It thus is of extreme importance to simplify human interfacing with technology. Automation is one such area that aims that achieves simplicity whilst increasing efficiency. Laboratory automatic operating System aims to further the cause of automation so as to achieve the goal of simplicity. Where lab automation becomes truly "smart" is in the Internet-enabled devices that attach to this network and control it. The classic control unit is the lab computer, for which many of the earlier home automation systems were designed. Today's laboratory automation systems are more likely to distribute programming and monitoring control between a dedicated device in the labs, like the control panel of a security system, and a user-friendly app interface that can be accessed via an Internet-enabled PC, smartphone or tablet. This paper aims to perform a survey of all the existing such systems and compare the available features.

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The paper will also compare and contrast all the systems and look at their various features and disadvantages. A wide variety of options are available for the laboratory automation systems. The fire alarm system detects the high amount of smoke and acts on it. Hence, it is more than just a sensor. The sensor is connected to an alarm system that is going to blare when the detection system is activated. Some fire alarm systems also come with an attached sprinkler system that is going to spray water down from your roof to put out the fire. However, even if you do not have that, the fire alarm is going to alert you and the fire brigade to put out the fire.

A. Inductive Principle

Laboratory automation is a method of controlling lab appliances automatically for the convenience of users. This technology makes life easier for the user, and saves energy by utilizing devices according to strict requirements. Controls can be as basic as dimming lights with a remote or as complex as setting up a network of items in the home that can be programmed using a main controller or even via cell phone from anywhere in the world.

B. Depth of Automation

System design is affected by the requirements ranging from simple control of lights
in the lab to controlling all appliances and the security system. Each requirement affects the overall design, and developers need to determine the most optimized way to perform all the tasks with the lowest cost and complexity. Despite the internal system complexity, the system should be easy to use and not pose barriers to its operation by a labhold user.

C. Cost

This is the most important aspect of system design as system complexity and depth of automation determine the cost. A highly complex – and thus costly – system can deter customers from purchasing and installing it in their laboratory.

D. Control Methods

We now have a controller, interfaces to interact with the controller, and sensors that tell the controller what things are occurring in the labs. Controllers can communicate and control the many different parts of a laboratory Automation System in a variety of ways. Some of these are IP (Internet Protocol sp), Wi-Fi, Bluetooth, Zig-bee, IR, Serial Data, and Relays (for motorization).

II. LITERATURE REVIEW

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

In this paper , a remote sensing and control system based on using Global System for Mobile (GSM).The system is suitable for a real time monitoring in home security as well as controlling and sensing in home automation with large number of controlled devices.

B. Lock K.A (2004). "Remote and Security Control Via SMS." Kolej Universiti Tun Hussein Onn Malaysia: Thesis Sarjana Muda.

The prototype was successfully developed and met the three stated objectives.
The system can automatically switch ON and OFF the extension and lamp remotely using SMS.

C. International Journal of Scientific & Engineering Research, Volume 11, Issue 6,June-2020 ISSN 2229-5518 IJSER © 2020 Smart Home Automation System Using on IoT Diponkar Kundu, Md. Ebrahim Khallil, Tushar Kumar Das, Abdullah Al Mamun, Ahmmad Musha

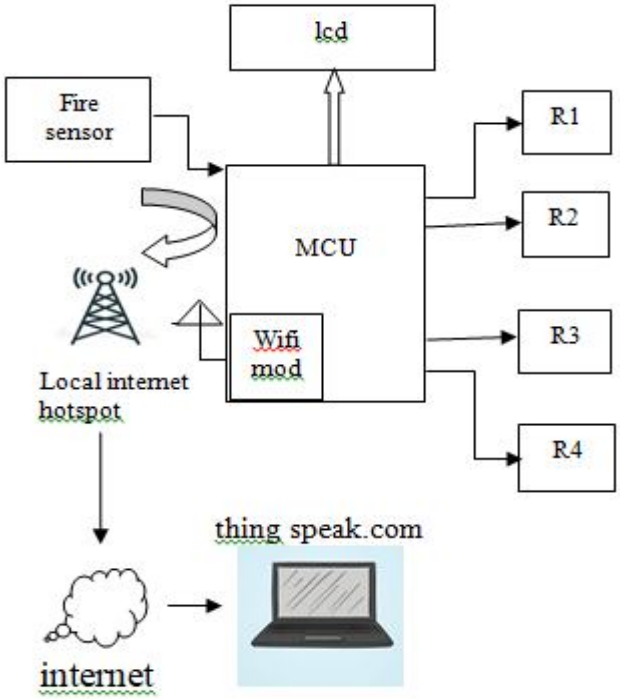
In this paper, system can be controlled via many ways like Voice control app, Smart-phone, internet, World Wide Web, and electrical switch that help all kinds of peoples (Spe-cially disable persons) to control home appliances. Through IoT technology, system can ensure security and comfort for all users.

D. R. Piyare1 and S. R. Lee1, "Smart Home-Control and Monitoring System Using Smart Phone", Independent Computer Consultants Association 2013, ASTL vol. 24, pp 83 - 86, 2013 © SERSC 2013.

- Home automation has become one of the rapidly growing industries by changing lifestyles as well as meeting people's needs.
- Energy saving was achieved by preventing unnecessary use of lighting with micro controller based building automation system, security of life and property in cases of theft and fire and user comfort is ensured by automatic or remote control of the system

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III. METHODOLOGY



In this system, we are going to make a laboratory automation system using ESP8266 Wi-Fi module . With the help of these modules, we will be able to control lights, electric fan and other home appliances through a Wi-Fi application using our Android Smart phone. All the appliances will be connected to relays, which are controlled by the microcontroller. ESP8266 and microcontroller together act as a web Server and it will send control commands through the mobile application i.e., android software.

We are implementing with the help of ESP8266 Wifi Module, as it is a self contained SoC with integration of TCP/IP stack, which may help any microcontroller having UART to access a Wi-Fi network. It can act as both Wi-Fi access point as well as a Wi-Fi client. It is pre-programmed with AT commands, so we can easily access and configure it using a microcontroller. First, we can connect ESP8266 with microcontroller. The ESP8266 runs on 5V, it may damage if you connect it directly to 9V from microcontroller. Now we can connect relays to microcontroller. Here a ULN IC is connected which is used as relay driver. Then all the AC devices are connected to relay output to ON/OFF the AC devices.

Proposed System Implementation

1) Start
2) System will be initialized.
3) Initially all control devices will be OFF after power-on.
4) Wi-Fi module will be initialized.
5) Open mobile application on Android smart phone.
6) Establish connection between Wi-Fi module and mobile application on Android Smart phone.
7) Waiting for control command to be received from Android mobile application.
8) Send control command (ON/OFF device) from Android mobile application.
9) Check received control command format.
10) If received command is “ON” then turn ON the particular Device.
11) If received command is “OFF” then turn OFF the particular Device.
12) Stop.

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IV. APLLICATIONS

A. Lighting control
B. Smart Laboratory appliances
C. Smart switches
D. Improved lab safety and security

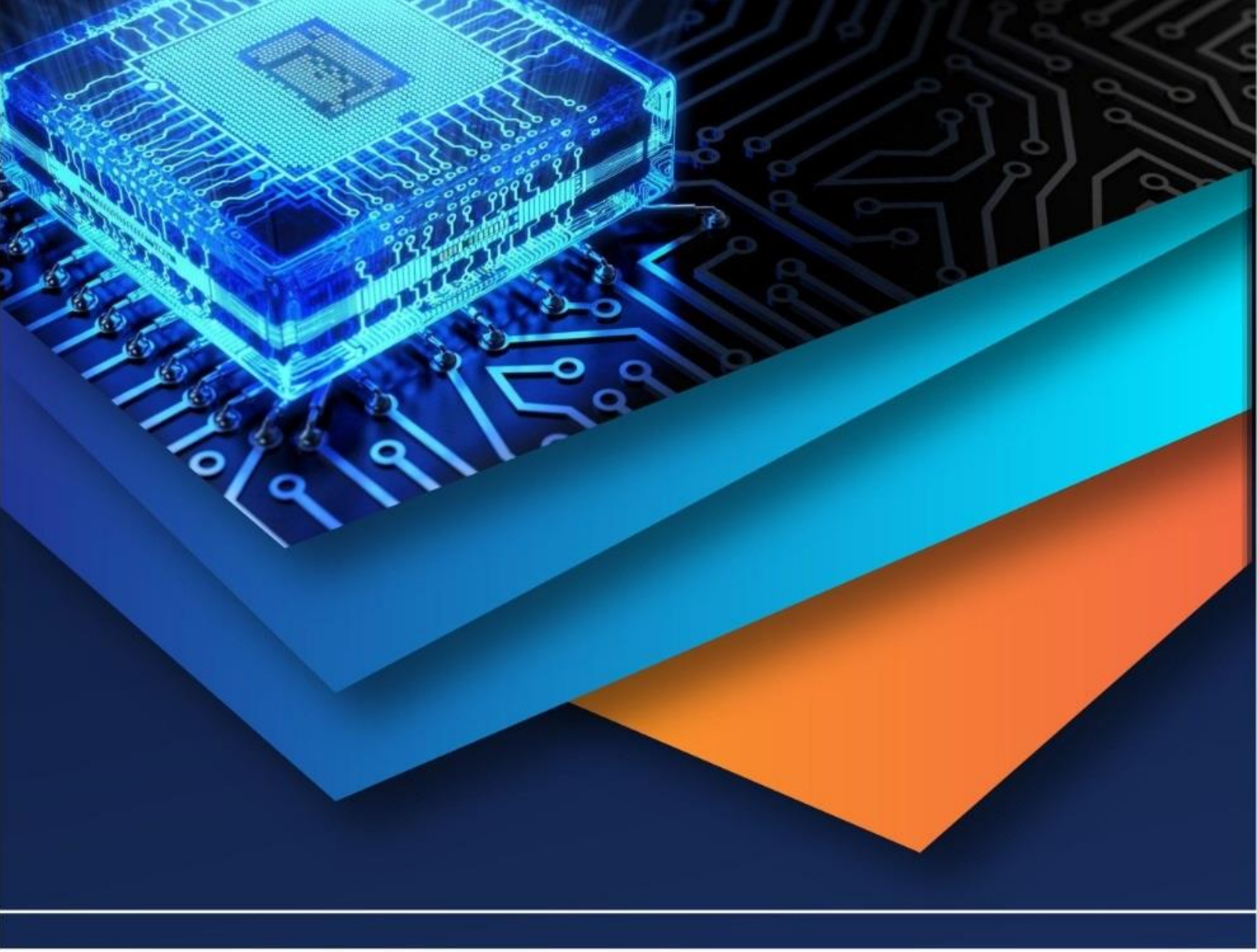
V. CONCLUSION

Today, Android is the world's powerful mobile platform open source operating system to fit easily whatever the functionality we had in our mind. This article is about wireless laboratory automation using Android mobile helps you to implement such a fantastic system in our lab at a very reasonable price using cost-effective devices. Thus, it overcomes many problems like costs, inflexibility, security etc. In addition, will provide greater advantages like it decrease our energy costs, it improves lab security. In addition, it is very convenient to use and will improve the comfort of our labortory.

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