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Lab Automation Based on IOT

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Abstract: ***The concept of laboratory automation has existed for years; such automation has been used primarily in nonclinical and industrial settings. Specimen movement and result reporting are based on the identification of specimens using bar coded specimens and bar coded specimen carriers. The implementation of a laboratory automation system is dependent on the presence of a laboratory information system. An interface between the laboratory information system and the laboratory automation system provides the information required to move the specimen through the laboratory. The reporting of results is dependent on the laboratory information system or manual input, depending on the type of work cell in which the results are produced.***
The greatest hurdle to overcome in developing and implementing a laboratory automation system is the integration of systems, including commercial laboratory instrumentation and user-defined work cells. The barriers to implementation primarily are proprietary in nature: instrument software and instrument hardware. When the instrument manufacturers realize the necessity for development of electronic and physical integration, the proliferation of laboratory automation systems will occur. This article describes the author's concepts of laboratory automation.

I. INTRODUCTION

This is the Simple project based on the lab automation. In the modern world or time, the technology is improving day by day. In this time the people want to do work with less efforts. And this can be achieved with the help of this project. The idea is to plant several sensors around the lab and give a calculated feedback to the response these sensors receive. An example would be having PIR sensors around the lab that would detect the presence of human and turns the fan ON or OFF. For light control, there will be LDR and if the illumination in the lab and turns the light ON/OFF according to the room'slighting changes from high to low. And this project is to be overall cost effective. While the idea to improve lab is the priority of this project work, importance is made to ensure that this system is affordable to all those who need it. The setup cost may initially be a bit high, but in the long run it is expected that there will be a reduction in both electricity.

II. LITERATURE SURVEY

1) This paper describes a Laboratory Automation System using IoT devices.. The project is published as open source software and hardware.

Published in: 2020 21st International Symposium on Electrical Apparatus & Technologies (SIELA)
Date of Conference: 3-6 June 2020
Date Added to IEEE Xplore: 14 August 2020
Publisher: IEEE

2) In this paper we presented the a Lab Automation System (LAS) using Nodemcuesp8266 that employs the integration of cloud networking, wireless communication, which provide the user with remote control of lights, fans, and appliances within their lab and storing the data in the cloud. The system will automatically change on the basis of sensors' data. This system is designed with low cost and expanded in lab to control variety of devices.

Published in: 2020 21st International Symposium on Electrical Apparatus & Technologies (SIELA)
Date of Conference: 3-6 June 2020
Date Added to IEEE Xplore: 14 August 2020
Publisher: IEEE

3) Prospective authors are requested to submit new, unpublished manuscripts for inclusion in the upcoming event described in this call for papers.

Published in: IEEE Transactions on Automation Science and Engineering (Volume: 2, Issue: 2, April 2005)
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III. PROBLEM STATEMENT

A. *Introduction*

The lab automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. Thedesigned system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark. This will help the user to analyze the condition of various parameters in the lab anytime anywhere.

1) Manual methods are used in small schools with less number of students
2) Automation can be implemented for only needy systems which may reduce cost
3) A single android smartphone can control multiple devices
4) Any android phone can be used, no internet required once the app is downloaded
5) There is no need for extra training of that person who is using it.
6) There is no time delay for turn on or turn off the connected device.4

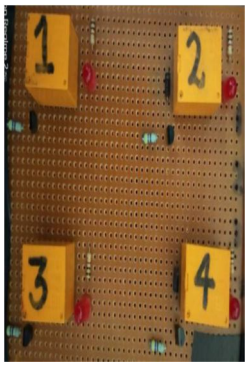
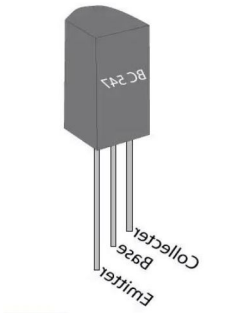
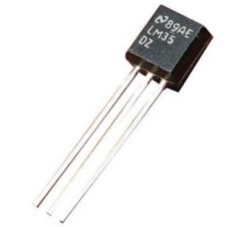
B. *Diagram*

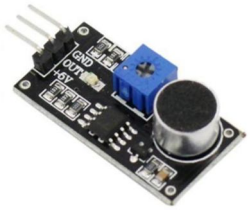
C. *Working*

1) IR sensors will be placed at the entrance of the lab where it acts as switch if any person enters in lab.
2) That IR will send signal to main ARDUINO circuit and from there appropriate signal for the output device will be given .
3) Temperature sensors are places in lab and will switches when temperature of lab goes increases to a certain level and fans will start.
4) At the end stage relay board is actual responsible to switch on or off the devices.

IV. MODULE DESCRIPTION

Sr. no.	COMPONENT USED	DETAILS
1		Arduino Uno R3 The Arduino Uno R3 is a microcontroller board based on the ATmega328 (datasheet). It has 14 digitals input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a compute with a USB cable or power it with a AC-to-DC adapter or battery to get started.

2		12v Relay Module The relay module is a separate hardware device used for remote device switching. With it you can remotely control devices over a network or the Internet. Devices can be remotely powered on or off with commands coming from Clock Watch Enterprise delivered over a local or wide area network.
3		Jumper Wire Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.
4		BC547 transistor transistor is a semiconductor device used to amplify or switch electronic signals and electrical power. It is composed of semiconductor material usually with at least three terminals for connection to an external circuit.
5		470ohm Resistor Resistor is a passive two terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines,
6		PCB board A printed circuit board mechanically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate.
7		LM35 Temperature Sensor LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry. The sensitivity of LM35 is 10 mV/degree Celsius. As temperature increases, output voltage also increases.

8		LM393 Sound Detection Sensor Module Sound is detected via microphone and fed into an LM393 op amp. The sound level set point is adjusted via an on-board potentiometer. When the sound level exceeds the set point, an LED on the module is illuminated and the output is set low.
9		IR Sensor IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation.

V. CONCLUSION

The lab automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark. This will help the user to analyze the condition of various parameters in the lab anytime anywhere

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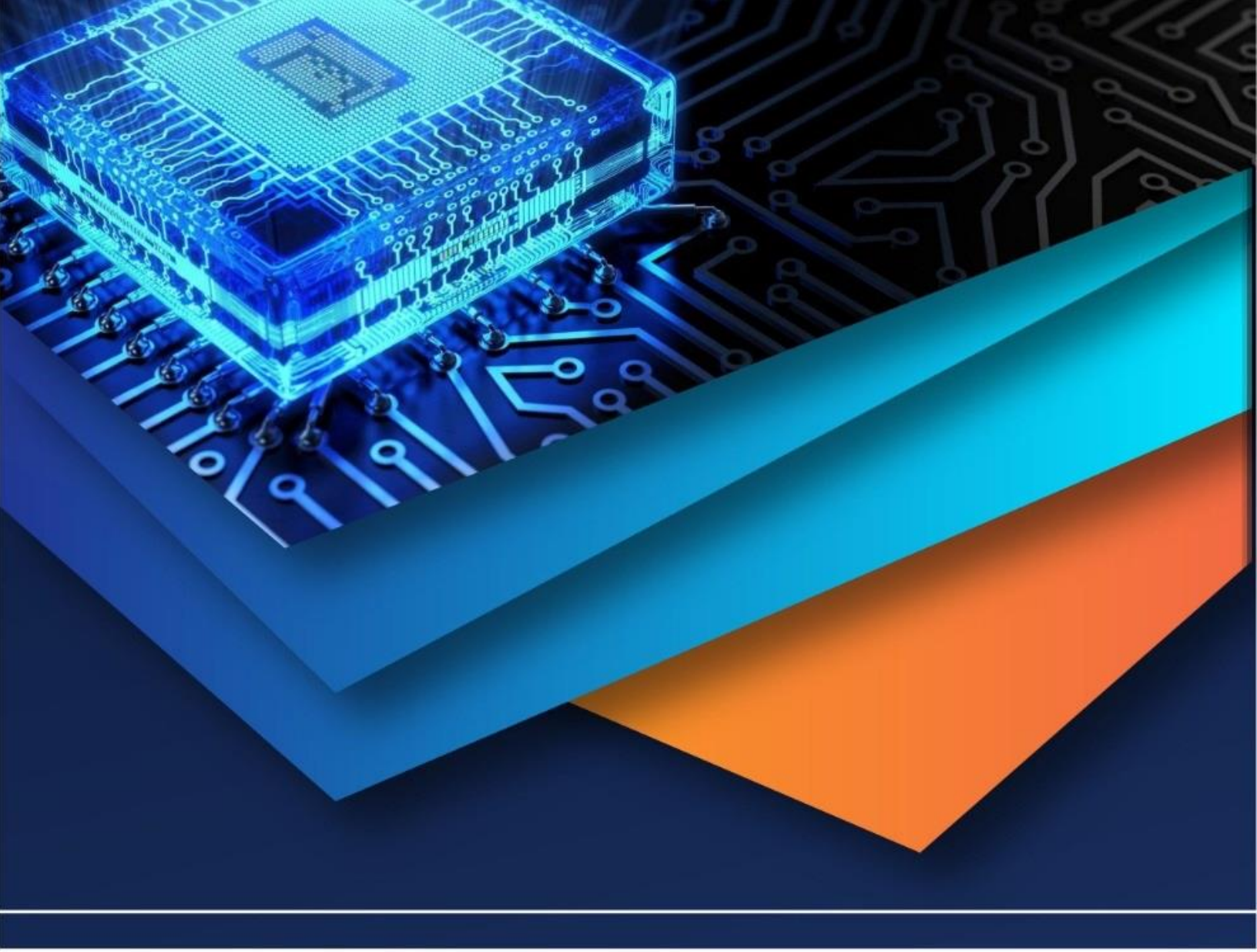

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