Lab Automation using Speech Recognition And Motion Detection

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Abstract - *In this project, we describe a system that integrates a large number of wireless motion sensors and a few strategically placed cameras and its application to real-time monitoring of indoor spaces. The electrical appliances such as fan, light switches, light sensors, current sensors are integrated in a system which then connected to microcontroller which act within the lab to control and perform the user commands. We use the motion sensor data to specify policies of camera control and detect the motion. This project aims on giving a security to the Lab via motion detection and speech recognition. The Lab automation system plays an important role in maintaining security and provide secure and flexible environment. Although the security of the Lab is an important issue, no such security is given prior importance. The aim of this project is to design a lab automation system which makes operating of electrical appliances and detection of motion through sensors in lab through android application. The speech recognition is done by Support Vector Machine. Motion sensors are much more data-efficient and far less expensive, but possess limited recognition capabilities.*

Key Words: **Speech Recognition, IR(Infrared Sensors), Security, Android Application, Lab Automation**.

1. INTRODUCTION:

As the technology is advancing the automation in various fields can easily be seen. Day by day the effort for doing the daily routine work is decreasing, and it's necessary for the busy schedules the people are having as well as for the cost effectiveness .By introducing automatic switching systems that can provide switching control of various household appliances as well as some other tasks that constitute the home automation system. Implementation of a professional quality and fully integrated Computer Lab Management System can significantly increase the efficiency, security, and cost effectiveness of computer lab operations. Work station access control, user sign-in and security. Lab colleagues ought to have the capacity to enlist clients appointed to workstations in the database, remotely bolt and open workstations, look after shortlists, approve clients against an Alert List, and assess the inhabitance of all the remotely found research facility rooms.

Support mechanization:

Lab aides and specialists must have the capacity to keep up issue logs for every workstation, representatives must have the capacity to team up on issues, and workstations that are

out of request must be set apart as inaccessible so lab aides can't allocate clients to them.

2. EXISTING SYSTEM

Nowadays, computer labs in schools and colleges are not automated or are not secured in a proper way. Students and staff use the lights, fans and computers in the lab while working but often forget to switch them OFF after the specified college/lab hours. This leads to excessive power consumption and leads to heating up of the systems.

Unauthorized users or intruders can easily and illegally enter the labs after college hours due to lack of security to the labs. These people can illegally hack into the college's system server and gain unauthorized access to confidential data by cracking the passwords. The process is called Phishing where the intruder acquires password credit essential financial data by sending fake email, messages electronically.

Intruders hack into the system ,steal important data and disappear. This leads to a huge loss in college/lab data and students suffer.
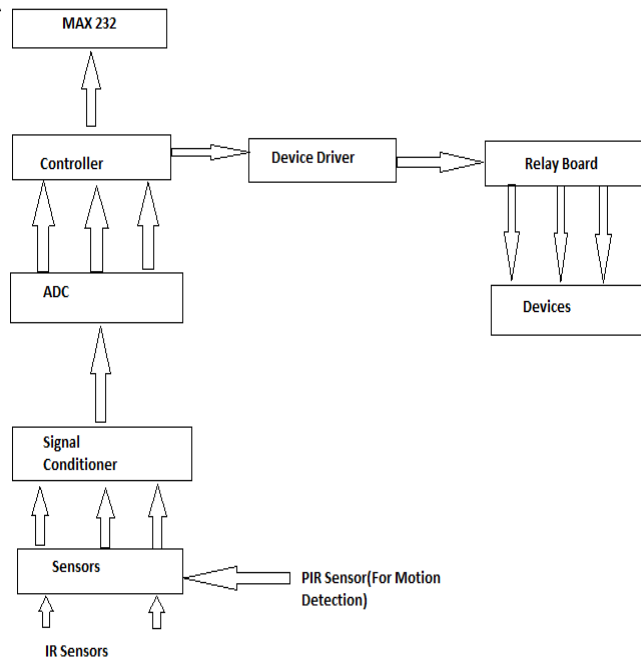
Labs must be provided with such a security that the guards should be alerted if any intruder tries to break into the lab after college hours.

3. WORKING MODULES:

There are 3 types of modules in this project:

1) Working Module 1.

2) Working Module2.

3) Working Module 3.
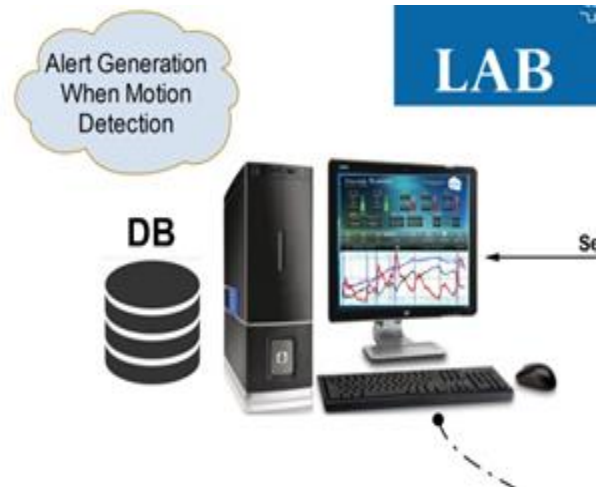
1) Working Module 1:

Fig -1: Working Module 1

In this module, the hardware module contains microcontroller, device driver, serial communication, relay board, devices and sensors.max 232 cable is used for serial communication between the pc and the circuit board two types of sensors are used.ie.IR (Infrared sensors) and PIR sensors.IR sensors are used for keeping count of number of people entering and leaving the lab.PIR sensors are used for detecting motion within the lab incase there is entry other than the main entrance of the lab. There is also an ADC converter which converts the analog signals sent from the signal conditioner to digital signals. There is a 32bit microcontroller which has a high performance but low power during operation. The device operates between 1.8-5.5 volts The ULN2003 is known for its high-present, high-voltage limit. The drivers can be paralleled for even higher current output. Significantly further, stacking one chip on top of another, both on top of another, both electrically and physically has been done.

Generally it can be used for interfacing with a stepper motor, where the motor requires high ratings which cannot be provided by other interfacing devices. There is a relay board on which devices like fans, lights etc connected for operation. A device driver is attached to the relay board. Now, this whole circuit board is connected to the PC database via a MAX 232 cable specifically used for serial communication.

2) Working Module 2:

Fig -2: Working Module 2

In this module, the database used is Glassfish. Its a desktop application. This is connected to the circuit board by serial communication by MAX 232 cable. The database checks the count of people entering and leaving the lab. It also checks the time .i.e. the time within which people enter and leave the lab. If any motion is detected after the lab hours then an alert is generated and consequently an alert message is sent to the lab admin.

3)Working Module 3

Fig -3: Working Module 3

In this module, there are 2 concepts described.

1. Remote Monitoring and

2. Remote Controlling.

These 2 concepts are widely used in securing the labs.

1) In Remote Controlling, the devices (fans, lights, computers) can be controlled .i.e. they can be switched off and switched on by an android application via speech

recognition. Once the lab admin enters the lab in the morning, via speech recognition, the lights and fans and other devices are automatically switched on.

2) In Remote Monitoring the IR sensors keep count of people entering and leaving the lab. If the count is 0 then there is no issue but if the count is 1 then there is an alert.

If there is unauthorized access in the lab or any motion is detected after the lab hours then an alert message is sent to the lab admin on his android phone using the android application using Wifi.

4. PROPOSED SYSTEM

In this project we will develop android application which will be provided to the lab assistant. The android application will cover the following features:

1. Admin login and authentication.

2. Speech command for controlling electric appliances.

3. Android application and microcontroller will be connected using a server.

4. IR sensors for motion detection

5. Alert SMS and email will we sent to the admin in case of a break in.

6. Alert SMS and email will we sent to the admin if any sensor value is reached above the threshold.

5. CONCLUSIONS

Lab is secured. If the fans and lights are ON in the absence of the staff and students, then they are automatically turned OFF. Intruders if any, can be detected after lab working hours using motion detection sensors. IR (Infrared) Sensors keep the count of number of people going in and out of the lab. If an intruder breaks in, then the buzzers automatically starts to work and via this the security guards are alerted and the intruder can be caught red-handed for trying to steal confidential data or hack into the system server.

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