1. LABVIEW

As stated above, LabVIEW controls the cursor movement. But it also controls the switches used to control appliances. As appliances can’t be directly controlled by desktop computer, we have been used a controller (i.e. microcontroller) to control the appliances. In our case, we use Atmega32 to interface it with Desktop computer, we used Arduino board. Now the question is WHY WE USE ARDUINO? The answer to this question is that Arduino can be easily and efficiently controlled by LabVIEW through the LIFA (LabVIEW Interface for Arduino) .The LabVIEW Interface for Arduino (LIFA) Toolkit allows developers to acquire data from the Arduino microcontroller and process it in the LabVIEW Graphical Programming environment. It uses VISA to implement hardware interfacing.

**II. TECHNOLOGICAL OVERVIEW**

Automated control System is designed and programmed in such a manner that it brings together the electrical loads control and their monitoring to our finger tips i.e. either on android device or to a Laptop/Desktop. In order to carry out this remote operation we make use of networking devices such as Wi-Fi router. Fig. 1 depicts the various sub-systems of automation system which uses active and passive sensors to detect the condition such as humidity content, light detecting resistor (LDR) for natural light intensity detection, thermistors for temperature detection, moisture detectors to detect the moisture content of the soil, smoke detectors to detect the presence of smoke or fire in space and passive infrared sensor to detect the movements made by human. Data and signals received from these sensors are collected and manipulated at the brain of the complete system known as Arduino, to send appropriate respective signals to switching relay so that they can control the respective load connected. In addition to this, the system make use of the several software‘s and one of them being Lab VIEW. Lab VIEW is used to control and monitor various connected loads. Lab VIEW not only provides the graphical interface but also facilitates to program up the Arduino according to the requirement and the sensors connected to it. Due to which Arduino could be regarded as the heart of the system. In addition to that, Automated System Module is equipped with an additional feature i.e. Android control, which makes its operation much easier and advanced. This technology has a key feature to obtain all the rights of controlling all electrical appliances connected to the Desktop module over Android application being the condition that both Android device and the master machine (on which main processing is taking place) should be on Local Area Network.

***A. Arduino Board****:*

Arduino is a device, which handles all the processing of input as well as output signals. It can also be regarded to as brain of the system, as the main decision making takes places here in, i.e. handling received signals and processing it out to give the respective signals to the relays which can drive loads according to the programming in LabVIEW. It helps to sense the physical world.

Arduino is basically an open source physical computing platform based on a simple micro-controller board and a development environment for writing software for the board. Arduino here is used to interact with physical world situation and take various decision according to the data received from various sensors. Various tasks that are realized using it in this project are controlling of light—according to the natural light intensity falling in the room, controlling of remotely located load such as in upper floors or in the basement etc. by receiving the signals from the desktop or android device as per user requirement and like this much more. There are several other micro controller that can help to carry out physical computing, but the reason to choose the Arduino is that it reduces complexity, it‘s easy and quick to installation, easy and readily available support and interface with other platforms such as Lab VIEW. The best and the most attractive feature is its reliability and cheap price which makes it a better option than any other micro-controller available in market. Arduino Uno is a micro-controller board having 14 digital I/O pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16-MHz ceramic resonator, an ICSP header and a reset button.



***B. LabVIEW:***

LabVIEW (an acronym for Laboratory Virtual Instrument Engineering Workbench) is a system design platform and development environment for a visual programming language from National Instruments. Programming in this development tool is different from other traditional programming languages like C, C++, as it utilizes the graphical notions to (connecting functional nodes via wire through which data flows) carry out the process. Much more than programming, it is a tool used by scientists and experts to carry out simulation and designing process. Due to features such as ease in programming, fast execution, direct interaction with hardware makes it very convenient to be utilized in this project. LabVIEW provides an easy interface, third party software which can be downloaded to interact with Arduino and further programmed to carry out the process efficiently and effectively. All the basic data handling and G-programming is done here with-in it such as interacting with Arduino, collecting the status of sensors and processing the data. All these raw data received are converted to valuable result in form of signal which is then transferred back to Arduino using serial cable which canfurther drive relays and other output loads connected to it. LabVIEW not only help to manipulate the data but also creates the G.I. (Graphical Interface) for interaction of user with the machine. It also provides the capability of driving any selected load using software or in other words, just a single mouse click away and one can check the load status. LabVIEW can also be regarded as the tool having ‗Supervisory Control and Data Acquisition‘.

3 . **III.ARDUINO UNO BOARD**

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, 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 computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

Figure 2: Arduino Uno Front and Back



The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The specifications of Arduino Uno are as follows:

Microcontroller ATmega328

Operating Voltage 5V

Input Voltage (recommended) 7-12V

Input Voltage (limits) 6-20V

Digital I/O Pins 14 (of which 6 provide PWM output)

Analog Input Pins 6

DC Current per I/O Pin 40 mA

DC Current for 3.3V Pin 50 mA

Flash Memory 32 KB (ATmega328) of which 0.5 KB used by bootloader

SRAM 2 KB (ATmega328)

EEPROM 1 KB (ATmega328)

Clock Speed 16 MHz