INTERNET BASED HOME AUTOMATION SYSTEM

Project B

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Approval Sheet

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1 CHAPTER ONE: INTRODUCTION

1.1 Background

An automation system is a precisely planned change in a physical or administrative task utilizing a new process, method, or machine that increases productivity, quality, and profit while providing methodological control and analysis. The value of system automation is in its ability to improve efficiency; reduce wasted resources associated with rejects or errors increase consistency, quality, and customer satisfaction; and maximize profit. Today's automation systems are a direct result of such early process engineering. Businesses across a broad spectrum of industries can realize benefits from implementing an automation system. Utilizing an automation system can be a simple change like providing production workers cordless drills in place of corded drills to allow for greater freedom of movement in performing their task. Complex automation systems integrate computer hardware and software, robotic equipment, line equipment, shipping processes, inventory control and employee training to increase manufacturing efficiency and product quality.

An internet based home automation system focuses on controlling home electronic devices whether you are inside or outside your home. Home automation gives an individual the ability to remotely or automatically control things around the home. A home appliance is a device or instrument designed to perform a specific function, especially an electrical device, such as a refrigerator, for household use. The words appliance and devices are used interchangeably.

Automation is today’s fact, where things are being controlled automatically, usually the basic tasks of turning on/off certain devices and beyond, either remotely or in close proximity. Automation lowers the human judgment to the lowest degree possible but does not completely eliminate it. The concept of remote management of household devices over the Internet from anywhere, any time in the world today can be a reality. Assume a system where from the office desk, the user could view the status of the devices and decides to take control by tuning his TV set to his favorite channel, turns on the cooling system, say the air conditioner, and switches on or off

some of the lights. This user could walk back home and only finds a very comfortable, pleasant home.

This system design is based on the conviction that security, control and communication are inseparable elements. This provides us in control and in touch with many aspects of our home environment. Our project helps us in monitoring our home environment and accordingly we can control the devices. This provides us in constant touch with our home environment and hence ensuring the safety of our home.

1.2 Problem statement

Many people are always on the move from place to place due to business demands. Some people can spend a couple of days away from their home leaving all their household appliances without any kind of monitoring and control. Some devices are left plugged into power sockets whereas others are supposed to be plugged into and out of power sockets at different intervals depending on the time of the day. All this requires an individual to manually attend to each of the devices independently from time to time. All such monitoring and control can be done without necessarily being around or inside the home. Some devices if not controlled properly consume a lot of energy, which leads to extra expenditure on electricity. Therefore we propose to design an Internet based home automation system which will enable one to remotely manage his/her appliances from anywhere, anytime.

1.3 Objectives of the study

1. To design an Internet based home automation system for controlling home appliances and acquiring their status.
2. To simulate and test the designed system

1.4 Ways to design home automation system

1.4.1 Gsm Based

GSM based Control System‖ implements the emerging applications of the GSM technology. Using GSM networks, a control system has been proposed that will act as an embedded system which can monitor and control appliances and other devices locally using built-in input and output peripherals. Remotely the system allows the user to effectively monitor and control the house/office appliances and equipment via the mobile phone set by sending commands in the form of DTMF TONE.

1.4.2 Bluetooth Based

The Bluetooth client is designed to run on mobile phones that are J2ME and MIDP 2.0 enabled. Nowadays most mobile phones support J2ME as well as MIDP 2.0 hence the user base for the Bluetooth client is very large. This is the most compelling reason to choosing J2ME as the development platform. When the application is started, it attempts to initialize the Bluetooth device. If the mobile phone doesn't have Bluetooth or doesn't support the J2ME Bluetooth API (JSR-82) an error is displayed. On pressing the Search button, it attempts to search for nearby Bluetooth devices and tries to identify the Home Automation Server running on the BTSPP protocol. Once the device discovery is complete, it displays a list of MAC address of any servers it has found. Select the desired server and press the Connect button. Once it's connected to the server, it displays a list of appliances and their current status. The appliances can be turned on and off by checking or clearing the corresponding checkboxes. When an appliance is turned on or off, the server propagates the status to all the other clients connected to it. Similarly if an appliance is turned on or off from another client, the status is updated on the mobile phone in real-time.

1.5 Scope of the study

Our area of interest is remote control of home appliances using the internet. This project will focus on the remote control of a light, temperature sensor and water level detector. With a light, switching on and off will be considered. Whereas, with

temperature sensor and water level detector the corresponding displaying of temperature and water level values will be considered.

1.6 Justification

Today, several people run businesses from far away from their areas of residence and at times have to travel and keep away from their homes for a couple of days. As a result, there is no access and control of the household appliances left at home yet there is a need to keep track of the status and behavior of some appliances. For manual control, an individual should either constantly move back and forth between home and work place or have an attendant for all the devices. However, having an attendant might not solve the problem as in most cases the devices are so many and distributed to be efficiently, manually controlled by one person. The appliances may be distributed in several rooms of the house which may require an individual to move from one room to another every other time trying to monitor and control such appliances. Such kind of control may turn out to be very hectic.

If an automated system is designed, it will reduce on the time, power wastage and money required for a person to attend to each of the devices at his/her home. In order to have convenience and reduction in the extra costs incurred in controlling appliances at home, regardless of whether one is around or away from his/her home, a remote control system, if designed can enable the user to automatically control such appliances. Therefore there is a need to design an automation system so as to automate the control of household appliances.

2 CHAPTER TWO: LITERATURE REVIEW

2.1 Home automation

Home automation is the residential extension of building automation. It is the automation of the home, housework or household activity.

Home automation may include centralized control of lighting, HVAC (heating, ventilation and air conditioning), appliances, and other systems, to provide improved convenience, comfort, energy efficiency and security.

With the invention of microcontrollers, the cost of electronic control fell rapidly. Remote and intelligent control technologies were adopted by the building services industry and appliance manufacturers worldwide as they offer the end user easily accessible and/or greater control of their products. As the amount of controllable appliances in the home rises, the ability of these devices to interconnect and communicate with each other digitally becomes a useful and desirable feature. Home automation aims at controlling and monitoring of appliances.

2.2 Internet

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers). The Internet is now widely used as a connectivity tool for educational, commercial, and personal applications. The Internet is an exciting portal that makes it possible for users to access virtually an infinite supply of information.

2.3 Webpage

The webpage is designed using html, jQuery and Ajax and accepts the instructions from the user.

2.3.1 HyperText Markup Language (HTML)

It is the main markup language for displaying web pages and other information that can be displayed in a web browser.

HTML is written in the form of HTML elements consisting of *tags* enclosed in angle brackets (like <html>), within the web page content. HTML tags most commonly come in pairs like <h1> and </h1>, although some tags, known as *empty elements*, are unpaired, for example <img>. The first tag in a pair is the *start tag*, the second tag is the *end tag* (they are also called *opening tags* and *closing tags*). In between these tags web designers can add text, tags, comments and other types of text-based content.

The purpose of a web browser is to read HTML documents and compose them into visible or audible web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page.

HTML elements form the building blocks of all websites. HTML allows images and objects to be embedded and can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It can embed scripts in languages such as JavaScript which affect the behavior of HTML web pages.

Web browsers can also refer to Cascading Style Sheets (CSS) to define the appearance and layout of text and other material. The W3C, maintainer of both the HTML and the CSS standards, encourages the use of CSS over explicit presentational HTML markup.

2.3.2 Ajax

Ajax (an acronym for **Asynchronous JavaScript and XML**) is a group of interrelated web development techniques used on the client-side to create asynchronous web applications. With Ajax, web applications can send data to, and retrieve data from, a server asynchronously (in the background) without interfering with the display and behavior of the existing page. Data can be retrieved using the XMLHttpRequest object. Despite the name, the use of XML is not required (JSON is often used instead), and the requests do not need to be asynchronous.

Ajax is not a single technology, but a group of technologies. HTML and CSS can be used in combination to mark up and style information. The DOM is accessed with JavaScript to dynamically display, and allow the user to interact with, the information presented. JavaScript and the XMLHttpRequest object provide a method for exchanging data asynchronously between browser and server to avoid full page reloads.

```
$.ajax({
})
```

2.3.3 jQuery

jQuery is a multi-browser JavaScript library designed to simplify the client-side scripting of HTML. It was released in January 2006 at Bar Camp NYC by John Resig. It is currently developed by a team of developers led by Dave Methvin. Used by over 55% of the 10,000 most visited websites, jQuery is the most popular JavaScript library in use today.

jQuery is free, open source software, licensed under the MIT License. jQuery's syntax is designed to make it easier to navigate a document, select DOM elements, create animations, handle events, and develop Ajax applications. jQuery also provides capabilities for developers to create plug-inson top of the JavaScript library. This enables developers to create abstractions for low-level interaction and animation, advanced effects and high-level, theme-able widgets. The modular approach to the jQuery library allows the creation of powerful dynamic web pages and web applications.

```
$(document).ready(function() {
// script goes here
});
```

2.4 Server

The webpage is put on the lamp server. The server is the link between the microcontroller and the webpage. The lamp server is programmed with PHP and bash

scripting. PHP issues commands to the microcontroller on the serial port depending on the user instructions and bash scripting is used to read the values from the microcontroller.

2.4.1 UBuntu 12.04

Ubuntu is a computer operating system based on the Debian Linux distribution and distributed as free and open source software, using its own desktop environment. It is named after the Southern African philosophy of *ubuntu* ("humanity towards others") or another translation would be: "the belief in a universal bond of sharing that connects all humanity".

As of 2012, according to online surveys, Ubuntu is the most popular Linux distribution on desktop/laptop personal computers, and most Ubuntu coverage focuses on its use in that market.

Features:

Ubuntu is composed of many software packages, the majority of which are distributed under a free software license. The main license used is the GNU General Public License (GNU GPL) which, along with the GNU Lesser General Public License (GNU LGPL), explicitly declares that users are free to run, copy, distribute, study, change, develop and improve the software. On the other hand, there is also proprietary software available that can run on Ubuntu.

The Ubiquity installer allows Ubuntu to be installed to the hard disk from within the Live CD environment, without the need for restarting the computer prior to installation. Beginning with 5.04, UTF-8 became the default character encoding, which allows for support of a variety of non-Roman scripts.

As a security feature, the sudo tool is used to assign temporary privileges for performing administrative tasks, allowing the root account to remain locked, and preventing inexperienced users from inadvertently making catastrophic system changes or opening security holes. PolicyKit is also being widely implemented into the desktop to further harden the system through the principle of least privilege.

Ubuntu Desktop includes a graphical desktop environment. In versions prior to 11.04 the default GUI was GNOME Panel but it was dropped in favor of Unity, a graphical interface Canonical first developed for the Ubuntu Netbook Edition.

Ubuntu comes installed with a wide range of software that includes LibreOffice, Firefox, Thunderbird, Empathy, Transmission, and several lightweight games (such as Sudoku and chess). Additional software that is not installed by default (including software that used to be in the default installation such as Evolution, GIMP, Pidgin, and Synaptic) can be downloaded and installed using the Ubuntu Software Center or other apt-based package management tools. Programs in the Software Center are mostly free, but there are also priced products, including applications and magazines.

Ubuntu can close its own network ports using its own firewalls software. End-users can install Gufw (GUI for Uncomplicated Firewall) and keep it enabled. GNOME (the former default desktop) offers support for more than 46 languages. Ubuntu can also run many programs designed for Microsoft Windows (such as Microsoft Office), through Wine or using a Virtual Machine (such as VMware Workstation or VirtualBox).

Ubuntu compiles their packages using gcc features such as PIE and Buffer overflow protection to harden their software. These extra features greatly increase security at the performance expense of 1% in 32 bit and 0.01% in 64 bit.

2.4.2 PHP Version 5

It is an open source general-purpose server-side scripting language originally designed for Web development to produce dynamic Web pages. It is one of the first developed server-side scripting languages to be embedded into an HTML source document rather than calling an external file to process data. The code is interpreted by a Web server with a PHP processor module which generates the resulting Web page. It also has evolved to include a command-line interface capability and can be used in standalone graphical applications. PHP can be deployed on most Web servers and also as a standalone shell on almost every operating system and platform free of charge.

PHP is a general-purpose scripting language that is especially suited to server-side web development where PHP generally runs on a web server. Any PHP code in a requested file is executed by the PHP runtime, usually to create dynamic web page content or dynamic images used on Web sites or elsewhere. It can also be used for command-line scripting and client-side graphical user interface (GUI) applications. PHP can be deployed on most Web servers, many operating systems and platforms, and can be used with many relational database management systems.

2.4.3 Bash Scripting

Bash is a Unix shell written by Brian Fox for the GNU Project as a free software replacement for the Bourne shell (sh). Released in 1989, it has been distributed widely as the shell for the GNU operating system and as the default shell on Linux and Mac OS X. It has been ported to Microsoft Windows and distributed with Cygwin and MinGW, to DOS by the DJGPP project, to Novell NetWare and to Android via various terminal emulation applications.

Bash is a command processor, typically run in a text window, allowing the user to type commands which cause actions. Bash can also read commands from a file, called a script. Like all Unix shells, it supports filename wildcarding, piping, here documents, command substitution, variables and control structures for condition-testing and iteration. The keywords, syntax and other basic features of the language were all copied from sh. Other features, e.g., history, were copied from csh and ksh. Bash is a POSIX shell but with a number of extensions.

The name itself is an acronym, a pun, and a description. As an acronym, it stands for *Bourne-again shell*, referring to its objective as a free replacement for the Bourne shell. As a pun, it expressed that objective in a phrase that sounds similar to *born again*, a term for spiritual rebirth. The name is also descriptive of what it did, *bashing together* the features of sh, csh and ksh.

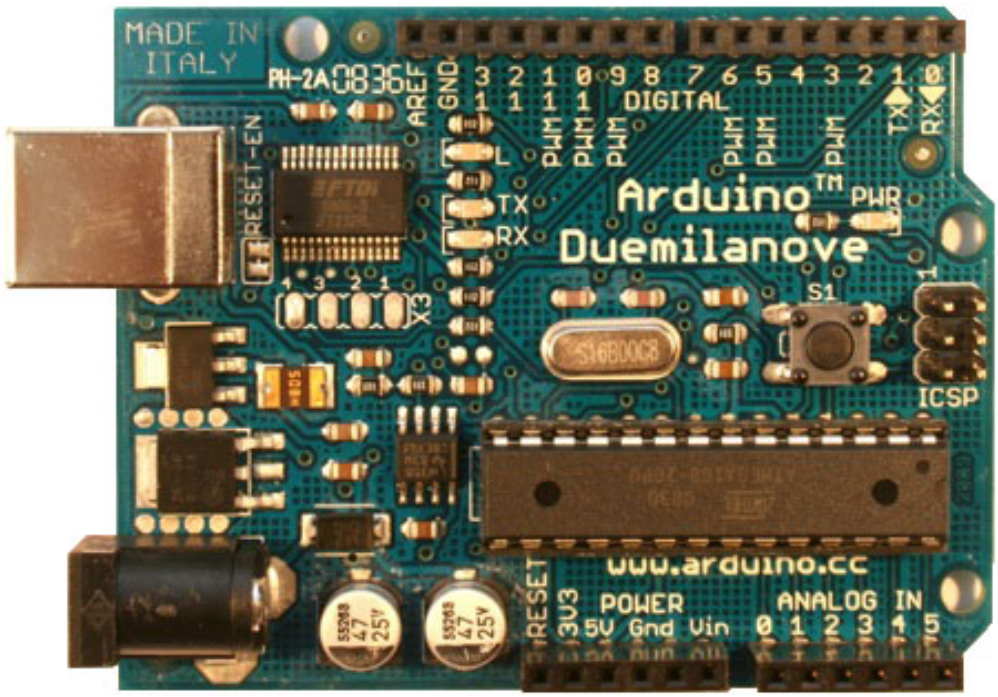
2.5 Microcontroller

The Microcontroller Arduino Duemilanove is connected to the serial port of the server and receives various instructions depending on which it controls the following devices:

1. Bulb (Sets it on or off)
2. Temperature Sensor (Reads the temperature value from it)
3. Water Level Detector(Reads the water level value from it)

The microcontroller is programmed using arduino software

2.5.1 Arduino Duemilanove



Overview

The Arduino Duemilanove ("2009") is a microcontroller board based on the ATmega168 (datasheet) or ATmega328 (datasheet). It has 14 digital 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 computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

"Duemilanove" means 2009 in Italian and is named after the year of its release. The Duemilanove is the latest in a series of USB Arduino boards.

Summary

Microcontroller	ATmega168
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	16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB used by bootloader
SRAM	1 KB (ATmega168) or 2 KB (ATmega328)
EEPROM	512 bytes (ATmega168) or 1 KB (ATmega328)
Clock Speed	16 MHz

Power

The Arduino Duemilanove can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- **VIN.** The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V.** The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.
- **3V3.** A 3.3 volt supply generated by the on-board FTDI chip. Maximum current draw is 50 mA.
- **GND.** Ground pins.

Memory

The ATmega168 has 16 KB of flash memory for storing code (of which 2 KB is used for the bootloader); the ATmega328has 32 KB, (also with 2 KB used for the bootloader). The ATmega168 has 1 KB of SRAM and 512 bytes of EEPROM (which can be read and written with the EEPROM library); the ATmega328 has 2 KB of SRAM and 1 KB of EEPROM.

Input and Output

Each of the 14 digital pins on the Duemilanove can be used as an input or output, using pinMode(), digitalWrite(), anddigitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

- **Serial: 0 (RX) and 1 (TX).** Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the FTDI USB-to-TTL Serial chip.
- **External Interrupts: 2 and 3.** These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. **PWM: 3, 5, 6, 9, 10, and 11.** Provide 8-bit PWM output with the analogWrite() function.
- **SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK).** These pins support SPI communication using the SPI library.
- **LED: 13.** There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Duemilanove has 6 analog inputs, each of which provides 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. Additionally, some pins have specialized functionality:

- **I^2C: analog input pins A4 (SDA) and A5 (SCL).** Support I^2C (TWI) communication using the Wire library.

There are a couple of other pins on the board:

- **AREF.** Reference voltage for the analog inputs. Used with analogReference().
- **Reset.** Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

ATmeCommunication

The Arduino Duemilanove has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers.
The ATmega168 and ATmega328 provide UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with Windows version of the Arduino software) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer (but not for serial communication on pins 0 and 1).
A SoftwareSerial library allows for serial communication on any of the Duemilanove's digital pins.
The ATmega168 and ATmega328 also support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus.

Programming

The Arduino Duemilanove can be programmed with the Arduino software (download). Select "Arduino Diecimila or Duemilanove w/ ATmega168" or "Arduino Duemilanove w/ ATmega328" from the **Tools > Board** menu (according to the microcontroller on your board).
The ATmega168 or ATmega328 on the Arduino Duemilanove comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500protocol (reference, C header files).
You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header.

Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Arduino Duemilanove is designed in a way that allows it to be reset by software

running on a connected computer. One of the hardware flow control lines (DTR) of the FT232RL is connected to the reset line of the ATmega168 or ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.

This setup has other implications. When the Duemilanove is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Duemilanove. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.

The Duemilanove contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line.

USB Over current Protection

The Arduino Duemilanove has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Physical Characteristics

The maximum length and width of the Duemilanove PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Three screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

2.5.2 Arduino Software

It is an open-source single-board microcontroller, descendant of the open-source Wiring platform, designed to make the process of using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open hardware design for the Arduino board with an Atmel AVR processor and on-board input/output support. The software consists of a standard programming language compiler and the boot loader that runs on the board.

Arduino hardware is programmed using a Wiring-based language (syntax and libraries), similar to C++ with some slight simplifications and modifications, and a Processing-based integrated development envionment.

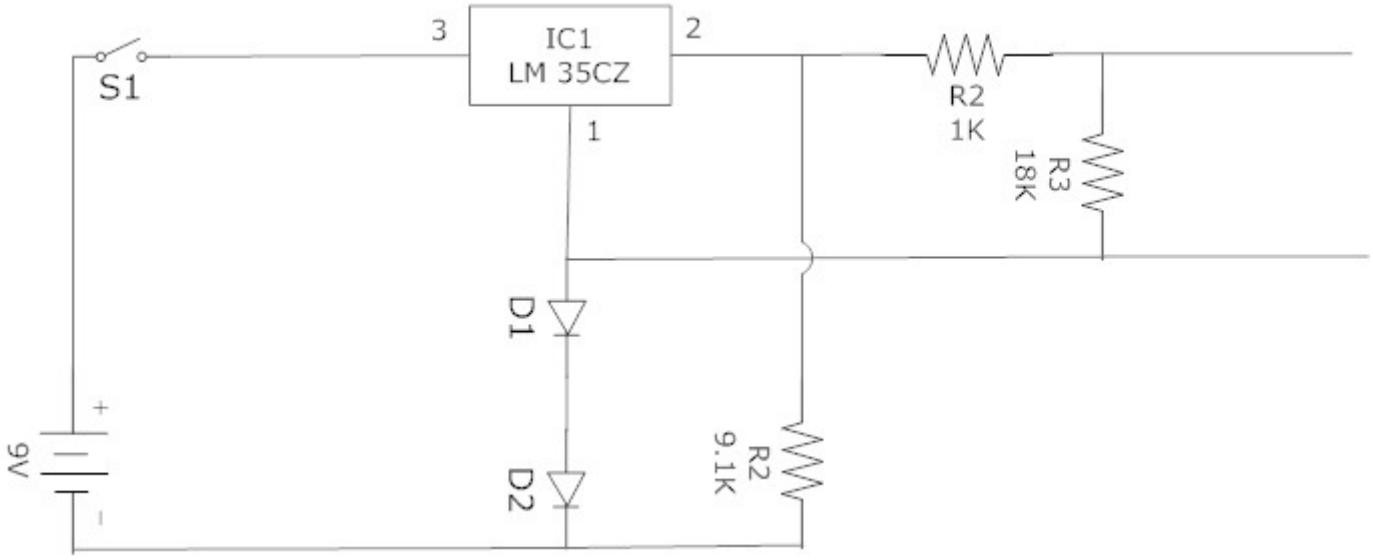
Current versions can be purchased pre-assembled; hardware design information is available for those who would like to assemble an Arduino by hand. Additionally, variations of the Italian-made Arduino—with varying levels of compatibility—have been released by third parties; some of them are programmed using the Arduino software.

2.6 Devices:

1. Bulb (Connected on pin 13 of the arduino boardis switched on or off by the microcontroller by setting pin 13 low or high)
2. Temperature Sensor (Connected to the arduino on analog voltage pin A0 and supplied voltage from the arduino. The microcontroller reads the analog voltage calibrates it and provides to the serial port.)

3. Water Level Detector (to the arduino on analog voltage pin A1 and supplied voltage through external power supply. The microcontroller reads the analog voltage calibrates it and provides to the serial port.)
4.

2.6.1 Temperature Sensor



This is very tiny but useful circuit and can be constructed as one evening job. This can sense the room temperature and can be connected to digital multi meter for the output. The circuit converts temperature into a corresponding voltage i.e for every degree of the temperature sensor.

Connect the output wires to the digital multi meter and set the multi meter for D.C measurement at 200 mV. The output displayed here will be the direct digital conversation of actual temperature of room.

LISTS OF COMPONENTS:

RESISTORS:

R1 - 9.1K

R2 - 1K

R3 - 18K

MISCELLANEOUS

PCB

D1 - IN 4148

D2 - IN 4148

IC1 - LM35

9V - 9v snapper

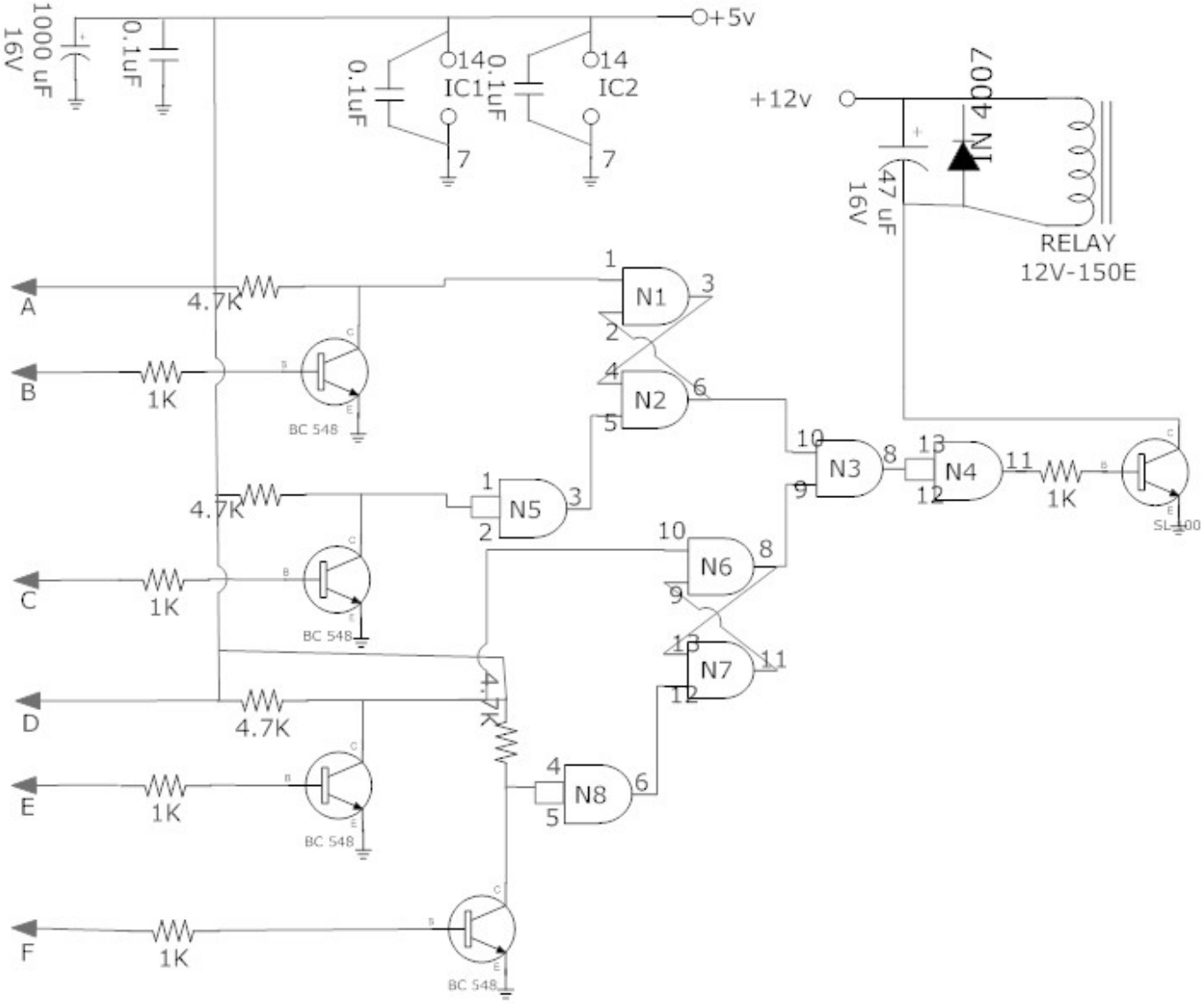
RANGE:

+100mV/ 10 C

+100mV/ 0 C

+100mV /100 C

2.6.2 Water Level Detector



A number of small and complex circuits have appeared for water level controller but most of them switch over the tank whenever water level decreases. Some of them do not bother about the water in the ground level tank. Thus we end up with burnt motor, which try to pump up non-existent water from ground level to the overhead tank.

This modified Water level controller has been provided with two flip flops for the two tasks and each tank has three probes to monitor its status. Here, we are going to implement it for the ground level tank.

The operation of the circuit is self-explanatory. When the underground tank is full transistor T3 and T4 both conduct there by setting the flip-flop comprising N7 and N8 whose output namely '1' is fed into N3. The output of N3 is '0'which is inverted and used in trigger transistor SL 100, and thus water level value is provided at the output.

Specification:

RESISTORS

R1.....R5	=1k
R1.....R9	=4k

CAPACITORS

C1	=100uf/ 16 V
C2	=47 uf/ 16 V
C3.....C5	=0.1 U Disc

SEMICONDUCTORS

U1	=7805
U2(IC)(N1-N4)	=7400
U3(N5-N8)	=7400
T1.....T4	=BC548
T5	=SL 100
D1	=IN4007

MISCELLANEOUS:

Relay	=12V-150E

3 CHAPTER THREE: PROBLEMS FACED

3.1 Existing System

In existing system Home automation and security are separate systems working independently. Automation system provides us to control the electrical home appliances with the help of a PC. Security system provides to indicate the homes status by using different type of sensors. Thus automation and security are of separate units. Also in existing system if any one of the sensors goes abnormal the user is not immediately informed about the status, since there is no way for the user to get information about the status.

The main disadvantages of existing systems are: -

- Automation, Security, Monitoring and Communication is not integrated.
- Monitoring System should be always in online so it is more expensive.
- Limited to smaller distance i.e., within a single network.
- Real-time monitoring is not possible.

3.2 Proposed System

To overcome the drawbacks of the above we are going for remote control through internet. In our project home automation and security is given greater importance by monitoring and controlling home environment done via Internet. Thus monitoring and controlling home environment in real time is made possible.

In today's home environment, the quest for greater security is practically universal. As a result, the need for more efficient monitoring of the status of home such as, detection of fire and also violation of security and also controlling the Home electrical equipment's has become one of the important concerns. This improves efficiency by providing real time access and control of all types of home equipment's virtually from anywhere. Thus our system covers a large distance than the existing systems. Our project entitled Home Automation Using Internet integrates automation and security into a single unit. Also when abnormal condition of any sensor is detected immediate message is given as an alert to the user PC.

3.3 Applications

Our Automation software helps us to automate the home electrical appliances such as, Light, Fan, and TV etc… from any PC connected to a network.

- Real-time monitoring is made possible
- Industrial automation can also be done.
- It also helps to monitor and control temperature continuously.
- All types of electrical equipment's can be controller

4 CHAPTER FOUR: PROBLEM SOLUTION

4.1 Principle

The system will be modeled with three different units
Ubuntu Lamp Server
Arduino Microcontroller and Devices
Webpage

A webpage will be setup to run on Ubuntu lamp server. The webpage will act as a user interface to send instructions to the microcontroller. The Ubuntu lamp server will process the instructions and send the corresponding instructions on to the serial port. The microcontroller connected on the serial port receives these commands and carries out further operations with the devices. In case of write operation (bulb) the arduino sets the corresponding pin on which the bulb is connected high or low depending on the received instructions. In case of read operation (temperature sensor and water level detector) the arduino reads the corresponding pin on which the device is connected and sends the information on to the serial port. The bash script reads the value from the serial port and stores it in the notepad file. The corresponding value is displayed on the webpage using PHP and AJAX.

4.2 Installation

4.2.1 Ubuntu Desktop 12.04

Installing Ubuntu

1. Get an Ubuntu installation disk (liveDVD or liveUSB).
2. Insert the Ubuntu disk into your DVD drive. (or connect your liveUSB)
3. Make sure that your BIOS (boot order) is set to boot from a CD/USB before a hard drive.
4. Start or restart your computer. Choose the **Try Ubuntu** option in order to check that your hardware (screen, keyboard, internet...) is correctly recognized by Ubuntu.

5. Backup your documents on an external disk or DVDs
6. When you are ready to install Ubuntu on your hard disk, click the **Install Ubuntu** button.
7. Select your desired language and click **Continue**. The **Preparing to install Ubuntu** window appears.
8. Select the desired options. Click **Continue**. The **Installation type** window appears.

- If you want to install Ubuntu alongside you other systems (eg alongside Windows), select the **Install Ubuntu alongside them**.

- If you want to install Ubuntu over your entire hard drive, select **Erase disk and install Ubuntu**, then select the hard drive that you want to install Ubuntu. Warning: this will erase all data and systems that are currently on the disk.

- If you want to manually setup your partitioning scheme, select the **something else** option. You will find further advice on the Disk Space page.

Click **Install now**. From this point, the installation cannot be cancelled. Few additional parameters need to be setup. The **Where are you?** Window appears.

Select the location closest to your location. Click **Continue**. The **Keyboard layout** window appears.

Select the correct keyboard layout. Click **Continue**

When the installation wizard finishes, the **Installation complete** window appears.

Click **Restart now** to restart your computer. Ubuntu is now installed.

4.2.2 Lamp Server

1. To start off we will install Apache. Open up the Terminal (*Applications* > *Accessories* > *Terminal*).
2. Copy/Paste the following line of code into Terminal and then press enter: sudo apt-get install apache2
3. The Terminal will then ask you for your password type it and then press enter.

Testing Apache

1. Open up any web browser and then enter the following into the web address: http://localhost/
2. You should see a folder entitled *apache2-default/*. Open it and you will see a message saying "It works!"

4.2.3 PHP Version 5

1. Again open up the Terminal (*Applications* > *Accessories* > *Terminal*).
2. Copy/Paste the following line into Terminal and press enter: sudo apt-get install php5 libapache2-mod-php5
3. In order for PHP to work and be compatible with Apache we must restart it. Type the following code in Terminal to do this: sudo /etc/init.d/apache2 restart

Testing PHP

1. In the terminal copy/paste the following line: sudo gedit/var/www/testphp.php. This will open up a file called *phptest.php*.
2. Copy/Paste this line into the php test file: <?php phpinfo(); ?>
3. Save and close the file.
4. Now open your web browser and type the following into the web address: http://localhost/testphp.php

4.2.4 Arduino Software

Install the Arduino IDE in Ubuntu

1. Install gcc-avr, avr-libc and openjdk-6-jre if you don't have it already.
2. Plug in the board, see where it's connected
3. Download and unpack the Arduino IDEtarball
4. Run the IDE
5. Select your board model and serial port
6. Run a sample program

Install gcc-avr and avr-libc

Gcc-avr and avr-libc give your system the tools it needs to compile c into AVR machine code:
sudo apt-get install gcc-avr avr-libc

Install openjdk-6-jre

$ sudo apt-get install openjdk-6-jre
Once those are installed plug in your board and type $dmesg. It will print the kernel's ring buffer and show you what USB port your Arduino is plugged into:
According to dmesg, our board is plugged into ttyUSB0.

Download and Run the Arduino IDE

~/Downloads$ tar xzvf arduino-1.0.4-linux32.tgz
~/Downloads$ cd arduino-1.0.4
~/Downloads/arduino-1.0.4$ ./arduino
./arduino launches the Arduino IDE.

Change port permissions

Changing the permissions on /dev/ttyACM0 to world readable and writeable fixed the grayed out serial port.
sudo chmod a+rw /dev/ttyUSB0

4.3 Steps

For write operation
BULB ON:
User opens the webpage
User clicks on the link on the webpage
PHP sends value "1" on user click on to the serial port

Arduino microcontroller receives the message and sets high pin number 13 on which the bulb is connected

The bulb is switched on

BULB OFF:

User opens the webpage

User clicks on the link on the webpage

PHP sends value “0” on user click on to the serial port

Arduino microcontroller receives the message and sets LOW pin number 13 on which the bulb is connected

The bulb is switched off

For read operation

Temperature Sensor

User opens the webpage

User clicks on the link on the webpage

PHP sends value “2” on user click on to the serial port

Arduino microcontroller receives the message and reads the analog voltage on pin number A0 on which the temperature sensor is connected

Arduino microcontroller then writes the temperature value on the serial port

Bash Script reads the value on the serial port on stores it in the notepad text file

The stored value is then displayed on the webpage using Ajax

For read operation

Water Level Detector

User opens the webpage

User clicks on the link on the webpage

PHP sends value “3” on user click on to the serial port

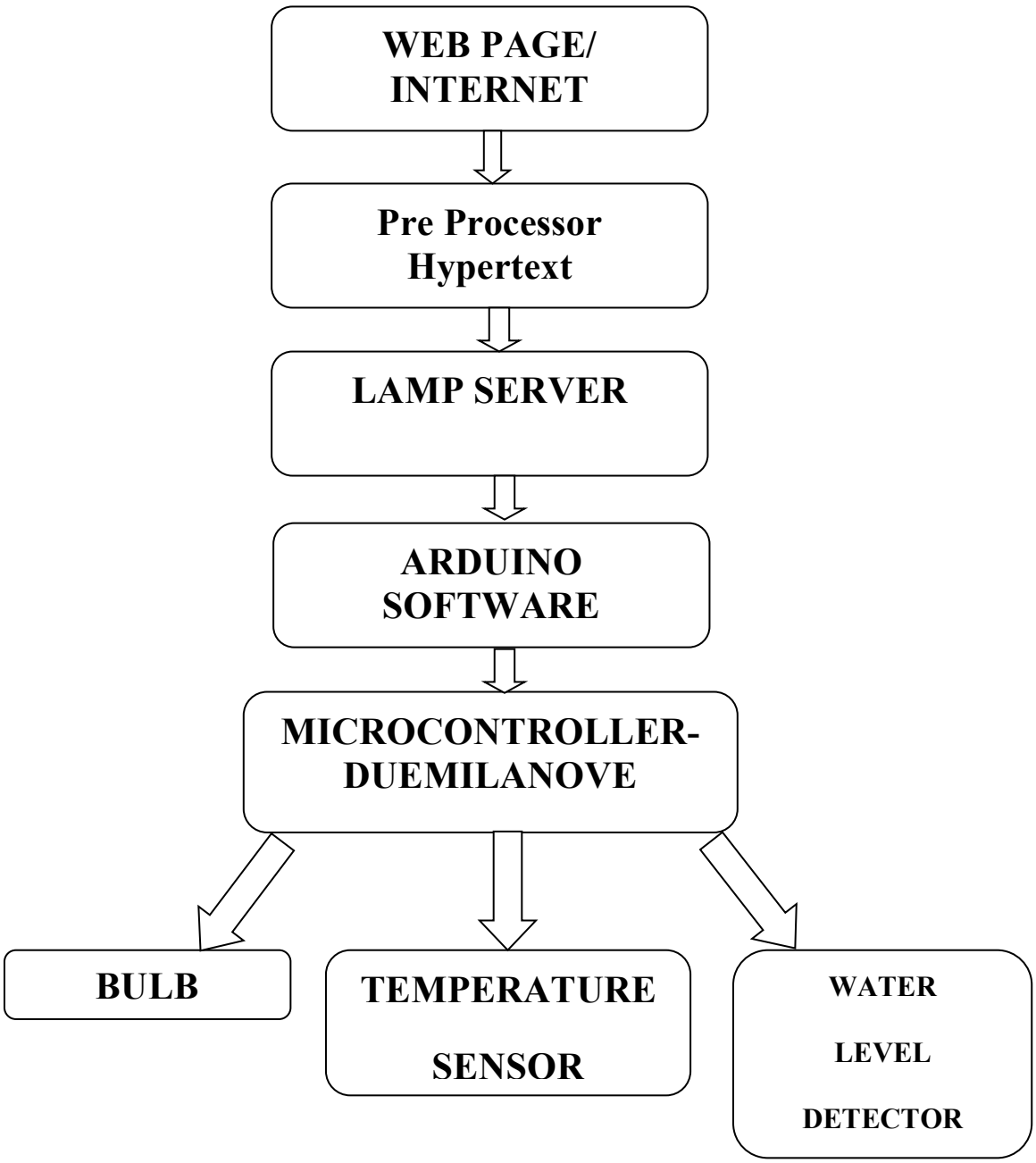
Arduino microcontroller receives the message and reads the analog voltage on pin number A1 on which the temperature sensor is connected

Arduino microcontroller then writes the temperature value on the serial port

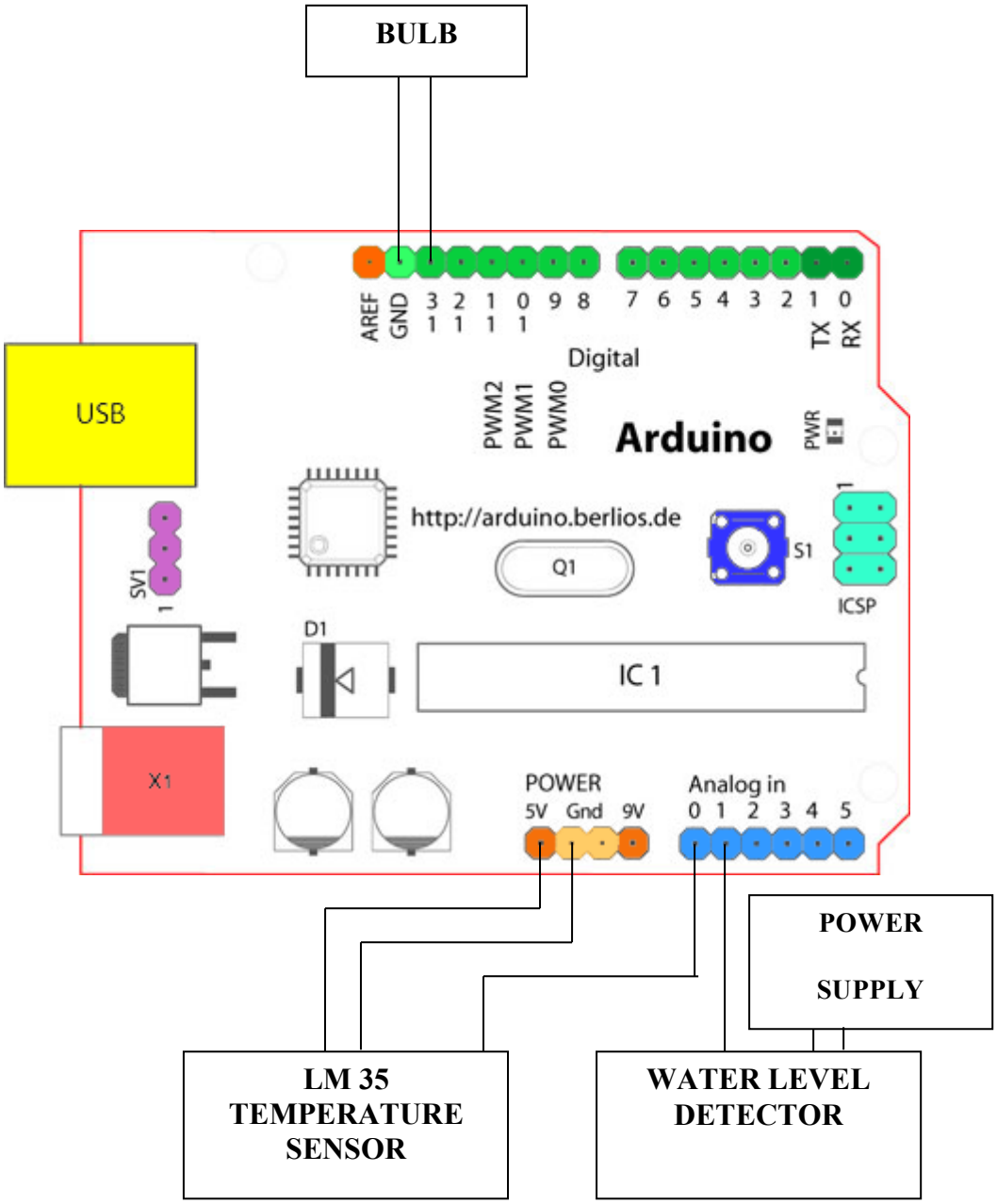
Bash Script reads the value on the serial port on stores it in the notepad text file

The stored value is then displayed on the webpage using Ajax

4.4 Flowchart



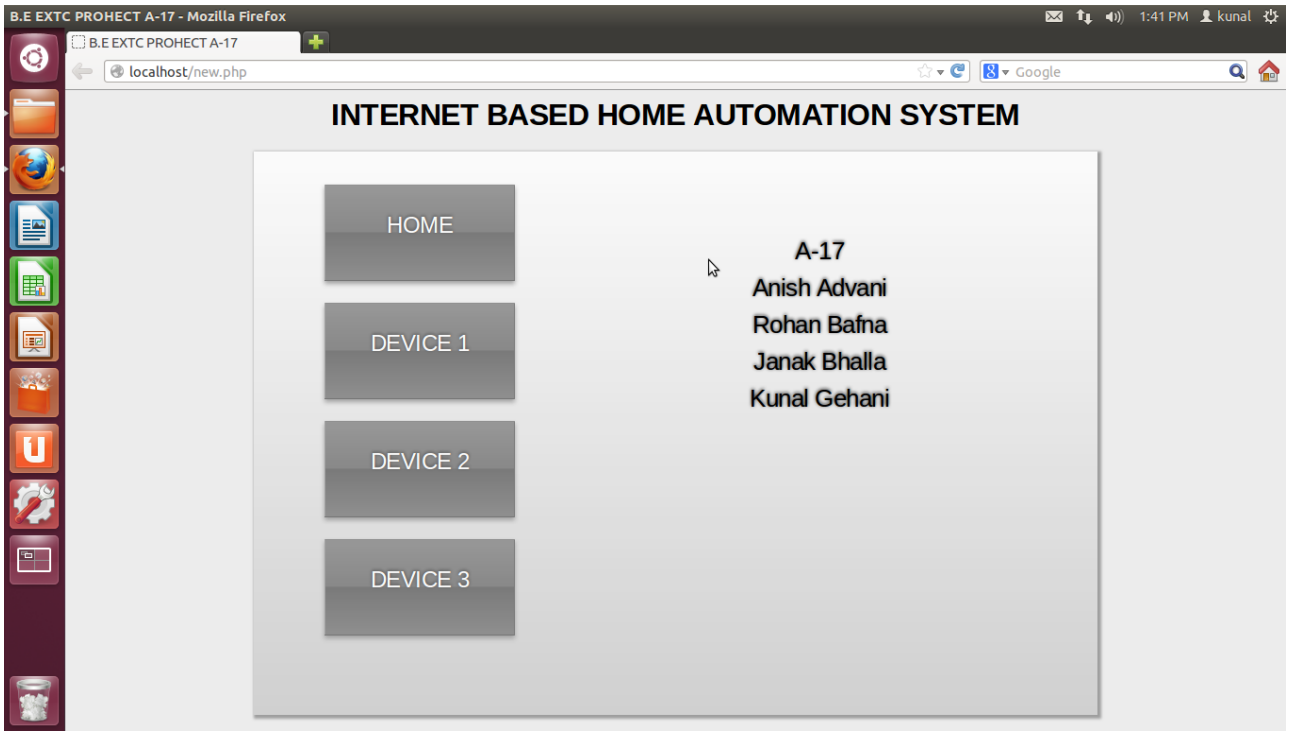
4.5 Pin Diagram



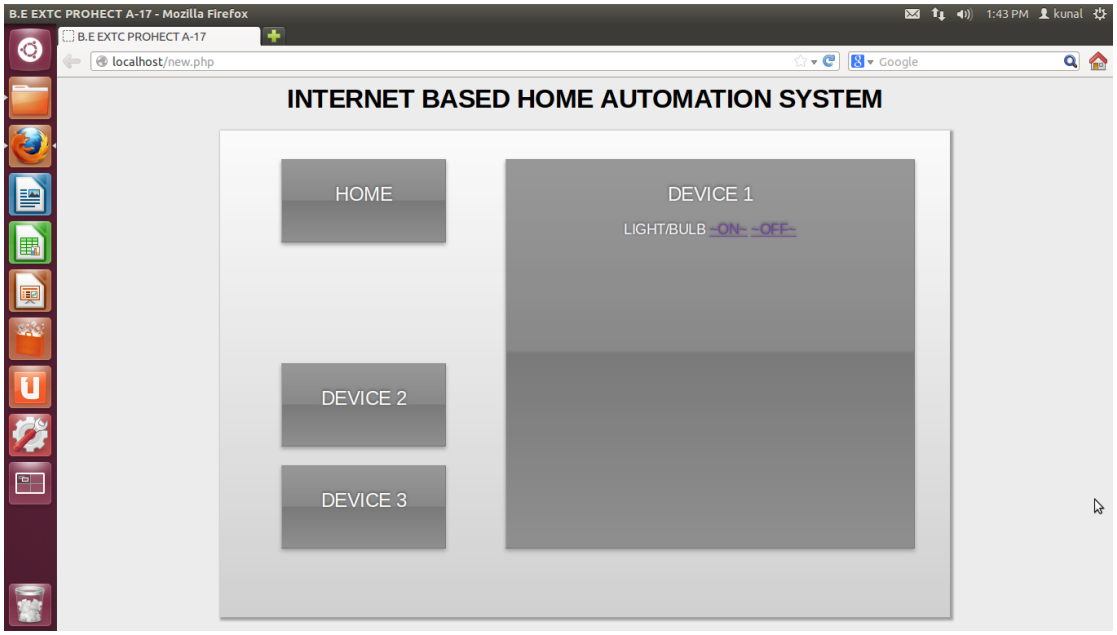
5 RESULT AND ANALYSIS

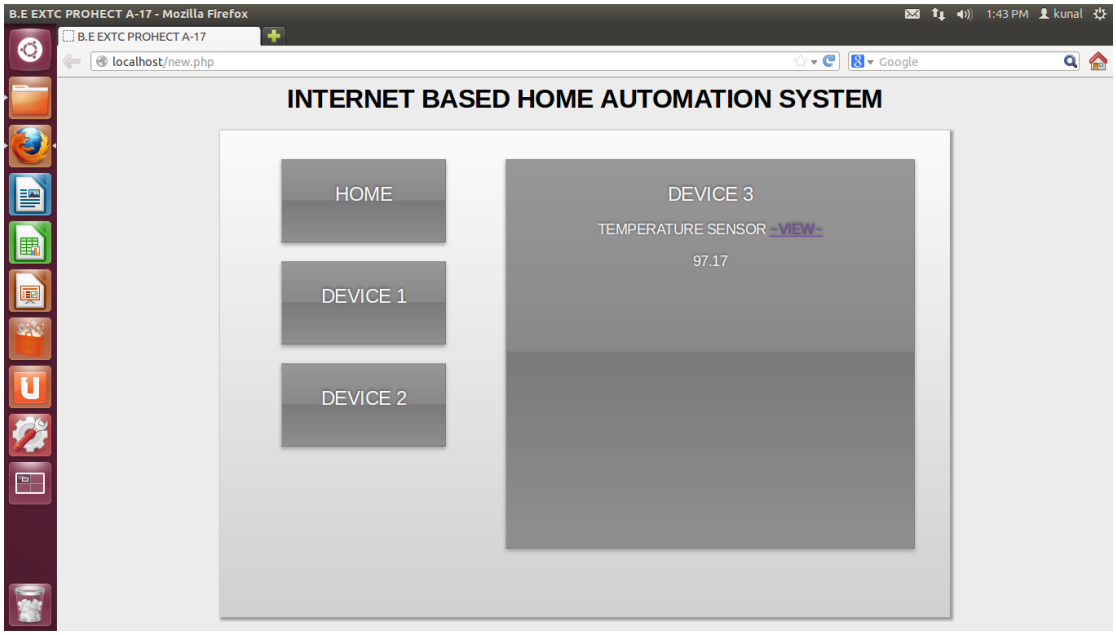
1) Snapshot of webpage

Used as GUI for the user to send instructions



2) Snapshots of devices page





6 CONCLUSION

Home automation is the control for any or all-electrical devices at home or in office either remotely or more efficiently. It is one of the most exciting developments in technology for the home that has come along the decades. Current development in the field of Home Automation has made possible, control of several devices using voice command, Remote control or artificial Intelligence.

This project has the objective of establishing a communication link between a remote computer terminal and a computer at a target location and thus controlling various devices via data communication. The remote computer gives the user a great degree of freedom by managing the appliances at home.

Broadband internet access is the basis of this project. A dedicated connection is essential as it is secure, faster and most importantly is always connected.

Home automation can be used to control devices/systems like:

Security

Lights and similar appliances

Heating and cooling

Entry systems

Garage doors

Our project consists of various devices connected to a microcontroller which co-ordinates with the lamp server. The webpage acts as a user interface which is set up

on the lamp server and allows user to input commands. The lamp server and PHP act as a communication link between the webpage and microcontroller and processes and exchanges data.

The project involves developing circuits that allows us to:

Switch ON/OFF consumer devices like bulb, fan

Read temperature values

Read water level values

The software component of the project involves using languages html, ajax, jquery and css for designing webpage (Graphical user interface) and for regulating data transfer via serial port of the lamp server computer.

Hence we have been able to establish a connection and interact with the appliances at home.

7 REFERENCES

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INTERNET BASED HOME AUTOMATION SYSTEM

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Abstract

Have you ever walked into an empty house where the temperature was at a comfortable level, your dinner was hot and waiting for you, and the TV was on your favourite channel? If this feels like a homely welcome to you then you probably know that this dream is expensive and unrealistic for the common middle class. Currently available technology allows this to be done with timers and/or expensive computers with messy cable connections. This is currently done on a very limited basis, for the rich and disabled. We would like to present our scope on home automation, which is cheaper, wireless and convenient to use. The aim of home automation is to control home devices from a central control point. In this paper, we present the design and implementation of a low cost but yet flexible and secure Internet based home automation system.The communication between the devices is wireless. The protocol between the units in the design is enhanced to be suitable for most of the appliances. The system is designed to be low cost and flexible with the increasing variety of devices to be controlled.

INTRODUCTION

An automation system is a precisely planned change in a physical or administrative task utilizing a new process, method, or machine that increases productivity, quality, and profit while providing methodological control and analysis. The value of system automation is in its ability to improve efficiency; reduce wasted resources associated with rejects or errors increase consistency, quality, and customer satisfaction; and maximize profit. Today's automation systems are a direct result of such early process engineering. Businesses across a broad spectrum of industries can realize benefits from implementing an automation system.

Automation is today's fact, where things are being controlled automatically, usually the basic tasks of turning on/off certain devices and beyond, either remotely or in close proximity. Automation lowers the human judgment to the lowest degree possible but does not completely eliminate it. The concept of remote management of household devices over the internet from anywhere, any time in the world today can be a reality.

An internet based home automation system focuses on controlling home electronic devices whether you are inside or outside your home. Home automation gives an individual the ability to remotely or automatically control things around the home. A home appliance is a device or instrument designed to perform a specific function, especially an electrical device, such as a refrigerator, for household use.

OBJECTIVE

The major objective of this project is to design a flexible internet based wireless home automation system for controlling home appliances.

PRINCIPLE

The system will be modeled with three different units

- Ubuntu Server
- Arduino Microcontroller and Devices
- Webpage

A webpage will be setup to run on Ubuntu lamp server. The webpage will act as a user interface to send instructions to the microcontroller. The Ubuntu lamp server will

process the instructions and send the corresponding instructions on to the serial port. The microcontroller connected on the serial port receives these commands and carries out further operations with the devices. In case of write operation (bulb) the arduino sets the corresponding pin on which the bulb is connected high or low depending on the received instructions. In case of read operation (temperature sensor and water level detector) the arduino reads the corresponding pin on which the device is connected and sends the information on to the serial port. The bash script reads the value from the serial port and stores it in the notepad file. The corresponding value is displayed on the webpage using PHP and AJAX.

IMPLEMENTATION

Bulb:-
For write operation
BULB ON:
User opens the webpage
User clicks on the link on the webpage
PHP sends value “1” on user click on to the serial port
Arduino microcontroller receives the message and sets high pin number 13 on which the bulb is connected
The bulb is switched on
BULB OFF:
User opens the webpage
User clicks on the link on the webpage
PHP sends value “0” on user click on to the serial port
Arduino microcontroller receives the message and sets LOW pin number 13 on which the bulb is connected
The bulb is switched off

Temperature Sensor:-
For read operation
User opens the webpage
User clicks on the link on the webpage
PHP sends value “2” on user click on to the serial port
Arduino microcontroller receives the message and reads the analog voltage on pin number A0 on which the temperature sensor is connected
Arduino microcontroller then writes the temperature value on the serial port
Bash Script reads the value on the serial port on stores it in the notepad text file
The stored value is then displayed on the webpage using Ajax

Water Level Detector:-
For read operation
User opens the webpage
User clicks on the link on the webpage
PHP sends value “3” on user click on to the serial port
Arduino microcontroller receives the message and reads the analog voltage on pin number A1 on which the temperature sensor is connected
Arduino microcontroller then writes the temperature value on the serial port
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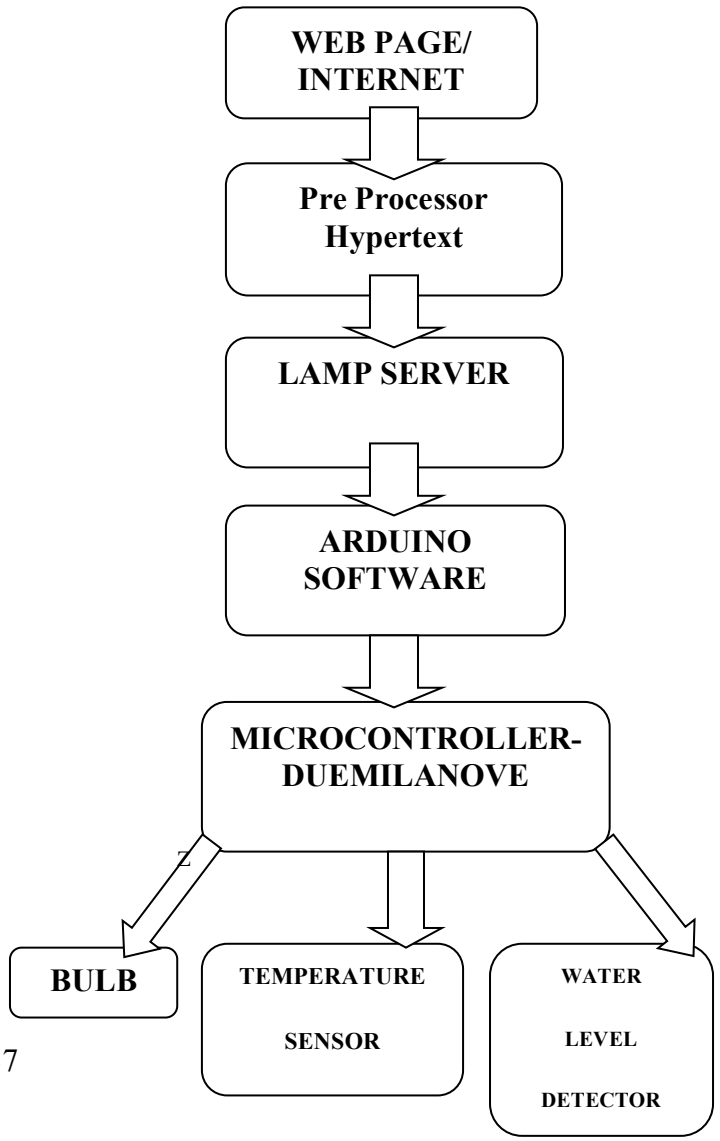
The stored value is then displayed on the webpage using Ajax

FLOWCHART



CONCLUSION

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This project has the objective of establishing a communication link between a remote computer terminal and a computer at a target location and thus controlling various devices via data communication. The remote computer gives the user a great degree of freedom by managing the appliances at home.

Broadband internet access is the basis of this project. A dedicated connection is essential as it is secure, faster and most importantly is always connected.

Home automation can be used to control devices/systems like:

- Security
- Lights and similar appliances
- Heating and cooling
- Entry systems
- Garage doors

Our project consists of various devices connected to a microcontroller which co-ordinates with the lamp server. The webpage acts as a user interface which is set up on the lamp server and allows user to input commands. The lamp server and PHP acts as a communication link between the webpage and microcontroller and processes and exchanges data.

The project involves developing circuits that allows us to:

- Switch ON/OFF consumer devices like bulb, fan
- Read temperature values
- Read water level values

The software component of the project involves using languages html, ajax, jquery and css for designing webpage (Graphical user interface) and for regulating data transfer via serial port of the lamp server computer. Hence we have been able to establish a connection and interact with the appliances at home.

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