VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Jnana Sangama, Belagavi - 590018

A Mini Project Report on

"ARCHITECTURAL MODEL OF A BUS STOP WITH AUTOMATIC SUNSHADE"

Submitted in partial fulfilment of the requirement for the award of the degree of

BACHELOR OF ENGINEERING

In

ELECTRONICS & COMMUNICATION ENGINEERING

By

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MITE

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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CERTIFICATE

Certified that the mini project work entitled **"ARCHITECTURAL MODEL OF A BUS STOP WITH AUTOMATIC SUNSHADE"** carried out by **Mr. PRAJWAL (USN: 4MT19EC060), Mr. DARSHAN D KAMTH (USN: 4MT19EC019), Ms. BHOOMIKA M (USN: 4MT19EC016) and Ms. DEEKSHA (USN: 4MT19EC020),** the bonafide students of **Mangalore Institute of Technology & Engineering** in partial fulfilment for the award of **Bachelor of Engineering** in **Electronics & Communication Engineering** of the **Visvesvaraya Technological University, Belagavi**, during the year **2021-22**. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The Mini Project report has been approved as it satisfies the academic requirements in respect of Mini Project Work prescribed for the said Degree.

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Name of the Examiners	**Signature with Date**
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DECLARATION

We, **Mr. PRAJWAL** (USN: 4MT19EC060), **Mr. DARSHAN D KAMATH** (USN: 4MT19EC019), **Ms. BHOOMIKA M** (USN: 4MT19EC016) and **Ms. DEEKSHA** (USN:4MT19EC020) students of 6th semester BE in **Electronics & Communication Engineering, Mangalore Institute of Technology & Engineering, Moodabidri,** hereby declare that the MiniProject work entitled **""ARCHITECTURAL MODEL OF A BUS STOP WITH AUTOMATIC SUNSHADE"**, submitted to the **Visvesvaraya Technological University, Belagavi** during the academic year 2021-22, is a record of an original work done by us under the guidance of **Mr. Ranjith H D,** Senior Assistant Professor, **Department of Electronics & Communication Engineering, Mangalore Institute of Technology & Engineering Moodabidri**. This Mini Project work is submitted in partial fulfilment of the requirements for the award of the degree of Bachelor of Engineering in Electronics & Communication Engineering. The results embodied in this report have not been submitted to any other University or Institute for the award of any degree.

Date:

Place: Moodabidri

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ABSTRACT

Automated system being an integral part of the current era, an automated sunshade is the new application. The aim of the Mini-Project is to build the automated sunshade for Bus Stop that will detect the shade and adjust accordingly. The ever-increasing population has increased the use of public transport and Bus stand plays a vital role in public transport. Bus stops need to be well equipped and proper lighting facility for night. By automating this system smooth functioning can be possible. And it is time saving, smart and economical system**.**

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Chapter 1

INTRODUCTION

The Introduction explains the overview and structure of report for Architectural Model of Bus Stop with Automatic Sunshade.

1.1 OVERVIEW

In this system photo diode detect the direction of sun and transfer the information to Arduino. As this is an architectural model the size is small, so SG-90 micro servo motor is used. External power source is connected if necessary. A proper mechanism is to be found for contracting and expanding the sun shade.

1.2 Structure of Report

Chapter 1: Deals with introduction.

Chapter 2: Describes the literature survey done on the concerned topic.

Chapter 3: Describes the proposed system.

Chapter 4: Includes the hardware and software requirements and its brief explanation.

Chapter 5: Explains the design methodology followed.

Chapter 6: The chapter includes System implementation.

Chapter 7: The chapter includes results and discussions.

Chapter 8: The chapter concludes and describes the future enhancement of the proposed Work.

Chapter 2

LITERATURE SURVEY

The literature survey is a systematic method for identifying, evaluating and interpreting the work produced by the researchers, scholars and practitioners. The literature survey which was studied to build this project helped in understanding the nuances and techniques involved. The literature survey helped in understanding the commercial applications of this project.

2.1 Literature Review

W Setya et al.,[1] designed and developed "The Measurement of Measuring Light Resistanceusing Light Dependent Resistance (LDR) Sensors". Light Dependent Resistance (LDR) is one type of resistor whose resistance value is affected by the intensity of light received by it. This study aimsto measure the amount of resistance in each colour of light measured in the LDR. The variation in distance between the lamp and LDR causes greater resistance.
The results of this study indicate that

1) the distance of the light source is inversely proportional to the intensity of light,

2) The distance of the light source is directly proportional to the magnitude of resistance,

3) The intensity of light is inversely proportional to resistance, and

4) the dominant large resistance value is in the dominant blue light the value of large light intensity is in the colour of yellow lights.

Alaa Hoor et al.,[2] in his project titled "The Rain Warning System" focusing mainlyon the Rain Sensor. Sensors can be used in both everyday life and by manufacturing. The ultimate goal of this project is to detect the rain using a Rain Sensors. Rain sensor is switching circuit activated by the rain fall. There are different type of rain sensor classifiedbased on their working. They are

1) Resistive rain sensor

2) Capacitive Rain Sensor

3) Mechanical Rain Sensor

4) Optical Rain Sensor

Guido di Pasquo et al.,[3] had published the paper on "Servo SG90 Characterization". The SG90 is a light weight, low-cost hobby servo. It is controlled by Pulse Width Modulation (PWM),with a duty cycle of 600µs to 2400µs (measured), and a total period of 20ms (50Hz). This paper investigates the transient and steady state response of a SG90 Servo and two methods to measure the angle of its shaft using an Inertial Measurement Unit (IMU). It will also show its transfer function and some instabilities and accuracy problems found during testing. It also analyzes the response obtained using the IMU as a feedback sensor for a closed loop system.

2.2 Motivation

People nowadays are more suspected to the diseases which are caused from sun rays, dust, rain, fog like dust allergies, skin allergies, fever, eye itching, dizziness etc. Considering all these issues this project is done. Since most of the people access bus a Bus Stand must be comfortable, safe and well equipped for the passengers to wait.

2.3 Need (Scope) of Project

The aim of this project is to keep the sun from reaching the interior and help to reduce the temperature inside the bus stop. It can be possible by measuring a deviation ofsun ray and a tracking device, and by that adjust the position of the sunshield and adjust a sun shading angle of the sunshield according to the sun ray.

2.4 Problem Statement

Automated system being an integral part of the current era, an automated sunshade is the new application. Since the population is increasing day by day the use of public transport and bus plays very important role. Bus stop is the only shelter they get while waiting for the bus. When the people stand in the bus stop they face direct rays from the sun or the rain may fall upon them when the wind breezes in the particular direction. During rainy season the people become wet and during the summer, they might feel sweaty and dizziness. Due to these issues, the Automated Sunshade System plays a vital role. The Automated Sunshade System automatically detects the sunshade or rain through the sensors and adjust accordingly.

Chapter 3

MICROCONTOLLER & INTEGRATED DEVELOPMENT ENVIRONMENT

Microcontroller and Integrated Development Environment has been explained briefly in this chapter. Here it contains features and applications of Microcontroller and IDE.

3.1 Microcontroller

The ATmega328 is one kind of single-chip microcontroller formed with Atmel within the megaAVR family. The architecture of this Arduino Uno is a customized Harvard architecture with 8 bit RISC processor core. Other boards of Arduino Uno include Arduino Pro Mini, Arduino Nano, Arduino Due, Arduino Mega, and Arduino Leonardo.

3.2 Features

The operating voltage is 5V
The recommended input voltage will range from 7v to 12V.
The input voltage ranges from 6v to 20V.
Digital input/output pins are 14.
Analog input pins are 6.
DC Current for each input/output pin is 40 mA.
DC Current for 3.3V Pin is 50 mA.
Flash Memory is 32 KB.
SRAM is 2 KB.
CLK Speed is 16 MHz.

3.3 High Voltage Protection of USB

The Arduino Uno board has a rearrangeable poly fuse that defends the USB port of the PC fromthe over-voltage. Though most of the PCs have their own inner protection, the fuse gives an additional coating of safety. If above 500mA is given to the USB port, then the fuse will routinely crack the connection until the over-voltage is removed.

3.4 Physical Characteristics

The physical characteristics of an Arduino board mainly include length and width. The printed circuit board of the Arduino Uno length and width are 2.7 X 2.1 inches, but the powerjack and the USB connector will extend beyond the previous measurement. The board can be attached on the surface otherwise case with the screw holes.

3.5 Applications

Arduino Uno is used in Do-it-Yourself projects prototyping.
In developing projects based on code-based control.
Development of Automation System.
Designing of basic circuit designs.

3.6 Integrated Development Environment

An integrated development environment (IDE) is a software suite that consolidates basic tools required to write and test software. Developers use numerous tools throughout software code creation, building and testing. Development tools often include text editors, code libraries, compilers and test platforms. Without an IDE, a developer must select, deploy, integrate and manage all of these tools separately.

An IDE brings many of those development-related tools together as a single framework, application or service. The integrated toolset is designed to simplify software development and can identify and minimize coding mistakes and typos. Some IDEs are open source, while others are commercial offerings. An IDE can be a standalone application or it can be part of a larger package.

3.7 Common Features of Integrated Development Environments

An IDE typically contains a code editor, a compiler or interpreter, and a debugger, accessed through a single graphical user interface (GUI). The user writes and edits source code in the code editor. The compiler translates the source code into a readable language.

That is executable for a computer. And the debugger tests the software to solve any issues or bugs. An IDE can also contain features such as programmable editors, object and data modeling, unit testing, a source code library and build automation tools. An IDE's toolbar looks much like a word processor's toolbar. The toolbar facilitates color-based organization, source-code formatting, error diagnostics and reporting, and intelligent code completion. Through an IDE's interface, a developer or team of developers can compile and executecode incrementally and manage changes to source code in a uniform manner. IDEs are typically designed to integrate with third-party version control libraries, such as GitHub and Apache's Subversion.

An IDE can support model-driven development (MDD). A developer working with an IDE starts with a model, which the IDE translates into suitable code. The IDE then debugs and tests themodel-driven code, with a high level of automation. Once the build is successful and properly tested,it can be deployed for further testing through the IDE or other tools outside of the IDE.

3.8 Benefits of using IDEs

An IDE can improve the productivity of software developers thanks to fast setup and standardization across tools. Without an IDE, developers spend time deciding what tools to use for various tasks, configuring the tools and learning how to use them. Many or even all of the necessary dev-test tools are included in one integrated development environment. IDEs are also designed with all their tools under one user interface. An IDE can standardize the development process by organizing the necessary features for software development in the UI. There are three main categories where IDE makes more understandable for the user:

3.3.1 Increased Efficiency

3.3.2 Collaboration with programmers

3.3.3 Project Management using program resources

3.9 Advantages

IDE's can be used to create software applications, drivers and utilities.

It allows developing software in any programming language without spending much time on language syntax.

IDE has the ability to correct syntaxes, gives a warning about memory leaks, assist in writing quality of code, etc.

It has increased efficiency, where you can code faster with less effort, and its features helporganise resources, prevent mistakes, and provide shortcuts.

It supports collaboration, in which a group of programmers can easily work together withinan IDE.

It provides program resources that are easy.

When creating applications, IDE manages resources such as library files, header files, etc.,at specified locations.

This includes pre-installed libraries for a specific programming language.That makes development easier by using syntax highlight features.

It makes the creation of database applications easily.

They provide services to sort, search, retrieve and process data in the database.

IDE's can able to translate code from high-level languages to the object code of the targetedplatform at the compile or build stage.

It helps to keep track of the code, generates code and allows searching.

Chapter 4

HARDWARE/SOFTWARE DESCRIPTION

This explains about Hardware and Software where Software is set of instruction that can be stored and run by Hardware.

4.1 Arduino uno:

The **Arduino Uno** is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The board is equipped with sets of digital and Analog input/output(I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 Analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. The central unit of the system is Arduino board, where all the components are interfaced externally on the board and programmed as per their functionality to work in synchronization.

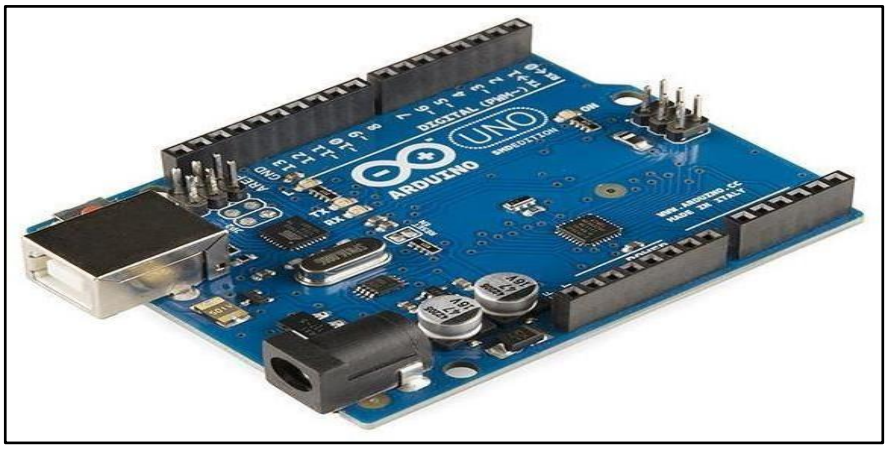

Figure 4.1: Arduino uno.

It's an electronic prototyping platform/ board supported Atmega 328 which is of 8-bit, 16 Mhz. It operates at 5v. every pin contains a specific function to control. The storage is nonvolatile storage and EEPROM. The key comparison of a non-volatile storage with the EEPROM is that the incontrovertible fact that non-volatile storage contents are erasable. In contrast to EEPROM, the entire device is erased. where one can erase and judge on bases of Byte and section. The availability of the non-volatile memory during which the blocks of the contains are divided and therefore block by block the portion is erased, where an no erased option is provided for the EEPROM byte. BIOSROM of the PCB is the new upgrade which is immensely used..

- **VIN**: The input voltage to the Arduino board when it is using an external power source. You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V**: This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage the board.
- **3.3v**: A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **GND**: Ground pins.
- **IOREF**: This pin on the Arduino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source, or enable voltage translators on the outputs to work with the 5V or 3.3V.
- **Reset**: Typically used to add a reset button to shields that block the one on the board.

4.2 Rain Sensors

A rain sensor is one kind of switching device which is used to detect the rainfall. It works like a switch and the working principle of this sensor is, whenever there is rain, the switch will be normally closed. The rain sensor module/board is shown below. Basically, this board includes nickel coated lines and it works on the resistance principle. This sensor module permits to gauge moisture through analog output pins & it gives a digital output while moisture threshold surpasses.

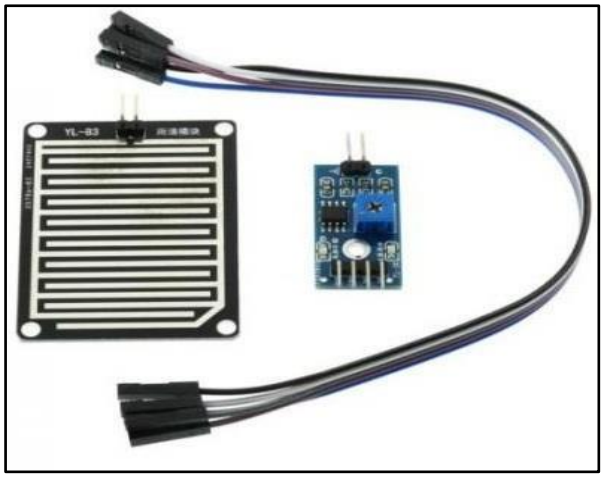

Figure 4.2: Rain Sensors

This module is similar to the LM393 IC because it includes the electronic module as well as a PCB.

Here PCB is used to collect the raindrops. When the rain falls on the board, then it createsa parallel resistance path to calculate through the operational amplifier. This sensor is a resistive dipole, and based on the moisture only it shows the resistance. For example, it shows more resistance when it is dry and shows less resistance when it is wet.

4.3 Light Dependent Resistors

A photoresistor or light dependent resistor is an electronic component that is sensitive to light. When light falls upon it, then the resistance changes. Values of the resistance of the LDR may change over many orders of magnitude the value of the resistance falling as the level of light increases. It is not uncommon for the values of resistance of an LDR or photoresistor to be several megohms in darkness and then to fall to a few hundred ohms in bright light. With such a wide variation in resistance, LDRs are easy to use and there are many LDR circuits available. The sensitivity of light dependent resistors or photoresistors also varies with the wavelength of the incident light. LDRs are made from semiconductor materials to enable them to have their light sensitive properties. Many materials can be used, but one popular material for these photoresistors is cadmium sulphide, CdS, although the use of these cells is now restricted in Europe because of environmental issues with the use of cadmium.

Figure 4.3(a): Typical leaded LDR

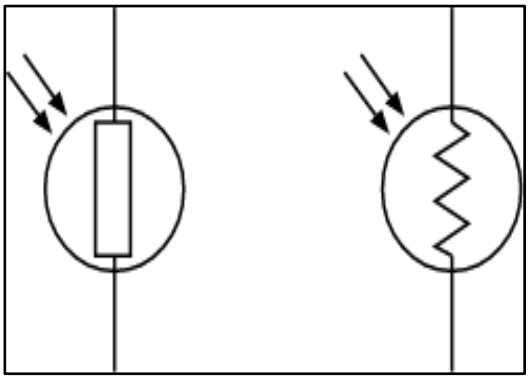

Figure 4.3(b): Circuit Symbol

Similarly other cadmium based semiconductor materials like cadmium CdSe are also restricted. Other materials that can be used include lead sulphide, PbS and indium antimonide, InSb. Although a semiconductor material is used for these photoresistors, they

are purely passive devices because they do not possess a PN junction, and this separates them from other photodetectors like photodiodes and phototransistors.

4.4 SG90 Servo Motor

Micro Servo Motor SG90 is a tiny and lightweight server motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standardkinds but smaller. You can use any servo code, hardware or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with a 3 horns(arms) and hardware.

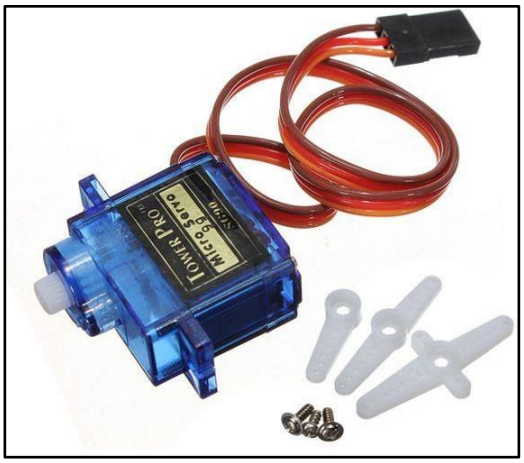

Figure 4.4: SG90 Servo Motor

4.5 Resistors

Resistor is defined as a passive electrical component with two terminals that are used for either limiting or regulating the flow of electric current in electrical circuits.

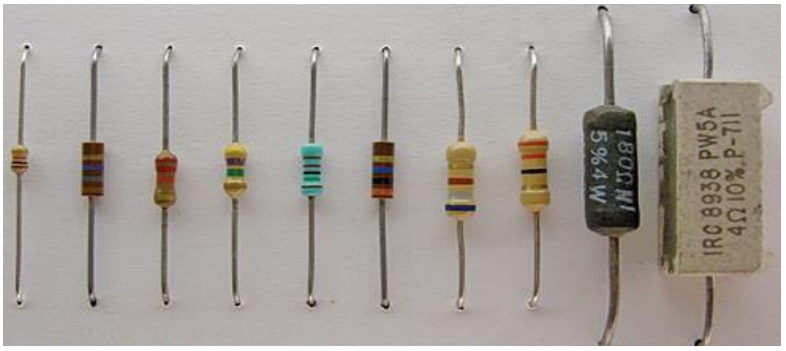

Figure 4.5: Resistors

The main purposeof resistor is to reduce the current flow and to lower the voltage in any

particular portion of the circuit. It is made of copper wires which are coiled around a ceramic rod and the outer partof the resistor is coated with an insulating paint. The SI unit of resistor is Ohm.

4.6 Arduino IDE

Arduino Uno can detect the surroundings from the input. Here the input is a variety of sensors and these can affect its surroundings through controlling motors, lights, other actuators, etc. The ATmega328 microcontroller on the Arduino board can be programmed with the help of an Arduino programming language and the IDE (Integrated Development Environment). **Arduino projects** can communicate by software while running on a PC.

Figure 4.6: Arduino IDE

Once the Arduino IDE tool is installed in the PC, attach the Arduino board to the computerwith the help of USB cable. Open the Arduino IDE & select the right board by choosing Tools–>Board>Arduino Uno, and select the right Port by choosing Tools–>Port. This board can be programmed with the help of an Arduino programming language depends on Wiring.

To activate the Arduino board & flash the LED on the board, dump the program code with the selection of Files–> Examples>Basics>Flash. When the programming codes are dumped into the IDE, and then click the button ‘upload’ on the top bar. Once this process is completed, check the LED flash on the board.

Chapter 5

DESIGN AND IMPLEMENTATION

The methodology is also known as the collection of the method for the research,or the framework of the content for research, a logical scheme based on views, beliefs andvalues that guides the choices of researchers to get a valid conclusion.

5.1 Block Diagram

Two photoresistors are used to calculate the position of the sun as well as to turn on the busstop lighting and street lights. In morning sunlight falls on the east photoresistor and sends signal to the resistor and in the evening sunlight falls on west photoresistor and the same process will be repeated. A rain sensor is added so that the sunshade expands completely when it rains. It detects that comes short circuiting the tape of the printed circuits.The figure 5.1 shows the functional block diagram.

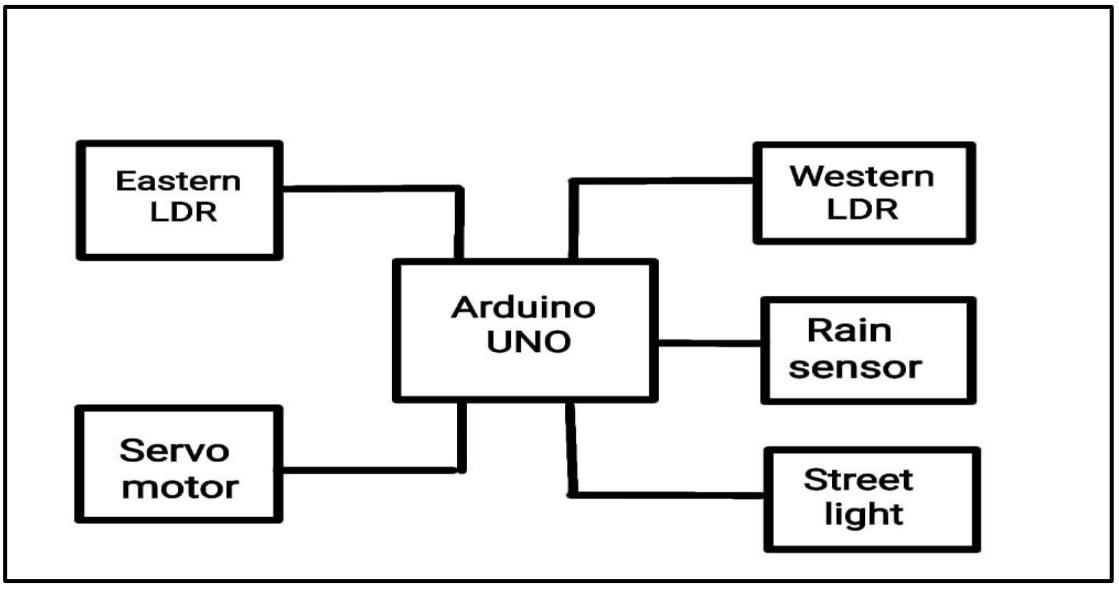

Figure 5.1: Functional Block Diagram.

The sensors acts as a variable resistancethat will change status. The resistance increases when the sensor is wet and the resistance is lower when the sensor is dry. All the components are mounted on a bread board. Arduino is programmedsuch that it receives signal from LDR. Rain sensor and send the output signal. The sunshade will be controlled by a servo motor. Sunshade will contract/expand the sunshade according to the positionof the sun.

5.2 Flow Chart

Flowchart in a logical sequence, or structure is a graphical representation of a productionprocess. The purpose of a flow chart of the process of working with a project or a common language or reference point is provided.

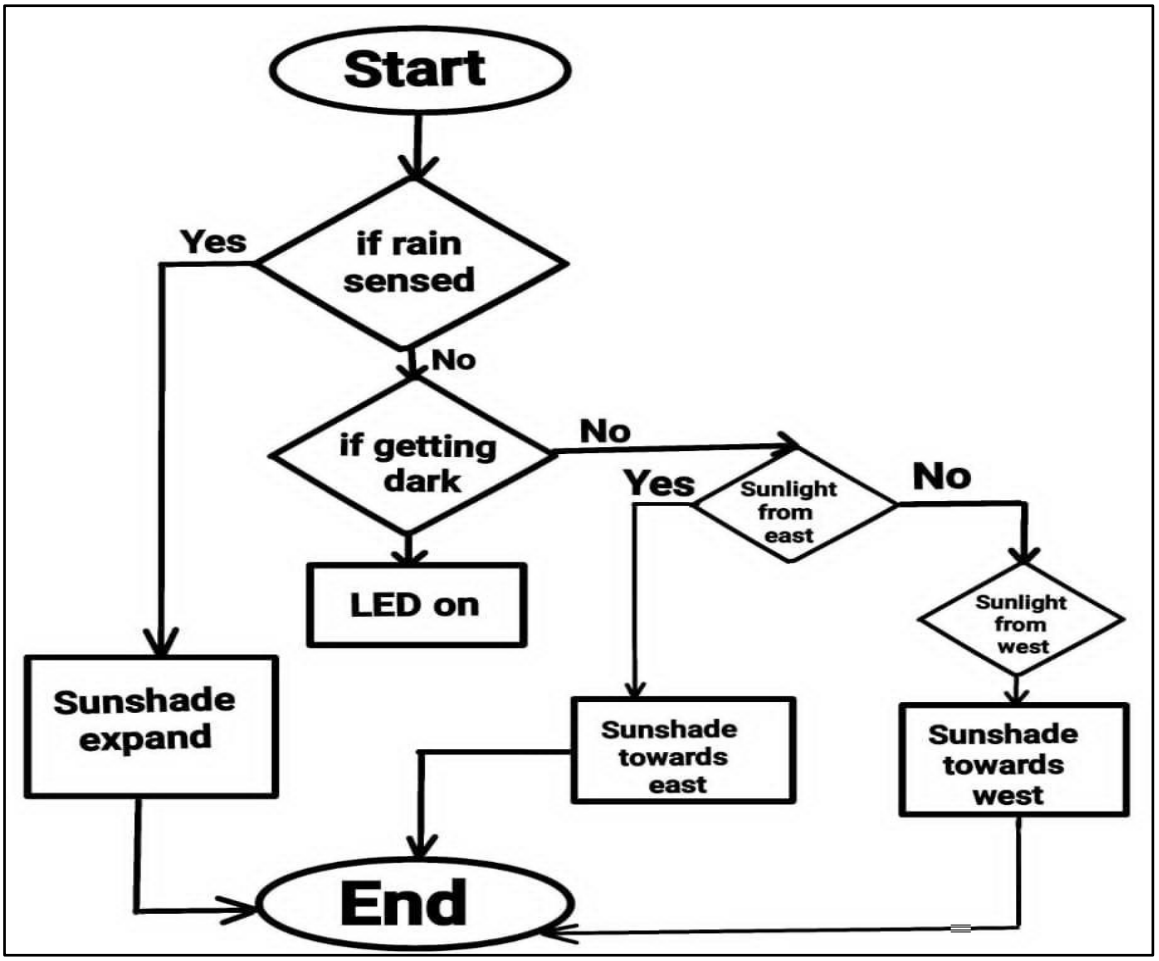

Figure 5.2: Flowchart of Architectural Model of Bus Stop using Automated Sunshade.

Initially, START operation is to start the process of working in flowchart. Here rain sensor is used to detect the rain. If rain is detected then sunshade will expand else flow moves to sun light detection. Sun shade move to east or west depending on sunlight.

5.1 Circuit diagram

The figure 5.3 represents the circuit diagram of proposed system.

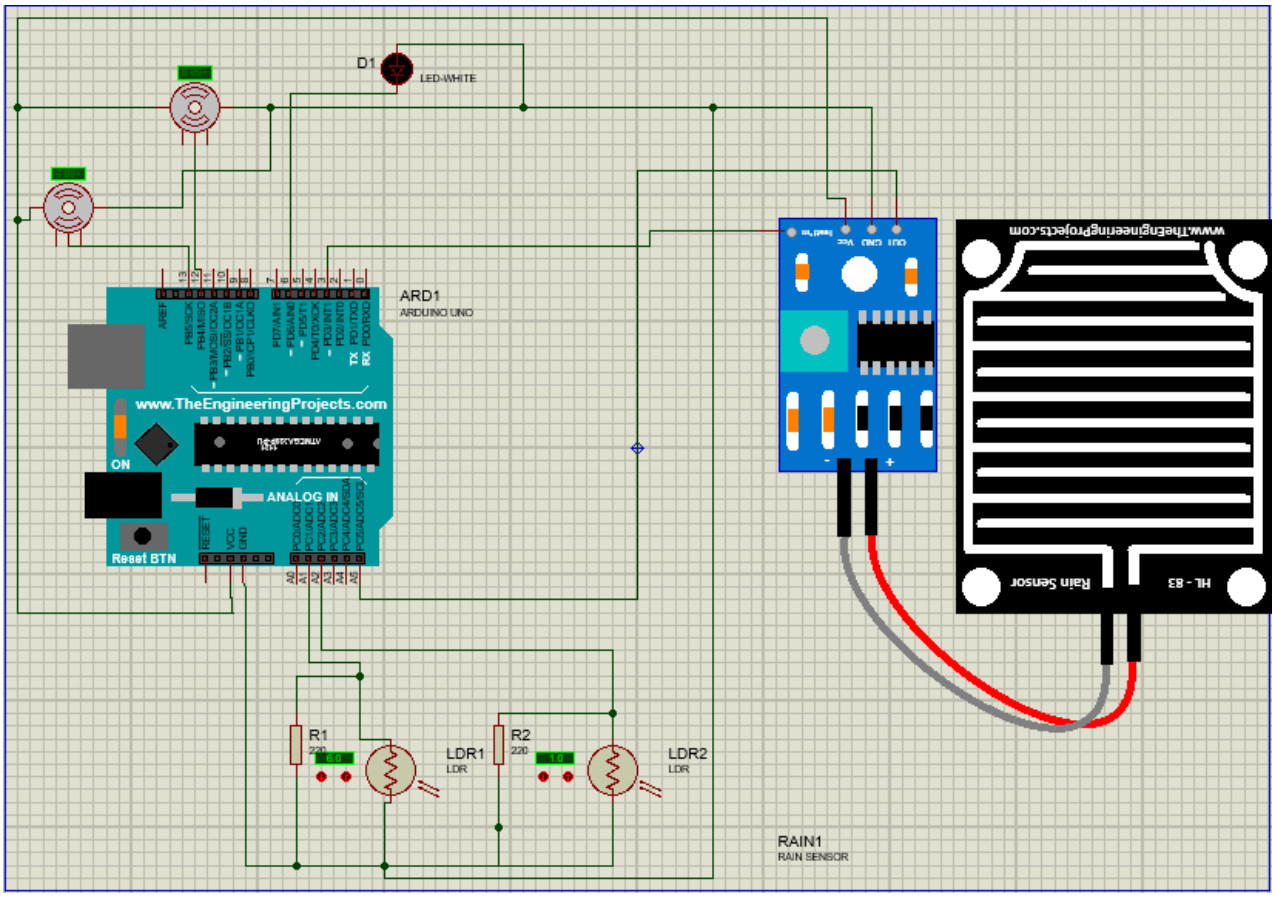

Figure 5.3: Circuit diagram of the proposed system.

This is the circuit for Architectural model of buss top with automatic sun shade. Rain sensor analog input is connected to A5 and digital is connected to pin 2. Two servo motors are connected to pin 12 and 13. And Vcc is connected to 5V of Arduino and GND is connected to GND pin of arduino East LDR is connected to A2 and west LDR is connected to A1 along with resistence. Interior Light is given to pin 8. The sensor has excellent sensitivity combined with the quick response time. This circuit triggers the alert based on intensity of light in console.

Chapter 6

EXPERIMENTAL RESULTS & DISCUSSIONS

The figure 6.1 shows the prototype of the proposed system. It consists of Arduino uno microcontroller which is the main part of the system. Two LDR and Rain Sensor which is mainly used to detect the sun rays and the rain.

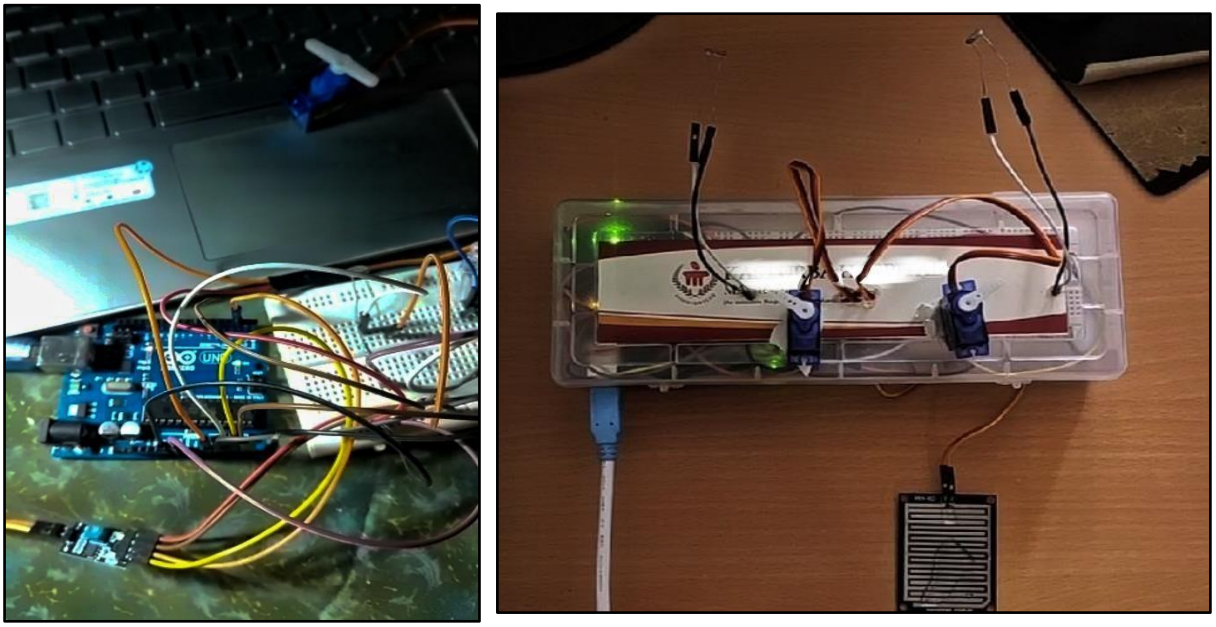

Figure 6.1: Prototype of the proposed system

The Resistances are used in this circuit which increases the resistance when the sensor is wet and the resistance is lower when the sensor is dry. Two SG90 Servo Motors are used which acts along when the light falls on the LDRs and helps to adjust the shade of the bus stop. LED are used in this circuit as a street light. All thesecomponents are mounted on a bread board.

6.1 Analysis

The figure 6.2 shows the output of the program. The output represents the presence of rain on the rain sensor and status of the LED. It also prints the intensity of Eastern light and Western light. It also prints the position of the Sunshade.

The figure 6.2 represents the snapshot of output.

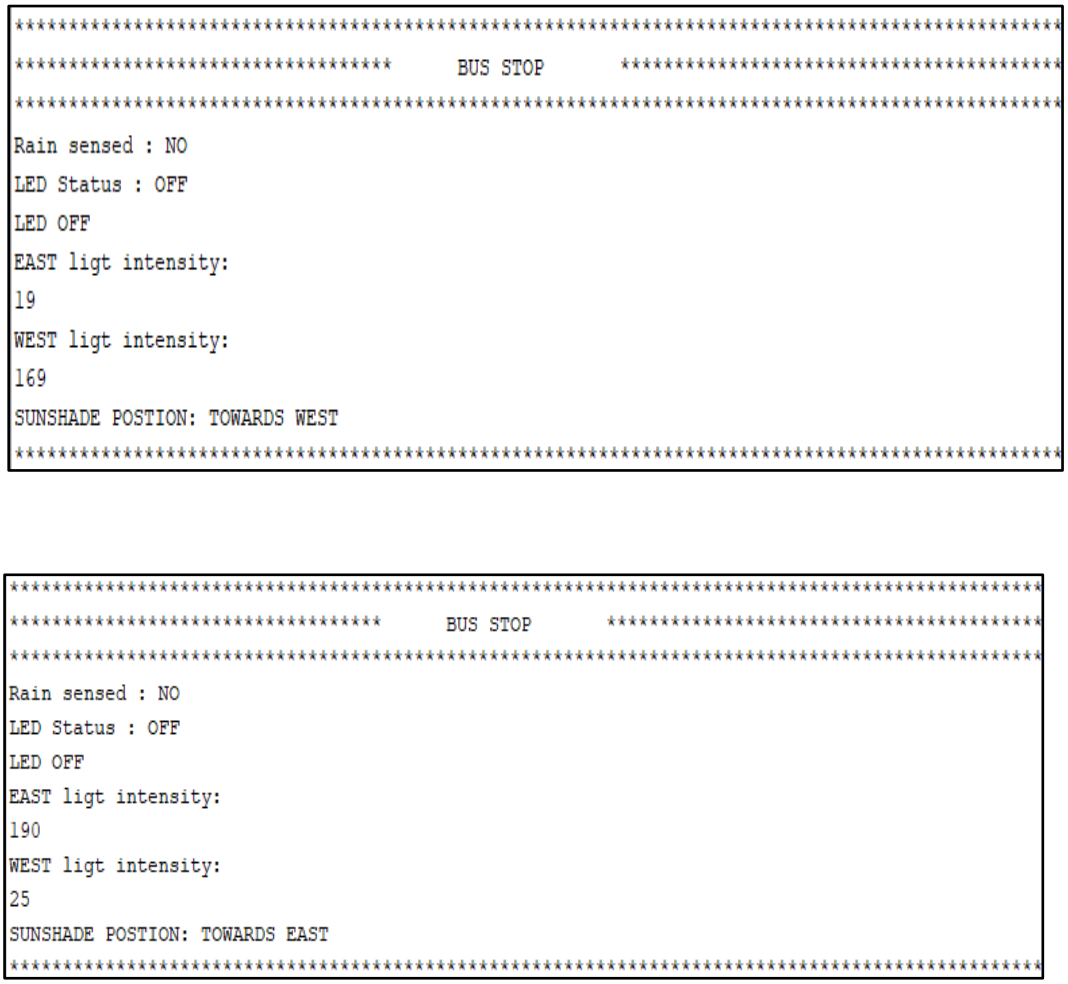

Figure 6.2: Snapshot of the output

6.2 Application

Bus stop plays a vital role in public transport. By using better facilities, we can improve public transport and encourage people to use public transport which will reduce the dependencies on fossil fuels. Safety plays a major role in today's world and it is necessary that good safety systemsare to be implemented in places of education and work. These should be designed in a way that to provide adequate protection from weather.

6.3 Advantages

These are some of the advantages

- Low cost.
- Low power consumption.
- High accuracy.
- The sensor has excellence sensitivity combine with a quick response of time
- Simple in construction
- Less construction time
- Modern approach

6.4 Disadvantages

- Continuous power supply will be required.
- Power full motors required
- Electricity requirement is high

Chapter 7

CONCLUSION

The prototype of architectural model of a bus stop with automatic sun shade can be efficiently designed. We have designed a model that contains of many sensors using Arduino such as rain sensor LDRs and also Sg servo Motor rain sensors and LDR sensor receives the proper Input and SG Servo Motor and street light gives the proper output based on the input provided. we learned many skills such as soldering wiring the circuit and other tools that we used for this project and was able to together as a team during this project. Thus, the architectural model of a bus stop with automatic sunshade system was successfully designed, implemented and tested

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7.1 Future Enhancement

It leaves us with the further scope of improvement. The inbuilt Arduino power which is notthat much sufferable, in future improvement, a bigger rechargeable battery can be used , which can sustain the module for a long period of time, with warning signal whenever battery runs out In further modification. in addition to this camera module can be included which will increase the safety. Entire system can be made to run through solar which will reduce electricity consumption. With further improvement in design the system can be made handier and more cost effective for theusers.

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