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# Op-amp Based Automatic Umbrella

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***Abstract***

*The objective of the dissertation is to develop a smarter cover that, due to its practicality and accessibility, may lessen the need for human labour. In today's civilization, which is exposed to wind and rain without adequate safeguards, this is vital. The objective of this investigation is to develop a commercial, residential cover that is very sensitive to situations involving the sun and the rain. Operating on the surface of wide areas is challenging due to the extreme temperature of the sun, especially in the high seasons of summer.*

**Keywords:** Processing App, IR Sensor, DC Motor, Rain, folding canopy

## INTRODUCTION

A retractable canopy (overhead roof) that is supported by metal or wooden ribs and typically set on a made of lumber metal, or silicone pole is known as an umbrella. It is designed to protect someone from both the elements. Most portable, lightweight umbrellas and parasols are designed for solitary use. The largest hand-portable umbrellas include golf tarps. Umbrellas can be divided into two main groups: There are in fact two different kinds of canopies: entirely collapsible parasols in which the metal pole holding the roof in place retracts, shrinking it to approximately the size of a handbag, and non-collapsible umbrellas, in which only the domed is capable of being lowered.

A folding canopy (overhead roof) supported by metal or wooden ribs is often held in place by a made of wood metal, and acrylic pole. It is intended to shield the wearer from the sun and the elements. The majority of portable hand-held umbrellas and parasols are designed for individual use. Golf parasol are the biggest hand-held parasols. There are two types of umbrellas: fully collapsing umbrellas, which mean that the metal pole holding the canopy retracts, allowing the umbrella to be folded up and placed in a handbag, and non-collapsible umbrellas, in which the support pole is unable to do so and the dome must be fully crushed.

Modern sensors in the Rain Sensing Motorised Umbrella can instantly identify the presence of rain. The motorised mechanism of the umbrella opens the canopy quickly and easily when raindrops are detected, protecting you from the elements. Say good to frantically looking for cover or battling a recalcitrant conventional umbrella. RainGuard makes sure you're ready for any unexpected downpour and keeps you dry and cosy.

In addition to its autonomous features, RainGuard has a slick and practical design. It is well-made and compact, making it easy to grip and move.. High-quality, waterproof supplies were used in the construction of the canopy, which ensures maximum protection from the rain without sacrificing endurance. To further improve your experience, RainGuard adds clever features. You can alter the settings so that the rain-sensing technology operates at the speed and sensitivity

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that suit your tastes. It easily integrates into your daily routine, whether you're travelling to work, running errands, or enjoying the great outdoors, thanks to its small size [1–5].

## BLOCK DIAGRAM DESCRIPTION

The Block Architecture of the short-range radar system is shown in the aforementioned Figure 1. Here, we create a circuit based system using the free source Uno from the Arduino circuit. A 10 microsecond pulse width is sent by the ATMEGA 328 controller to the ultrasonic transmitter, and the ultrasonic TX module receives the echo back message. Receive the pulse width that the microcontroller has determined after that. There, a Dc motor with an ultrasonic modules installed on it is used for getting a 180-degree output.

MATLAB and the microchip interacted using the UART protocol at a 9600 baud rate. The ASCII value is the basis for the above protocol. As a result, the microchip broadcasts the computed distance to the MATLAB COM port. A red spot can be seen on the MATLAB GUI when distinct obstacles that are between 180 degrees and 250 cm away are sensed [6–8].

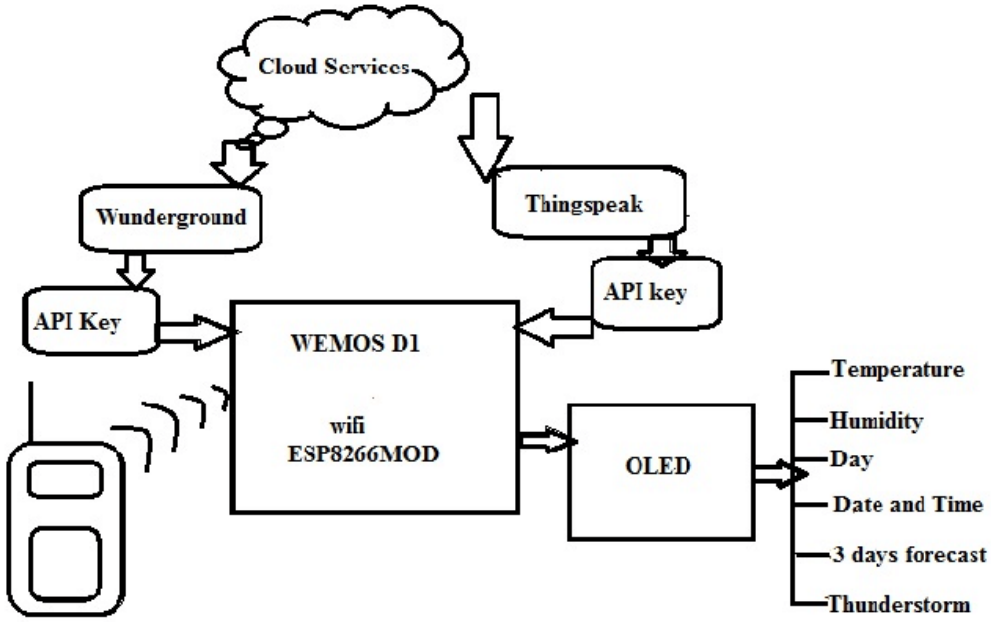


**Figure 1.** Block diagram

## ARDUINO UNO

A board featuring a microcontroller called the Arduino Uno; it relies on the ATmega328. It has a 16 MHz ceramic resonator, a 32 kByte flash memory that may be customised, 14 digital I/O pins, six of those are capable of being used as the outputs of PWM, six conventional inputs, and a USB connector, a power jack, and a reset button key. Arduino is an open-source building and programming environment.

The board known as the Arduino Uno, which has an Atmega328P microcontroller and a variety of inputs and exits, can be used for a variety of projects. Six digital input metal pins a power jack, an USB interface for reprogramming and interaction a 16 MHz quartz crystalline material, 14 pins for digital input and output, and six audio input pins are all included. These parts give the motherboard adaptability and make it possible for it to communicate with actuators,sensors, and other kinds of electrical gadgets of electronics. Most gadgets can take in and transfer data sent to it, and they can even send commands to a particular electrical equipment over the internet (Figure 2). Its hardware consists of an Arduino Uno circuit board. Whatever required for functioning the microchip is included; all that is required to get going is the connection of a USB cable, an AC-to-DC adapter, or a

 

battery to power it.. Italian for "one," "Uno" was chosen to symbolise the imminent Arduino 1.0 release. Moving forward, the reference versions of Arduino will be the Uno variant and the current version 1.0. The latest edition of the Arduino Bluetooth in order board is called The Uno (Table 1).

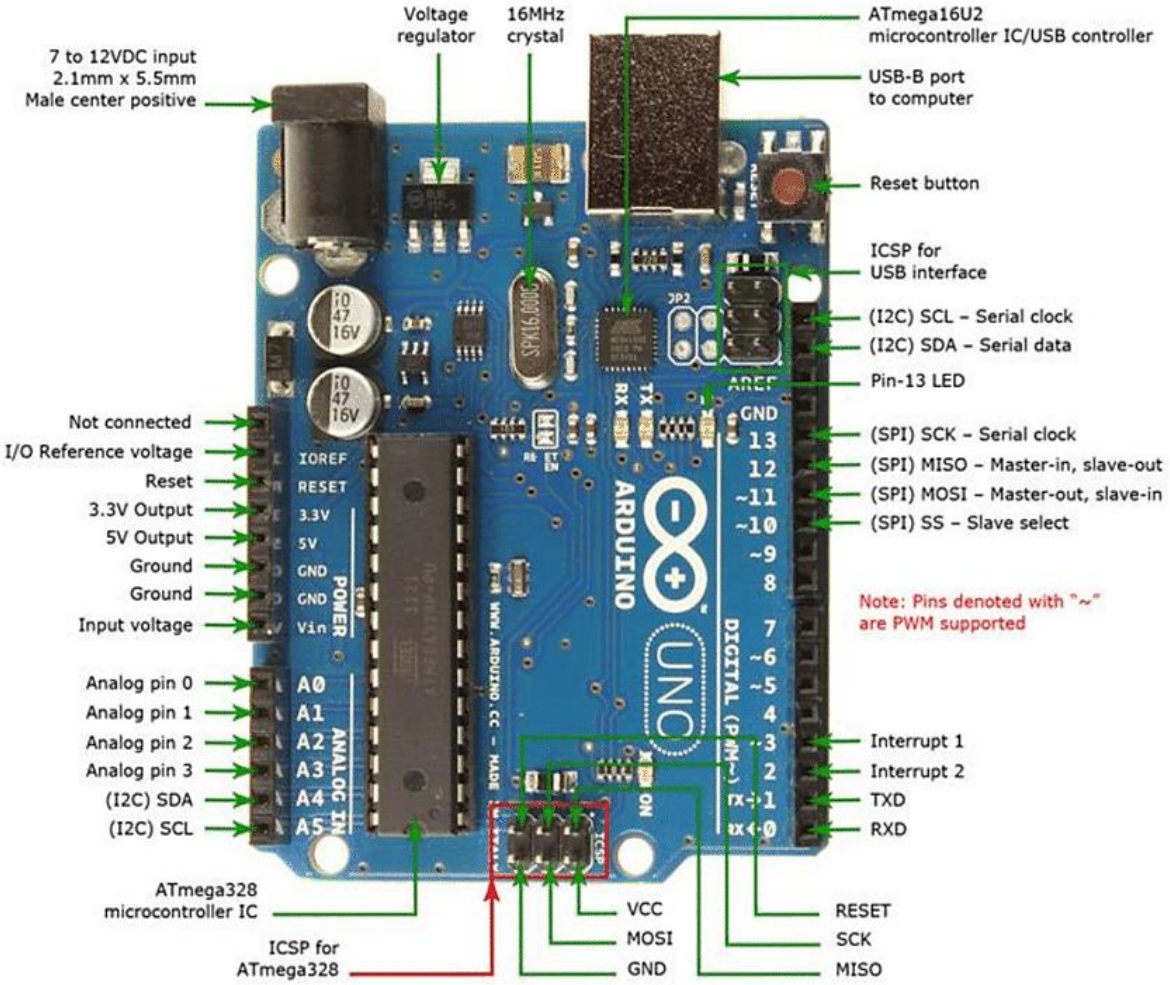


**Figure 2.** Arduino board.

**Table 1.** Arduino board specifications

| Board specifications | Range |
|---|---|
| Input Voltage (recommended) | 7–12 V |
| Input Voltage (limit) | 6–20 V |
| Digital I/O Pins | 54 (of which 15 providePWM output) |
| Operating Voltage | 5 V |
| Analog Input Pins | 16 |
| DC Current per I/O Pin | 20 mA |
| DC Current for 3.3 V Pin | 50 mA |
| Flash Memory | 32 KB (ATmega328P) |
| SRAM | 2 KB (ATmega338P) |
| EEPROM | 1 KB (ATmega328P) |
| Clock Speed | 16 MHz |
| Length | 101.52 mm |
| Width | 68.6 mm |
| Weight | 25 g |

 

**Rain SENSOR**

The device recognises rain and alerts those who need to know in a variety of industries, including irrigation, car dialogue, automation for homes, etc. An overview of a rain sensor's operation is included in this piece.

One type of shifting device designed for recognising rainfall is a precipitation sensor. The A sensor's working process is comparable to the function of a switches; when it rainfall, the gate is normally open (Figure 3).

- The two-sided material used in this type of sensor module is of high grade.

The sensor's footprint is 5 cm × 4 cm, and it can be created with a nickel plate on the side. It has anti-conductivity with oxidising issues with prolonged usage [9]. A device called a potentiometer can be used to modify the sensor's sensitivity. The needed voltage is 5 V (Table 2).

**Figure 3.** Rain Sensor.

**Table 2.** Rain sensor specifications

| Sensor specifications | Range |
|---|---|
| Power Supply | +5V DC |
| Working Current | 15 mA |
| Effectual Angle | <15° |
| Ranging Distance | 2 cm–400 cm/1″ |
| Resolution | 0.3 cm |
| Measuring Angle | 30 degree |
| Trigger Input Pulse | 10 uS |
| Dimension | 45 mm × 20 mm |

**Servo Motor**

*An electromechanical machine known as a servo motor can accurately push or rotate an object. If you want to spin an object at a specific angle or distance, use a motor called a servo.* It is only powered by a straightforward motor that runs. A servo motor is a type of actuator that can rotate with

 

incredibly fine precision. This particular kind of motor typically has a control circuit that gives information concerning the driving shaft's present location. The servo motors can spin very accurately thanks to this indication. An object is rotated using a servo motor that rotates at predefined angles or intervals(Figure 4). It consists only of a straightforward motor that drives a servo actuator. A motor is referred to as a servo motor with a DC voltage if it is powered by a DC power source, and a servomotor with an AC voltage if it is driven by an AC power source[10]. In this session, we will only discuss how the DC servo motor functions. In addition to these fundamental categories, there appear to be countless other servo motor types based on the kind of gear arrangement and operational parameters. The servomotor is a machine that frequently has a gear configuration that enables us to manufacture a servo motor with an incredibly high torque in small and light designs. Due of these qualities, it is used in a wide range of programmes, such as toy automobiles, RC planes, and mechanisation.• The computerised device has to be able to turn in a variety of directions and follow someone else with accuracy.

- The automated device must be unaffected by outside elements like noise.
- The robot must be capable to avoid collision


**Figure 4.** Servo Motor.

**RESULT & DISCUSSION**

The two electronic and attached rain sensors to earn irrigation systems are available. The majority of these sensors use hygroscopic discs, which swell in an amount of rain along with diminish again and a second time whenever they dry eliminated. The hygroscopic disc stack then presses or releases the electrical switch, and the rate of drying is typically adjusted by adjusting the amount of ventilation reaching the middle of the stack. However, a variety of electromagnetic type gauges are also offered for sale that measure rainfall utilising penetration or dropping bucket types of inquiry.. In particular, they either connect directly to the drinking water controller's sensor that is being tested machines or are installed in sequence with the solenoid valve widespread circuit so that they keep the opening of any valves when rain has been detected. Both mobile and wired kinds use comparable processes that temporarily stop watering by the irrigation purposes controller.

In cases when irrigation networks are still in use during the winter, some irrigation rain sensors also include a freeze gauge to prevent the system as a whole from working in subfreezing conditions.

In the current work, a robot shower-sensing canopy is proposed. It emerges when it starts to rain and automatically closes when it stops. In order to control everything in the system, the designed model won't need any human input. Every time it rains, the rain sensor measures the amount of precipitation and transmits that data to Abc. The Arduino processes the data gathered by a rain sensor and sends the result to the servo motor for it to perform the requested action. The drizzle sensor has digital analogue output pins that are used to figure out the velocity of the downpour. Depending on the strength of the downpour, the embedded system is in charge of processing all of the data that causes the poncho to retract und spread (Figure 5).

 

**Figure 5.** Result of Hardware.

## CONCLUSION

Following the completion of the current work with all the steps needed in creating a machine-readable umbrella with a realistic cost analysis and a practical method for protecting objects and goods from areas of high intensity radiation,

This kind of parasol should be utilised in various locations across the community in order to safeguard crops, automobiles, etc. It may be used on a huge scale for minimising human labour. It has a rack as well as pinion gear that converts rotational momentum into reciprocal motion. It could be modified and utilised in future when needed to regulate the functions of the rains system and to recognise meteorological conditions based on predetermined values. The test version of the proposed system is able to used in conjunction with energy from renewable sources. The model that was created is not only clever additionally intelligent because it will decide how to fold and unfold the canopy. The model that was produced is not only clever but also intelligence because it will decide how the umbrella's handle should be folded and unfolded. The entire setup can be managed by a programmed Arduino and an electric stepper motor that folds the roof while using two or more switches and knowing its course towards the future. Having completed the current work and all the steps associated with constructing a computer-controlled umbrella. It which could be reasonably priced and an efficient means to provide warmth and security to objects and goods with significant amounts of power, such a kind of encompassing should be used in many different places throughout the village to protect crops and vehicles, among other things. It can be used on massive operations areas to minimise human labour. It has a rack and wedge gear that converts rotational momentum into motion that reciprocates.

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