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Automatic Clothing Drying Using Rain Sensors and Ldr Sensors Based on Arduino UNO

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ABSTRACT

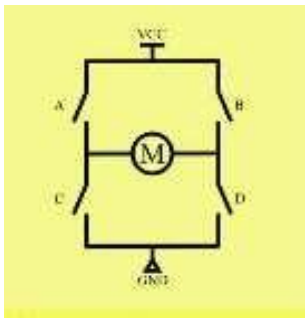
During the rainy season, the majority of people feel anxious when they are drying clothes. This anxiety will increase when drying clothes but is outside the house, and the house is not there. From that incident people became reluctant drying clothes in an open place, because I was worried that the clothesline would get wet in the rain. When the rainy season the majority of people dry their clothes on the terrace of the house, this is done to Avoid drying clothes exposed to rain when the owner is left doing outdoor activities house. From the description of the problem above, the author found the idea to make a towing device clothesline that can work automatically. The tool uses an Arduino microcontroller The Uno is coupled with a rain sensor and a Light Dependent Resistor sensor. The way this tool works is detects the surrounding weather through the rain sensor and LDR sensor, when the sensor does not receive light then the tool will translate it will rain, so the tool will attract clothesline in a place protected from rain. When the sensor detects sunlight the tool will translate that the weather around is hot, so the tool will pull the clothesline a place exposed to the sun. While the rain sensor detects droplets from the water rain.Hopefully with the creation of an automatic clothesline puller can help people reduce anxiety when drying clothes in the rainy season.

Keywords: Arduino Uno; microcontroller; Rain sensor; LDR; Motor driver.

1. INTRODUCTION

1.1 H.-Bridge

H-Bridge or H bridge is one of the electronic circuits used to regulate the work of electric motors. Can be used to regulate the direction of current flowing in a load. In electric motors. This circuit can regulate the direction of rotation of the motor and the amount of current flowing in the electric motor. The name H Bridge is taken from the configuration of the circuit which looks like the letter H. In this circuit there are two possible directions for the current to flow, namely the current shown in red and the direction of the current shown in green. Both current directions determine the direction of rotation of the motor electricity. How the H-bridge circuit works, as the name implies, this circuit does consist of 4 switches which are arranged to form the letters H. Look at Figure 1



Figue 1. Bridge Circuit Picture

the main function of the H-bridge circuit is to change the direction of the electric current in the motor (M). whether it flows from the left or the right. The change in current direction is used to change the motor rotation, clockwise (CW) or counterclockwise (CCW)

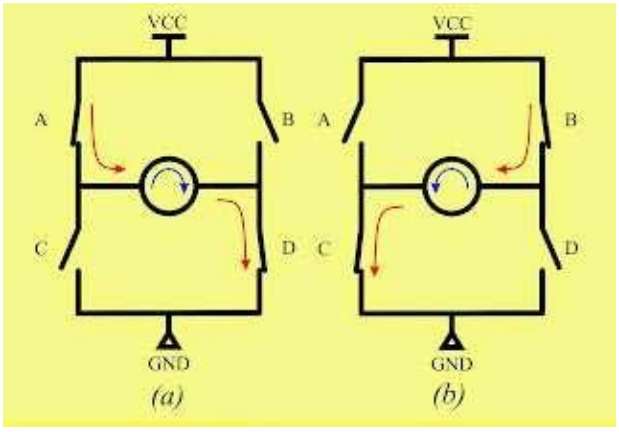


Figure 2. (a) CW Rotating Motor, (b) CCW Rotating Motor.

In Figure 2 there are two different conditions, (a) and (b). Pay attention to the active switch. Figure (a) shows switches A and D which are active, so that the electric current from VCC flows from the left side of the motor and causes the motor to rotate CW. While in Figure (b) the active switches are B and C, so the electric current flows from the right side of the motor and causes the motor to rotate the other way around (CCW).

The H-Bridge circuit is only useful for DC motors. The use of an H-bridge circuit is not limited to a switch, but can be replaced by using an electronic switch such as a BJT/MOSFET transistor.

Actuator

An actuator is a mechanical device that converts electrical or fluid energy into other quantities such as velocity and electromagnetic devices so as to produce kinetic energy. The resulting kinetic energy will be used to drive or control a mechanism or system. Usually the actuator is activated by a mechanical arm driven by an electric motor. This mechanical device

is controlled by an automatic controller that has been programmed between the microcontrollers. The actuator itself can do certain things after receiving commands from the controller, which is in charge of operating the actuator.

Figure 3. Pict of actuator

Mechatronics

Mechatronics is a technology or engineering that combines technology about machinery, electronics, and informatics to design, manufacture, operate and maintain systems to achieve the mandated goals. As we know from the definition, mechatronics is a combination of science and technology disciplines of mechanical engineering, electrical engineering, informatics engineering, and control engineering. In the beginning, there was no mechatronics science and technology discipline in particular. To combine these several disciplines of science and technology, mechatronics requires control theory and systems theory.

Arduino Uno

Arduino Uno is a microcontroller board based on ATMega328 (datsheet), has 14 input pins from digital output where 6 input pins can be used as Pulse Width Modulation (PWM) outputs and 6 analog input pins, 16 MHz crystal oscillator, USB connection, power jack, ICSP header, and reset button. To support the microcontroller so that it can be used, it is enough just to connect the Arduino uno board to the computer using a USB or power cable with AC to a DC adapter or battery to run it. Uno is different from all previous boards in terms of USB to serial connection, namely using the Atmega8U2 feature which is programmed as a USB to serial converter, in contrast to the previous board which uses the FTDI chip USB to serial driver. The name “Uno” means one in Italian, to mark the launch of Arduino 1.0. Uno and version 1.0 will be the reference version of Arduino Uno is the latest in

a series of USB Arduino boards, and as a reference for the Arduino platform, for comparison with previous versions, see the Arduino board index.

Figure 4. Picture of Arduino Uno ATmega328

Sensor Light Dependent Resistor (LDR)

LDR or Light Dependent Resistor is one type of resistor whose resistance value is influenced by the intensity of the light received by it. The value of the resistance on the LDR depends on the size of the light received by the LDR itself. LDR is a type of resistance that is very sensitive to light. The nature of this LDR resistance is that the resistance value will change when exposed to light or light.

To be able to determine the sensitivity of the Light Dependent Resistor sensor, it is necessary to do some testing, namely by placing the LDR sensor in a bright place and a dark place. In the experimental process, the light sensor can use the help of light from a lamp or light that comes from the sun

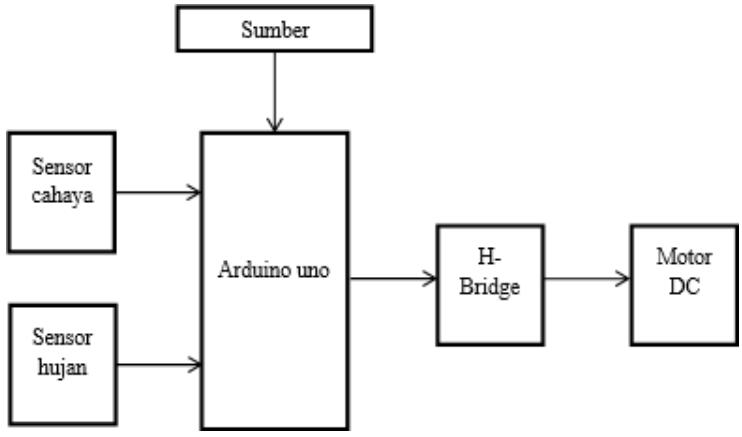
Figure 5. Picture of Light Dependent Resistor (LDR)

2. EXPERIMENTAL

Literary Study Method is the first stage in this research. This method is literature to obtain data or information about the tools to be made and get theoretical basis according to our order. Base The theory will be used as a data reference to make a clothes drying device or system the automatic. Data collection can be obtained from various sources, such as books,

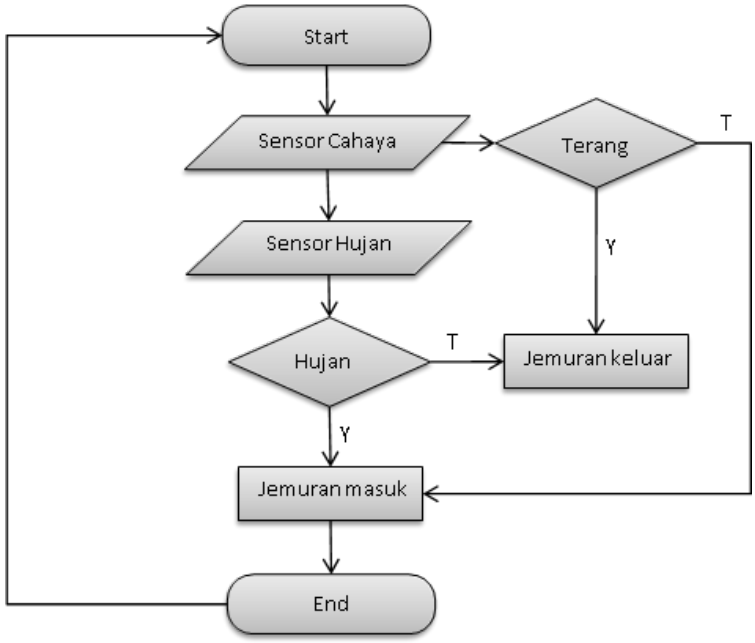
internet, assignments end, or through an interview with someone that can support the research. The more the more data you have, it will be more helpful author to complete this research and can be a comparison in working study.

2.1 Diagram Blok



In the block diagram above, the design uses light and rain sensors as input to detect the presence of light and water. When the light sensor detects light, the clothesline will move out. When water is detected by the rain sensor, the clothesline will move inside. To control the rotation of the motor using the H-Bridge circuit. The H-Bridge circuit is connected to port ~12 and port ~13. So to rotate the motor, you must use the c language in the Arduino program. That way, this circuit can be controlled by Arduino

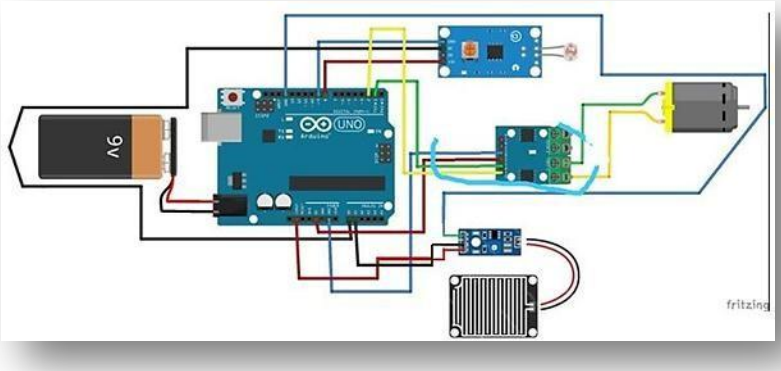
2.2 Flowchart



The flowchart above explains that when the weather is sunny, the light sensor will receive a light intensity value and the rain sensor will also receive a value which will then be processed by the microcontroller. If the light sensor receives a predetermined light intensity value that is too low, the microcontroller will immediately respond to the motor to cover the roof. And if the weather conditions are sunny, the light sensor will receive a high light intensity, then the microcontroller will verify on the rain sensor, whether there is water or not if yes, even though the weather is sunny the motor will close, but if there is no water the motor will still open/set roof in the open position.

3. RESULTS AND DISCUSSION

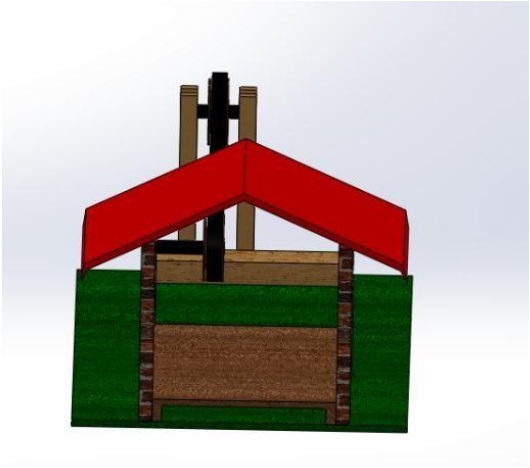
3.1 Circuit schema



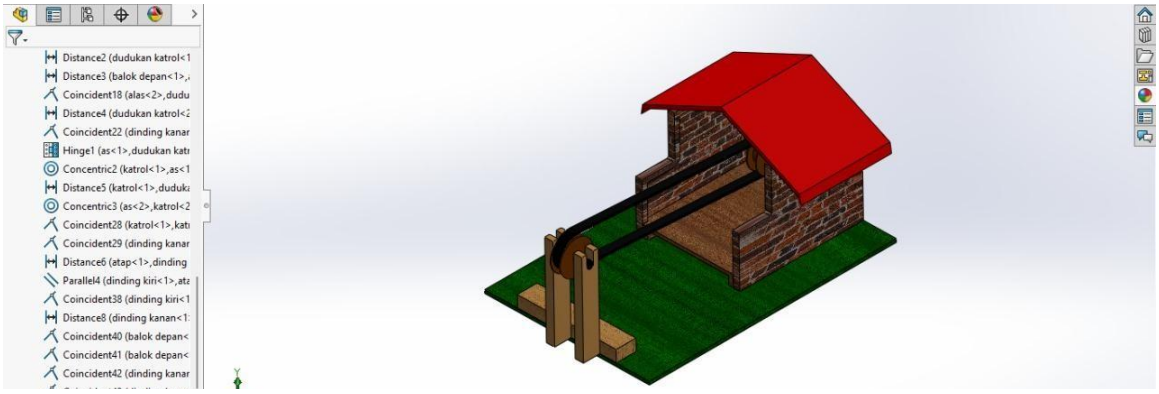
3.2 Mechanical design scheme

Mechanical Design

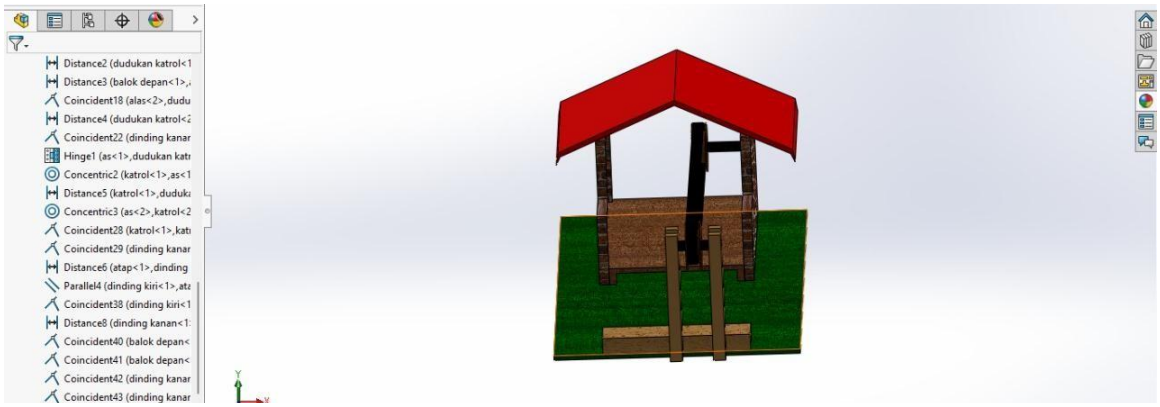
Here is a clothesline model design



Back view of the house sketch



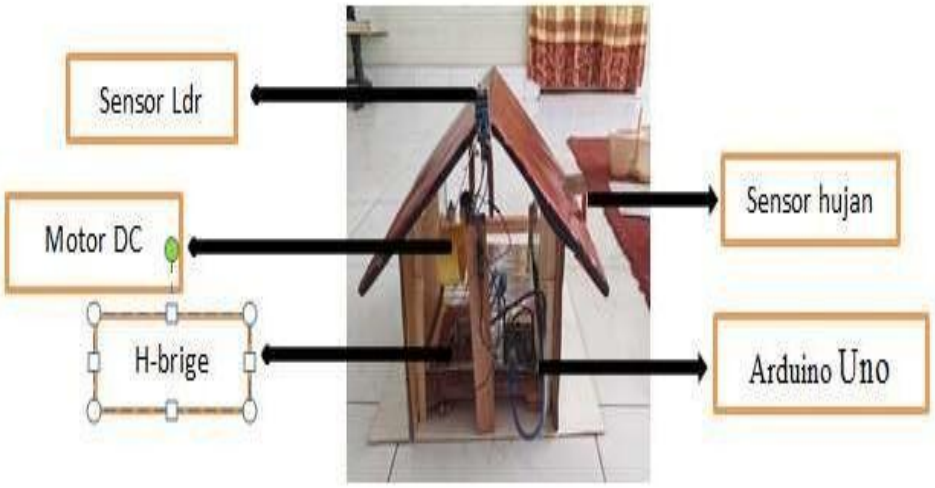
Side view of the house



Front view of the house

This tool uses a water (rain) and light sensor based on the Arduino-Uno microcontroller which can pull and remove clotheslines automatically. LDR sensor as a light detector which when the sensor detects bright and dark light attracts and removes clothesline.

Water sensor as a detector of weather conditions. If the rain sensor is exposed to water, the weather conditions are declared rain. In this tool an error occurs, namely the motor rotation is too fast.



Miniature drawing

At this stage is the implementation process of all the plans that have been made. Design prototype automatic clothes dryer made of plywood board, on the back side of the room building clothes dryer with a working hinge makes it easier for the roof to open and close automatically. The raindrop sensor is placed on the top door to make it easier to catch the water indicator rain when it is raining.

4. CONCLUSION

The working principle of an H-bridge DC motor using a MOSFET is to enable the MOSFET as a substitute for the role of a mechanical switch in the H-bridge DC motor circuit. In this automatic clothesline when light and rain sensors are used as input to detect the presence of light and water. When the light sensor detects light, the clothesline will move out. When water is detected by the rain sensor, the clothesline will move inside. To control the rotation of the motor using the H-Bridge circuit. So to rotate the motor, you must use the c language in the Arduino program. That way, this circuit can be controlled by Arduino.

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