

Arduino Based Automatic Car Washing System

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Automatic car washing system is fully automated with different stages of washing, cleaning and drying. Mostly it is done manually in automobile garage or service centers of automobile companies. This manual way of cleaning car results in more consumption of water, manpower and time. The automatic car washing system reduces the use of water and also manpower requirement.

In this paper, a prototype in which a car enters a washing station and automatically gets cleaned up is presented. The various components such as conveyer belt, sensors, dc motor, dc pump motors, brushes and dryer are used. All these components are controlled using ARDUINO. Cycles of washing includes washing with water, and then with detergent. By using this automatic car washing system, many cars can be washed and it will save time, energy and manpower. Such systems can be installed anywhere such as malls, airports, railway, stations, residential buildings etc.

COMPONENTS OF THE SYSTEM

The components of the system shown in Fig. 1 are as follows:

A. Arduino Mega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), 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. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila. [1]

ABSTRACT

In this modern era automation helps us to save time, cost as well as manpower. Vehicles are used extensively for transportation. To clean these vehicles there is a need of a proper washing system. The most common problems often encountered while cleaning these vehicles are consumption of water, manpower and time. The easy and effective systems for maintaining the vehicles cleanliness become high demand. Therefore, this paper focuses on car washing system using ARDUINO. The exterior of the car will be washed by detecting the car on conveyer belt and the processes are controlled by ARDUINO. The sensors are placed on conveyer belt at different places for car detection, washing, cleaning and drying. This system can be applied in car manufacturing companies after final assembly of car, service stations, car replacing and maintaining stations, and car body building industry.

KEYWORDS: Arduino Mega; Automatic car washing; IR Obstacle Sensors

INTRODUCTION

As the technology is upgrading day by day and everyday it creating our life easier, so we have to take advantage of these advancements. The world is trending towards fastest technology, by looking at all these aspects, the idea came to our mind to make a automatic car washing system. The car washing system is usually associated with fuel filling stations. It consists of large machines with automated brushes.

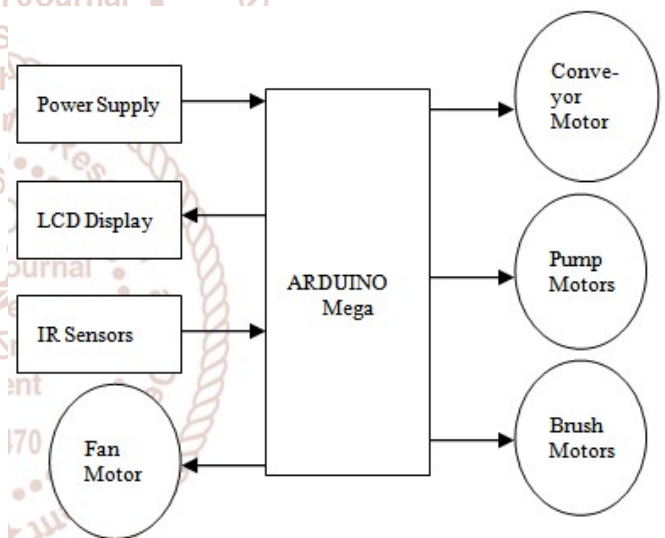


Figure 1 Block Diagram of the System

B. DC Pump Motors

A DC pump motor is a device that moves fluids in a variety of ways by using DC currents. DC pumps come in many different design types, each with its own method of operation, advantages, and preferred [3].

C. DC Motors

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor [3].

D. Motor Driver

The L298 Driver is a high voltage, high current dual full bridge driver designed to accept standard TTL logic levels and drive inductive loads such relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together the corresponding external terminal can be used for the connection of an external sensing resistor [2].

E. DC Fan Motor

DC fans are usually available at three nominal voltages: 12V, 24V and 48V. If the system has regulated power supply in one of these, then a DC fan may be selected which will give the exact performance required, regardless of the AC input variables which plague AC fans. Because the speed and airflow of a typical DC fan is proportional to the voltage supplied, a single product may be used to meet different applications by setting the supply voltage to what will give the desired airflow [3].

F. LCD Display

An LCD is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. It is easy to interface with a micro-controller because of an embedded controller (the black blob on the back of the board). This controller is standard across many displays, which means many micro-controllers (including the Arduino) have libraries that make displaying messages as easy as a single line of code. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock [2].

G. IR Obstacle Sensor

Based on a simple basic Idea, this IR obstacle sensor, is easy to build, easy to calibrate and still, it provides a detection range of 10- 30 cm. This sensor can be used for most indoor applications where no important ambient light is present. It is the same principle in ALL Infra-Red proximity sensors. The basic idea is to send infra red light through IR-LEDs, which is then reflected by any object in front of the sensor [2].

DESIGN OF THE SYSTEM

The design of the automatic car washing system is presented in Fig. 2. Firstly, IR sensor1 senses the presence of the car. If the car is presented, the conveyor belt starts. When the car is detected by the sensor2, it sends signal to the ARDUINO. At that time, the conveyor belt stops and then the car have to be washed with soapy water and hence the pump motor is opened and soapy water is sprayed on the car as shown in Fig. 3. The delay time is set as 10 seconds for soapy water and then the conveyor belt starts to go ahead the brushing process.

After the washing stage the car is moved ahead for cleaning using brush. The IR sensor3 detects that the car is in place and hence the car is cleaned using the brushes as shown in Fig 4. The delay time for brushing is set as 15 seconds and then, the conveyor belt starts to go ahead the rinsing process. When the car is detected by IR sensor 4, it is washed with water again to rinse the soapy water.

The last stage of car washing system is drying the car for which the car is again moved ahead and when the IR sensor 5 detects the car in place, the fan turns on and the car is dried as shown in Fig. 5. The delay time is set as 10 seconds to get the dry condition. And then, the conveyor is moved on again and when the sensor 6 detects the car, the car is removed from the conveyor belt.

For software implementation, Arduino IDE is used to develop and upload the code to the Arduino Duemilanove. The Arduino IDE are supported to Window, Mac OS X and also Linux. For Arduino software, installations are no needed. All we have to do is to download and extract it out and save it anywhere you like.

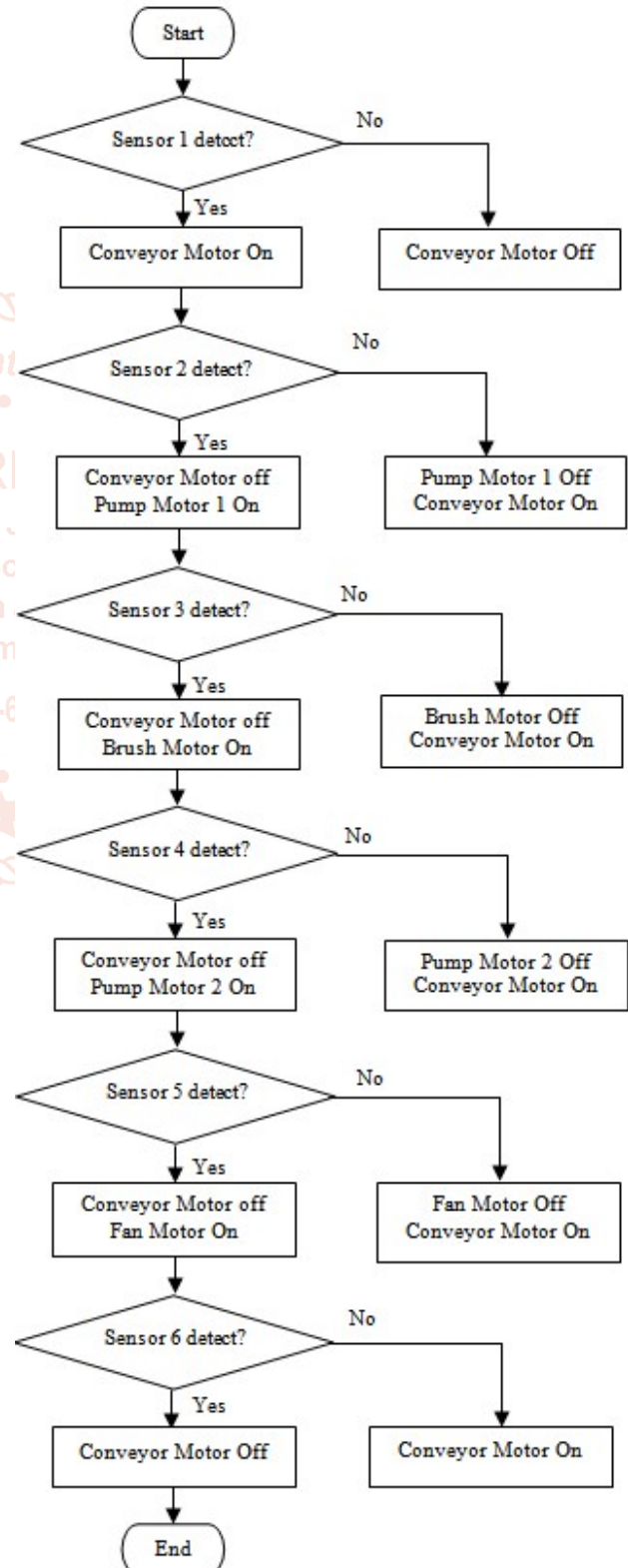


Figure 2 System Flow Chart of Automatic Car Washing

CONCLUSION

The automatic car washing system has been presented as a prototype in which a car enters a washing station and automatically gets cleaned up. The whole system is automatic so no manpower required: this system is based on ARDUINO automation so totally work is in digital format this will require only mechanical assembly. If we use special car washing pressure pumps, no DC pump motor will be required, the car washing pressure pumps are automated so there is no requirement of externally compressed pressure.



Figure 3 Result of Washing Process



Figure 4 Result of Cleansing process



Figure 5 Result of Drying Process

This system can be used in domestic service stations, as there is no compressor and number of loud noise: At the domestic workstation if no compressor is there then this will also work with no sound pollution. As ARDUINO is more durable than other electro-mechanical systems, no more space is required and there is no environmental pollution. The module of ARDUINO is very small, so it does not require large space. By implementing this automation system, the benefits such as saving time of operation and also man power reduced, improving the economy of the system will be obtained. Also the system is pollution free so it is implementable in the market easily, and thus from this research we can conclude that the overall working of the system plays an important role in smart city development ideas because the city becomes smart. The system becomes easier and cost effective as well as it has a long life to become and look effective and efficient.

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