

AUTOMATIC ECOFRIENDLY CAR WASHING SYSTEM USING ARDUINO

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Abstract—As our earth is flatter more advanced we humans crave for everything automatic, so as to get the work done with less time, less cost and manpower. Keeping this scenario as predominant this paper is about to create an new automation in the field of developing technology car washing system using Arduino UNO.

Most of the countries are already developed and are pioneers in the field of automation but developing country like India still needs lot of potential for the development of such system as well as design. Car washing can be done in the place it has been parked for a certain duration. The main objective of this project is to perform external car washing using arduino.

Our car washing system mainly has three operations namely washing, cleaning using brushes and drying. So the entire mechanism is done by anticipating the car which is placed on the conveyor belt and the process is controlled by arduino programming. This system is completely automatic and customer friendly.

Keywords— Arduino, Conveyor belt, Inductive type proximity sensor, SMPS, Dry fan, Brushes, Gear motor.

I. INTRODUCTION

Car wash is a facility used to clean the exterior body and in some cases interior of the car. Car wash can be self-service, full service with attendants who wash vehicles or by fully automated system. In self-service or full service with attendants it is more time consuming, more waste of water and human errors like scratches and destruction of gloss finish can occur, which leads to imperfection in the work.

Automation has its own significance with advancement of science and technology. Arduino plays a vital role in automation process. Arduino is the advanced version of embedded system. Arduino UNO easily adapts to other devices using serial port.

In our project we are using automatic car washing using arduino, which has many advantages when compared to the conventional methods like consistency in quality wash, reduces the utility of water, more reliable, less manpower required, saves time and can be installed anywhere such as fuel filling station, malls, residential buildings, airports etc.

Practically at home we use 150 gallons of water but using this process 35 gallons of water gets used up. By using this process we can clean up the car up to 95.

Automation is a need of time. Today in this modern era automation helps us to save time, cost as well as manpower. Vehicles are used extensively for transportation. It is also important to have easy and effective system for maintaining the vehicle cleanliness.

II. METHODOLOGY

A. Washing

In a car washing system, the first stage is washing. In the primary stage car is to be washed by water to remove the dust or mud from outer surface body and from wheels of car. It is done manually in service stations.

In our automatic system when car is sensed by proximity sensor on the conveyor belt, water is sprayed on the car. Then it is washed with foam, after washing with foam it has to be washed with water to remove the excess soap and water. The conveyor belt moves and the car is moved ahead.

B. Brushing

The second stage is brushing. The car is moved and the brushes with mechanism of motor is used for cleaning.

Two sets of side brush wash the area around the vehicles and a set of horizontal brushes wash the front, top and rear of the vehicles. The water rinses away.

C. Drying

The last stage is drying where fans are used for removing water vapour from the compressed air which are commonly done in commercial applications. Thus the car is dried using the dryers. After this stage the car is cleaned and the car is moved from the conveyor belt.

III. COMPONENTS

HARDWARE

A. Proximity sensor

A Proximity sensor operates by detecting the presence of nearby objects without any physical contacts by emitting electromagnetic radiation.

In our project we have used Inductive type proximity sensor for detection of metal cars. Inductive proximity sensors operates under the principle of inductance, where a fluctuating current induces an EMF in a target object.

B. Conveyor belt

Conveyor belt system is a common piece of mechanical handling equipment. A transport framework moves materials from one place to another. It is particularly helpful in applications including the transportation of substantial or massive materials.

C. Gear motor

Gear motor can be built either with AC or DC motors. Gear motor is a type of electrical motor a low horsepower, low speed and motor output. It adds mechanical gear to alter the speed torque of motor for an applications.

D. Push button

Push button switches are the most common form of manual control. A push button is a momentary or non-latching switch which causes a temporary change in state of an electrical circuit only when the switch is actuated physically. This is operated by opening or closing the contacts when pressed.

E. Arduino UNO

The Arduino Uno is a microcontroller board based on the 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.

F. SMPS

A switched-mode power supply (switching-mode power supply, switch-mode power supply, switched power supply, SMPS, or switcher) is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently. Like other power supplies, an SMPS transfers power from a DC or AC source (often mains power) to DC loads, such as a personal computer, while converting voltage and current characteristics. Voltage regulation is achieved by varying the ratio of on-to-off time. In contrast, a linear power supply regulates the output voltage by continually dissipating power in the pass transistor.

SOFTWARE

A.Arduino IDE

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

This software can be used with any Arduino board. It is used to write and upload programs to Arduino boards, but also, with the help of 3rd party cores, other vendor development boards

V. RESULTS AND DISCUSSIONS

The three of the most basic electronic components are resistors, inductors and capacitors. By integrating these components, a wide range of electronic circuits can be fabricated including sensors, oscillators, voltage and current dividers, relays, crossovers, transformers, Antennas and filters.

A. Connections

The PC Board can either be printed from as nonconductive filament or it can be a pre made. The electrical connections can then be laid upon and the components can be attached by softening the filament with a heated gun at 100 °C and pressed down firmly. The contact resistance can be lowered by adding a bit of silver paste to the point of contact between the IC and the filament after pressing the components into the filament rail. Figure 3a and 3b shows the methods of attaching the electronic components.

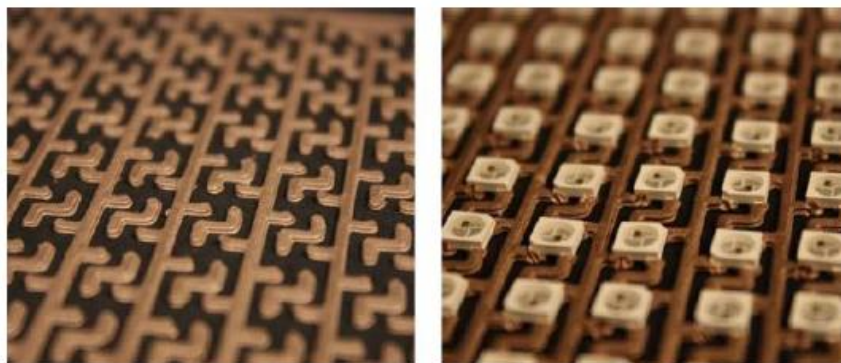


Fig. 3a: Circuit (left), LEDs press fitted by softening filament (right)

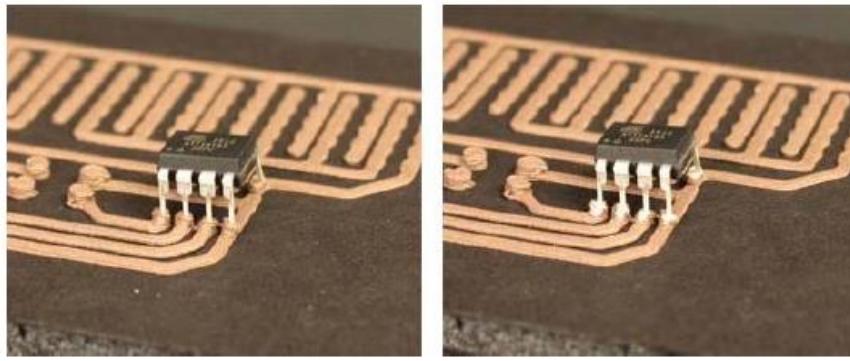


Fig. 3b: IC fitted with softening (left), adding silver at contact (right)

B. Resistor

The resistive element is achieved by altering the dimensions of the resistive element from which it is made by simply varying the cross-sectional area of the printed trace; resistors with values ranging from 1 to 1K can be obtained. Fig. 2 shows a linear line obtained from the results which follows Ohms law. Ref Fig. 4

C. Inductors

Air-cored Inductors can be printed which are commonly used in RF circuit. Different inductors consisting of different number of turns can be printed where PLA as an insulating dielectric material in the structure. Ref Fig. 4

D. Capacitors

Parallel plate capacitors are 3D printed in the conductive material, and PLA as in the inductor is used as the dielectric medium. The overlapping dimensions of the parallel plate and the vertical separation distance can be set to required dimensions. The capacitance can be easily changed by altering the 4 parameter such as Geometry: Permittivity of Dielectric, area of the plates and the Distance between the plates. Ref Fig. 4

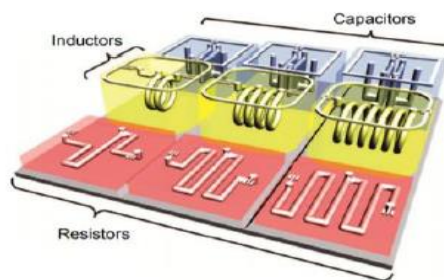


Fig. 4: Capacitors (blue), Inductors (yellow) and Resistors (red)

VI. CONCLUSIONS

Putting the entire discussion and research together anyone can conclude that, this method of controlling Automatic Car Washing will remove the restrictions that exists and introduces a distinctive way to create error free, highly efficient project.

This model will perform auto washing consequently which results in excellent final item. Hence it will be user accommodating and skilled to wash any kind of car.

After the completion of project we can conclude that such automation system are quite beneficial as it helps in saving time of operation ,reduces man power, improves the economy and protects the environment by creating pollution free environment. The overall working of the system plays an essential role in smart city development ideas.

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