

CONTROL OF MECHANICAL CONTROLLED VEHICLE AIR CONDITION SYSTEMS USING WITH SERVO MOTORS

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ABSTRACT

Servomotors are preferred in industry to realize high performance position control. In this study, the electronically controlled manual climate control panel is to be realized by using 3 dc servomotors. In the control, PIC16F877 microcontroller with memory and necessary I/O parts was used. This microcontroller was preferred, for the absence of hardware necessary in programming, ease of programming and for the economical reasons.

Keywords : Servomotors, Micro controller, Servosystems, air condition control.

1. Introduction

So stifling hot and cold. meteorological factors arising from adverse conditions to resolve, in most of today's vehicles heating system (hot air production) and air-conditioning system (cold air production) combination of air-conditioning systems are used. Air conditioning, driver and passenger in the vehicle to improve the comfort of temperature and humidity are the effects. In some cases (such as park under the sun for a long time) the temperature may become unbearable, or even create a real danger. In a short time to reach an acceptable comfort level, leaving open the car window a few minutes of heated air within the extreme right after the discharge of air services should be taken into the engine being run. Modern and expensive vehicles in this process automatically when the existing air conditioning systems that can economically benefit from these facilities can not be in class tools. This study will be developed with the help of air conditioning automatic control systems that do not have this feature by applying tools, users benefit from the comfort of air conditioning will be provided.

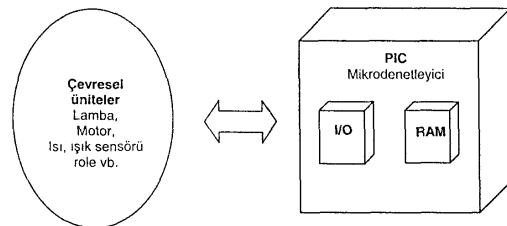
2. What is a Micro Controller ?

A microcontroller is a chip which includes one of a computer's basic component namely RAM I/O unit. Microcontrollers, which have been designed to use in applications requiring computer technology, are considerably cheaper and simpler compared to the microprocessors. Recent microcontrollers are used in various areas such as

automobiles, cameras, mobile phones, fax-modem devices, photocopy, radio, TV and some toys.



Recent microcontrollers are being produced by many chip manufacturers. Each firm gives different names to the chips they produce. For instance, whereas Microchip calls its products PIC, 8051 which was produced by Intel and launched to the market in the early 80s is also sometimes called MCS-51. [4]



Bir mikrodenetleyici sisteminin temel bileşenlerinin blok diyagramı

3. The Definition of JAL

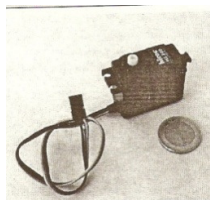
JAL is a high level clear source code compiler designed free of charge for the micro controllers of Microchip and Unicom firms. JAL can be downloaded from the internet easily since it is free of charge. They may create new programs with the help of the source codes of JAL or the source codes of the JAL may be improved. JAL, which is based on the language of PASCAL or C, uses a very simple and clear technique of programming language. Thus, people who have been using PASCAL or C before will easily adapt to JAL. The beginners also will not have any difficulties thanks to the easy programming language. [1]

If the advantages of using JAL in PIC programming should be summarized:

- Free of charge
- Easily downloadable from the internet
- Clear source code
- Usable for the most popular types of PIC
- Convenient for popular operating systems such as Windows, DOS, Linux, MAC
- Easy programming language
- Determined compiler
- Open to constant improvement are some of the reasons why it is used in programming of the JAL micro controllers.

4. RC Servo Motor

RC Servo Motor is one of the kinds of motors used in the applications such as model planes, cars, boats or small powered robots. Inside the RC servo motor there is a DC motor, a code decipher, an electronic circuit, and plastic or metal gears used to increase the motor power. Since RC servo has its own electronic driver inside, it can be driven directly by PIC. [3]



Picture 4 the view of the Servo Motor

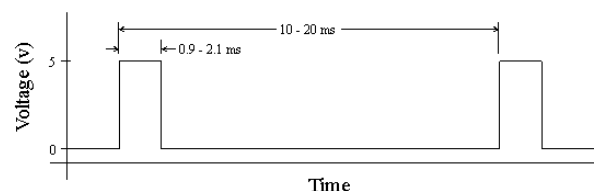
5. Design of the Application System

In this application, servo motors are controlled using a PIC 16F877A. when press button connected to Microcontroller ra0 pins , internal-external air separation by making the servo motor position (47 °) or (227 °)

when press buttons connected to Microcontroller RA1 and RA2 pins, 2. servo motor to change the temperature (47 °) and (227 °) between (30 °) 'lik increments will change position.

When press buttons connected to Microcontroller RA3 and RA4 pins, 3. servo motor to change air direction by performing (47 °) and (227°) between (30 °) 'lik increments will change position.

Servo motor can be brought to the desired position is mainly composed of a potentiometer, and dc motor is a kind of motor. Servo motor was first no matter what position as long as the pulse will be exactly the same position. PWM servo motors work by sending a square wave. Determine position Servo is sent logic 1 (+5 V) level is at the time. Will send a square wave has a period that can vary between 10-20 ms. 1.5 ms in length is sent servo logic 1 level to the middle position (0 °), 0.6 ms in the left-most position (-90 °), 2.4 ms on the far right position (+90 °) brings, but the values used may vary according to the servo model. In this application we will use servo motor max. Can turn 180°, 210° are also return. [5]



Fan speed adjustment and control for air conditioner on-off do not need to servo motor through the control relay is provided.

6. Production of the System

Vehicle air-conditioning control panel within the mechanical displacement are removed. Removing the inside of the panel by opening the control buttons such as keys and gears transfer movement over the elements are removed. Turning and milling gears are prepared according to the control panel. This gear is mounted to and control panel Servomotors are mounted in its place.

Total 3 pieces with servo motor,
 A. Temperature setting control
 B. Internal-external air flow control
 C. Air direction control output provided.



These servo motors within the vehicle control panel depends on the condition of mechanical wires by pulling or it can be controlled by a result of the mechanical wire connected to the other end of the valve and the valves opened and closed down or change direction by making vehicles within the control of the air can be ensured.

A. Temperature setting control

Servo motor control panel for adjusting the temperature of the warmest and coldest to come to the location needed to determine how many degrees are returning. This change in steps of 30° degree increments or in the form of reduction is done. Increased and therefore this process to make by two buttons.

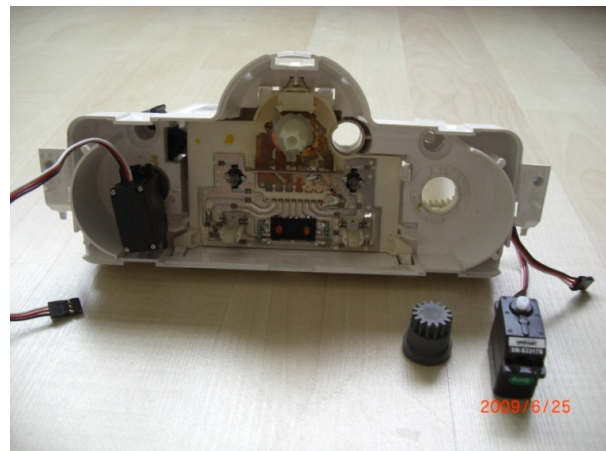
B. Internal-external air flow control

Internal-external control panel to control air flow air circulation inside and outside of the servo motor to position the air circulation needed to come back How many degrees are determined. Our control panel for air circulation internal our 47 position for external air circulation must be in the 227 position. Therefore, to make the process of internal air and external air comes just a button.

C. Air direction control output

Direction on the control panel to control the air output of the servo motor glass, legs, face, and they come into the mix as needed for the few degrees of rotation are determined. About our control panel glass 47, to 137 and face 227 feet when the air comes in the position have been identified. This

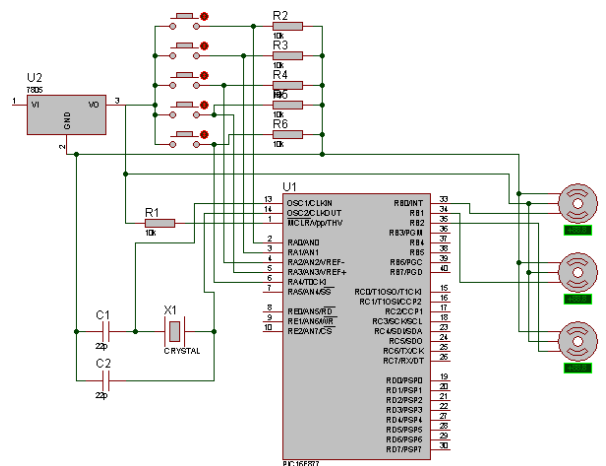
change in steps of 30-degree increments or reduction. Increased and therefore reduce this process to make two buttons. As a result, a total of 5 buttons are controlled by servo motors.



7. Application system includes those parts below:

- 1xPIC16F877A microcontroller
- 3 xPWM servo motors
- 1x4 Mhz crystal
- 2x15pf ceramics condansator
- 6x10 kΩ resistance
- 5x push buton
- 7805 5v. Voltage regulator
- 5 V DC source(Battery, cell, transformer or power source)

8. Circuit Schema



```

include 16f877_4
include jlib
include rc_cont_servo
disable_a_d_functions
const deger = 20
var byte a = 46
procedure ic is
  srv1 = 46
  a = 46
end procedure
procedure dis is
  srv1 = 230
  a = 230
end procedure
procedure sicarti is
  srv2 = srv2 + deger
  if srv2 > 230 then srv2 = 230 end if
end procedure
procedure siceksi is
  srv2 = srv2 - deger
  if srv2 < 46 then srv2 = 46 end if
end procedure
procedure hyarti is
  srv3 = srv3 + deger
  if srv3 > 230 then srv3 = 230 end if
end procedure
procedure hyeksi is
  srv3 = srv3 - deger
  if srv3 < 46 then srv3 = 46 end if
end procedure
forever loop
-----
if (pin_a0 == high) & (a == 46) then
  dis delay_1s
end if
if (pin_a0 == high) & (a == 230) then
  ic delay_1s
end if

```

9. JAL codes of the system

```

-----
if pin_a1 == high then
  sicarti
end if
if pin_a2 == high then siceksi end if
if pin_a3 == high then hyarti end if
if pin_a4 == high then hyeksi end if
rc_servo_3
end loop

```

10. Conclusion

In this study, using pic microcontroller 16f877 servo motors attached to the control of air-conditioning control panel, and prototypes were produced. Microcontroller code was prepared by JAL program. Internal-external air change with the help of three servo motor control, balance control and the air temperature change in direction is controlled through the 5 button. Accordingly, the performance of the prototype system performed in accordance with the design criteria have been concluded. This study developed under the system, automatic control applications has been reviewed and again, can be made more professional.

11. References

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