Speed Control of an Automatic Guided Vehicle

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Abstract- **We design, implementation and experimental results of an effective data communication protocol implemented on a distributed PIC microcontroller architecture based Automated Guided Vehicle (AGV) named ROVER II (Roaming Vehicle for Entity Relocation) is presented. The main objective of the research was to design and implement a seven-bit speed control signal for ROVER II's speed and position control allowing for one percent duty cycle increment. In addition, we propose a decision framework for design and implementation of automated guided vehicle systems, and suggest some fruitful research directions. To keep track of the matching result of both positions, the estimated position information used to update the vehicle's position by using the Kalman Filtering (KF) algorithm. Test performance is verified with accurate positioning control by experimentation.**

Keywords: **Mobile robot, speed control, data packets, Control Path, encapsulation/ decapsulation, Pulse Width Modulation (PWM)**

I. INTRODUCTION

An automated guided vehicle or automatic guided vehicle (AGV) is a mobile robot that follows markers or wires in the floor, or uses vision or lasers. They are most often used in industrial applications to move materials around a manufacturing facility or a warehouse. Application of the automatic guided vehicle has broadened during the late 20th century and they are no longer restricted to industrial environments.

A. Wired

The wired sensor is placed on the bottom of the robot and is placed facing the ground. A slot is cut in the ground and a wire is placed approximately 1 inch below the ground. The sensor detects the radio frequency being transmitted from the wire and follows it.

B. Guide Tape

Many light duty AGVs (some known as automated guided carts or AGCs) use tape for the guide path. The tapes can be one of two styles- magnetic or colored. The AGC is fitted with the appropriate guide sensor to follow the path of the tape. One major advantage of tape over wired guidance is that it can be easily removed and relocated if the course needs to change. It also does not involve the expense of cutting the factory or warehouse floor for the entire travel route. Additionally.

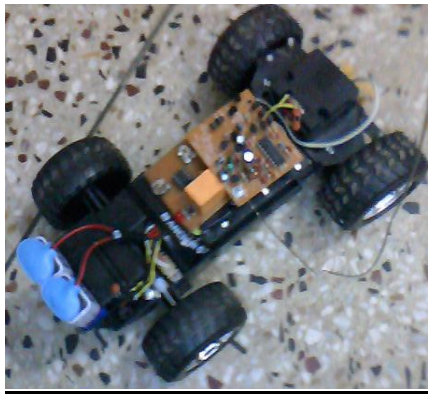

Fig 1. Automatic Guided Vehicle

1. Non Value Added Material Movement
2. Zone Containment of Manual Forklifts

II. PCB DESIGNING

A. Micro controller

This is the part of circuit which stores the data in its EEPROM & also performs all the operations required for testing the incoming data & to decide the response of received data. It also controls the mode of serial communication and speed of communication. The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile

memory technology and is compatible with the industry-standard MCS-52 instruction set and pin out.

B. Buffer IC

The I\O of microcontroller does not have the current capacity to drive the microcontroller hence we use the buffer ICs 74245 in the ports of microcontroller to protect from damage. It consists of resistor and diode in pin of buffer ICs. The buffer ICs 74245 is controlled the voltage and current (5.7V and 110 mA) which is supplied to the microcontroller and it limits the value of current and voltage is going to microcontroller.

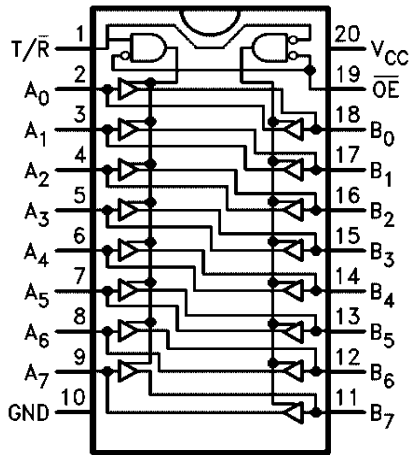

Fig 2 PIN Diagram of Buffer IC 74245

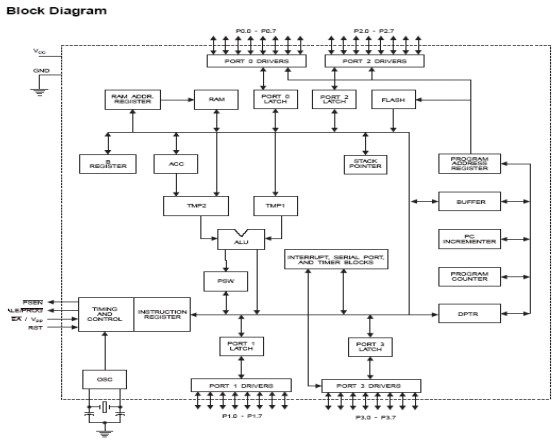

Fig 3.Block Diagram of Microcontroller 89S52

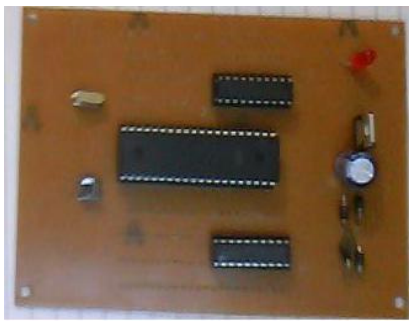

Fig 4.Circuit Diagram of Microcontroller 89S52

III. TRANSMITTER END

The inputs are fed to the transmitter. These input are converted in to codes through the code generator block, these code are used for to generate different modulating frequency. The modulating frequency in used to frequency modulates the carrier of the carrier signal which is then amplified and fed to antenna through R.F. amplifier and the power amplifier. The power supply used for the functioning of different modules.

IV. RECEIVER END

The signal is received though antenna and passed to the RF amplifier and is frequency demodulated to extract IF signal after mixing with local oscillator. The IF signals is passed through IF amplifier to the filter to avoid mixing of signals. The filtered signal is passed to frequency to code generator block, which is then passed to code decoder. The codes are then passed to driver cum interface circuit to generate voltage of positive polarity or –ve polarity. The power supply is given to the entire block either through the battery or through the domestic power supply of 230 V.

V. IR SENSOR

A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. Infrared (IR) light is electromagnetic radiation with a wavelength longer than that of visible light, measured from the nominal edge of visible red light at 0.7 micromeres, and extending conventionally to

300 micrometers. These wavelengths correspond to a frequency range of approximately 430 to 1 THz and include most of the thermal radiation emitted by objects near room temperature. Microscopically, IR light is typically emitted or absorbed by molecules when they change their rotational-vibration movements.

A. Component Description

SN	COMPONENT	TYPE	QUANTITY
1	IC Base	40 PIN	1
2	IC Base	20 PIN	2
3	IC1	89C51	1
4	IC2 & IC3	74245	2
5	Crystal	11.0592 MHz	1
6	Regulator IC	7805	1
7	Transistor	BC547	5
8	Resistor	10k,1/4W	20
		4.7k,1/4W	5
		1k,1/4W	1
9	Capacitor	33pf	2
10	LED	Red	3
11	Switch	Micro	1
12	Diode	1N4007	4
13	Amplifier ckt.		2
14	Transformer	6/750mA	1
15	Lead Wire		1
16	LDR sensor		1
17	Relay	12V	1
18	NE555 timer	8 pin	1

VI. MICROCONTROLLER PROGRAMMING

```
ORG    0000H
MOV     P0, #00H
MOV     P1, #00H
MAIN:
  JB     P1.0, ONE
  JB     P1.1, two
  JB     P1.2, three
  JB     P1.3, four
  SJMP    MAIN
ONE:
   SETB P0.0
    JB P1.0, one
    CLR P0.0
    SJMP MAIN
Two:
     SETB P0.1
     JB P1.1, two
     CLR P0.1
     SJMP MAIN
Three:
     SETB P0.2
     JB P1.2, three
     CLR P0.2
      SJMP MAIN
Four:
      SETB P0.3
      JB P1.3, four
      CLR P0.3
      SJMP MAIN
DELAY;.
5 sec delay
       MOV TMOD,#10H;
Timer1 Mode 1H
       MOV R0, #10
AGAIN: MOV TL1, #0B0H;
```

```
For 50ms 3cb0H is to be put
        MOV TH1, #03CH;
Label cannot be repeated in different sub routine
        SETB TR1
BACK: JNB TF1,
BACK;
Stay until timer rolls over
        CLR TR1
        CLR TF1
        DJNZ R0, AGAIN;
If R3 not zero then reload timer
        RET
        END
```

(i) Program to receive and send data

```
ORG 0000H
        MOV TMOD, #20H; timer 1, mode 2
        MOV TH1, #-6   ; 4800 baud rate
        MOV SCON, #50H; 8-bit, 1 stop,
        REN enabled
        SETB TR1; start timer 1
AGAIN:
        MOV A, P1
        MOV SBUF, A;
        Letter "A" to be transferred
HERE:
        JNB TI, HERE; wait for the last bit
        CLR TI; clear TI for next char
        JB RI, abc; wait for character to come SJMP AGAIN
abc:
WAIT:
        JNB RI, WAIT;
Wait for character to come in
        MOV A, SBUF
        CLR RI
    MOV P2,A
    SJMP AGAIN
    END
```

CONCLUSION

In any war against the enemy one has to protect oneself which attacking the enemy because enemy might use different explosives like bombs, mines and fences in the path. To overcome these obstacles we need to have robot that would tell us the accurate path of attack. This robot can be operated by soldier in a vehicle or tank. This works on the principle of R/F communication. The range of operation of this robot is 20-25ft.The robot has the receiver which is vehicle shape which has 4 wheels with 2 No. motors. Motor is attached with gear assembly one motor provides Left/Right direction to the robot and other motor provides Foreword /Backward motion. Robot is fitted with additional circuit which has to be connected with any type of sensor like ultrasonic, magnetic, optical, chemical or metallic sensor. When you send the signal through transmitter to the robot it moves forward and whenever any danger occurs it indicates through audio & visual display.

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