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"Design of a signal delay system for compensating the variable vehicle density at the traffic light using micro-controller based IR system"

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Abstract
A logical system is basically a combination of electrical and electronic components used for providing practical solution of indeterministic variables in the form of specific signal outputs.

The real-life problems are complex in nature due to their variability. A single set of variables can have infinite number of solutions for the function of space (x) and time (t) variables. A signal conditioning process is a useful tool for representing the real-life problem in the terms of known variables. At present time, microcontroller is a complete computer system in a single chip which can handle load and time sharing at the same instant without using human efforts. Only the supervision is required in case of any failure or damage of components.

Keywords: Indeterministic Variability, load sharing, time sharing

Literature Review

[1] K.Vidhya, A.Bazila Banu use the Density measurement by using open tool as software for image processing by just displaying the various conversion of image in the screen and finally surrounding the box on the vehicle in the given image, the number of vehicle is calculated. They can calculate the density of the vehicle by using mat lab tool by comparing the four side of the image which is given as a input. they can simulate the result of the four

given input image but this cannot be used in real time applications as it is very slow and the software is not free of cost like open to overcome this disadvantage of mat lab, open software is used which is very easy to install and is open source software and can be used in real time application in a quick manner. In this paper they have shown the density measurement in the signal by using open in the System.

[2] G.Kavya, B.Saranya: Density Based Intelligent Traffic Signal System Using PIC Microcontroller, the optimization of traffic light controller in a City using IR sensors and microcontroller. By using this system configuration tried to reduce the possibilities of traffic jams, caused by traffic lights, to an extent and successfully gets the results. No. of passing vehicle in the fixed time slot on the road decide the density range of traffics and on the basis of vehicle count microcontroller decide the traffic light delays for next recording interval. The recorded data can be downloaded to the computer through communication between microcontroller and the computer.

Sachin Jaiswal, Tushar Agarwal ,Akanksha Singh and Lakshita: The project is a replica of a four way lane crossing of real time scenario. In the first part, concentrated on problems faced by Ambulances, RFID concept is used to make the Ambulance's lane Green and thus providing a stoppage free way for the Ambulance. In the second part, concentrated on problems faced by Priority vehicles, IR transmitter and receiver are used to make the vehicles' lane Green and thus preventing traffic congestion. In the third part, concentrated on Traffic density control, IR transmitter and receiver are used to provide dynamic traffic control and thus increasing the duration of the Green light of the lane in which traffic density is high and hence, regulating traffic.

INTRODUCTION

In the year 1959 first IC was invented.it could provide input out signal conditioning 32 time better than a transistor. The output providing capacity of IC chips are increasing day by day. In year 1971 first microprocessor with the efficiency of 65000 transistors was developed. The automation was introduced with the invention of micro controller in year 1976. It was the major step taken in the history of automation. The advanced control systems are the latest achievements which are working in the areas of artificial intelligence, artificial neural network, advanced robotics etc. As we know comfort demands flexibility in the system which is achieved by using microcontroller based networks.

Fig (a):- Assembled Traffic Control system

Figure (a) represents the model of infra-red sensing system in a microcontroller based circuit. In India 230 Volts, 50 Hz power supply is used for the general-purpose operations. The power source is connected to a 12 Volt supply. It is connected to a rectifier circuit to generate DC power for the uniformity of the signal. The DC output is further connected to a capacitor type filter circuit in the order to purify the output DC of rectifier. LED is connected along with a stabilizer to maintain constant power supply to the VCC microcontroller of ATMEL (AT89552) type. It is a microcontroller of type 8051. Two pins of this microcontroller are connected to the DC power

source and rest are connected to the LEDs for providing different traffic signals. Preprogrammed circuit is connected to a point switch in series to reset the signal outputs. In this 40-pin controller parallel connection is provided to different signal LEDs and Infrared sensor. The obstacle in IR sensing provides potentiometric resistance to the controller. This extra resistance causes delay of rest signals due to increase in duration of green signal if the vehicle density in one direction is high. It allows to maintain the traffic density for smooth flow of moving vehicles. In this way the traffic jam can be avoided in the absence of traffic police. The automation ensures the effective human resource utilization in controller based traffic signals and streets. The programming of the green signal barrier is carried out by KIEL microcontroller based programming. The signal delay programming for the 7 sec to 19 sec.

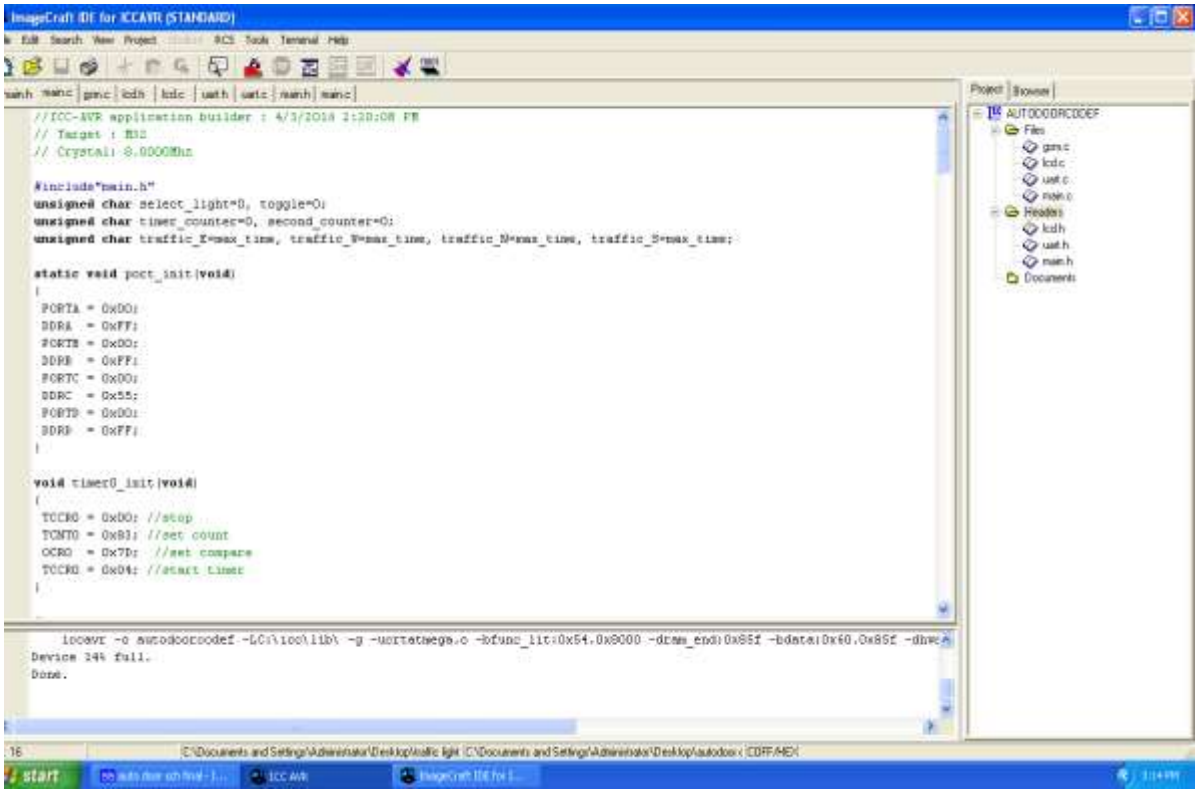

Fig:- Compiling Code

SIMULATION PROCESS

- Proteus8.1 is best simulation software for various designs with microcontroller.
- It is a handy tool to test programs and embedded designs for electronics hobbyist.
- Basically, PROTEUS is also simulating software but it helps you attach many components with the 8051. Like resistors, capacitors, LEDs, LCDs, keypads, ICs etc. and these are just few that I have named in general. It has a complete library and you will find everything that you will ever need. You can design your complete circuit and then

simulate it to view the final output. This means that after perfecting your project on the programming side in KEIL, you'll need to simulate it on PROTEUS to determine the output of the hardware components and change it if need be. This will completely ensure your project's success

- Open the Proteus and then create a new project by clicking on new project button.
- Now give a Name to our project and do not change anything, just follow .

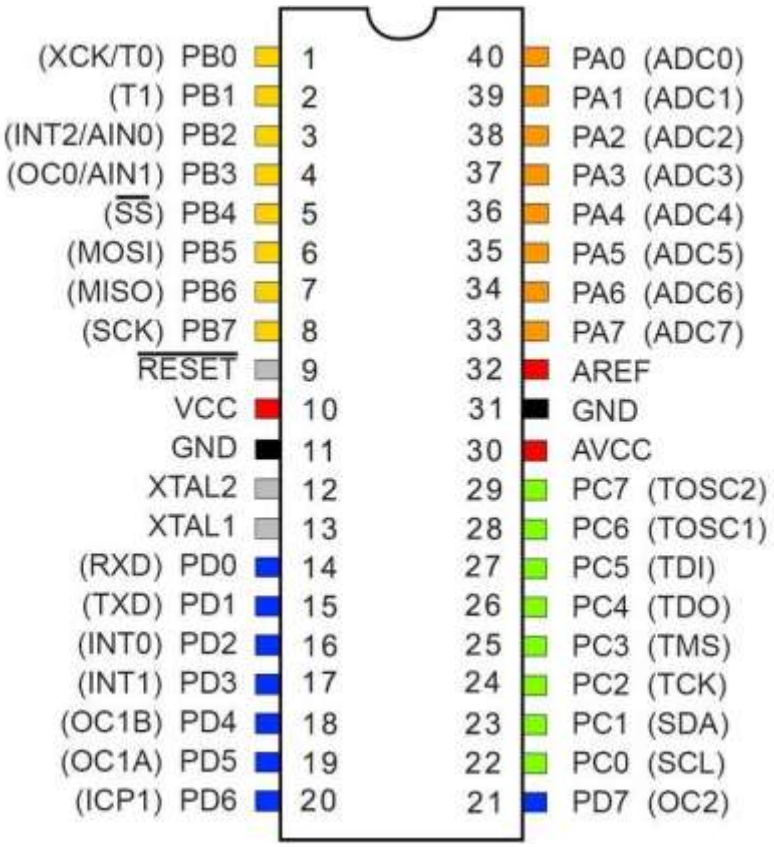

Fig:- ATMEGA 40 Pin Controller

- Draw the circuit diagram by clicking on Schematic Capture button and then add the components by Click P button followed by Component button under Devices for picking components.
- Choose your component by simply typing the name at Keyword box. After selecting item click OK and the selected components will listed under Devices.
- Now draw the circuit diagram i.e make the connection.
- Simulate the circuit by clicking on run button.

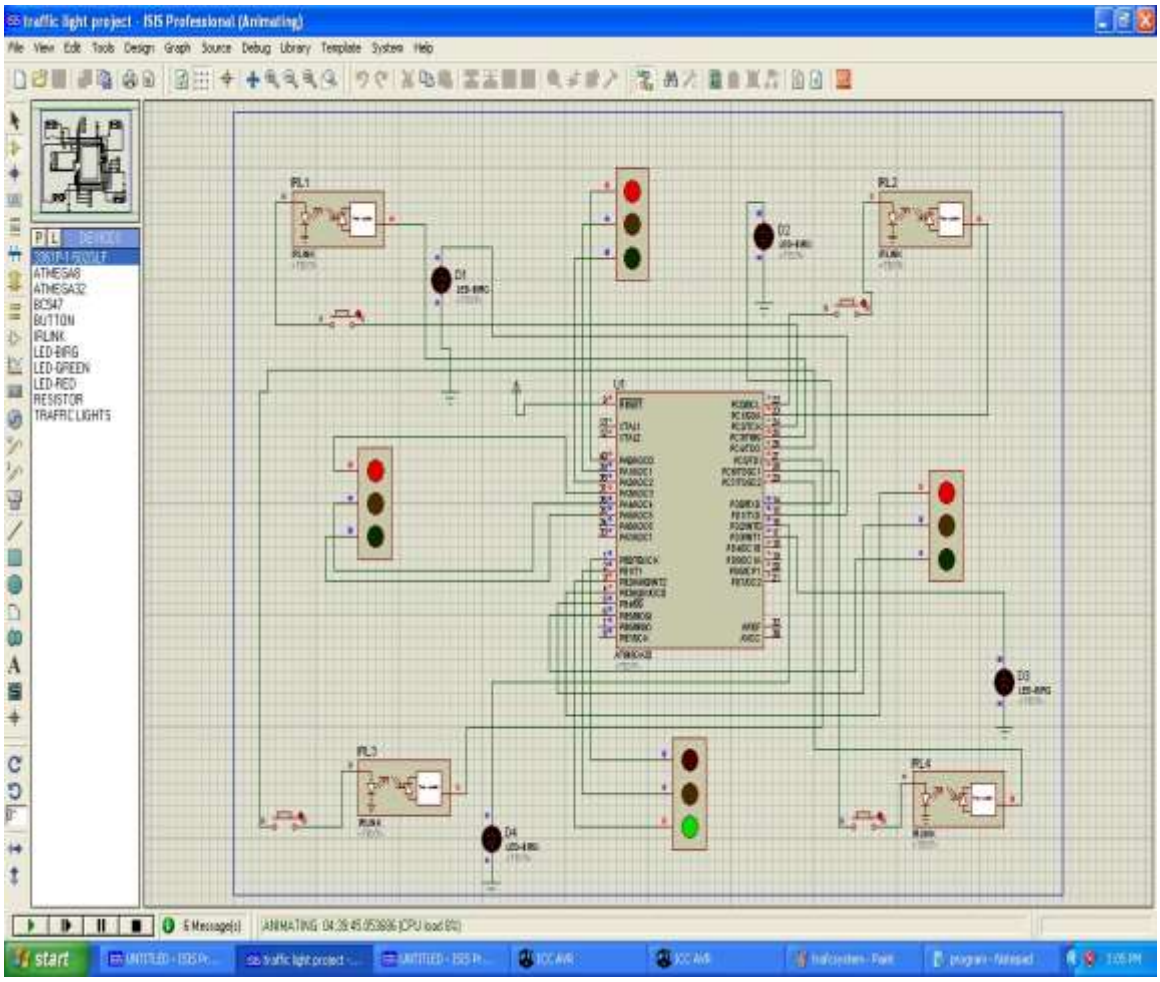

Fig:- Output when simulation start on proteus

Controller Programming

```
#include<reg51.h>
#include<intrins.h>

sbit in1_w=P0^4;
sbit in2_w=P0^3;
```

```
sbit in3_w=P0^2;

sbit in1_n=P3^3;
sbit in2_n=P3^4;
sbit in3_n=P3^5;

sbit in1_e=P1^3;
sbit in2_e=P1^4;
sbit in3_e=P1^5;

sbit in1_s=P2^3;
sbit in2_s=P2^4;
sbit in3_s=P2^5;

sbit out1_e=P1^2;
sbit out2_e=P1^1;
sbit out3_e=P1^0;

sbit out1_s=P2^2;
sbit out2_s=P2^1;
sbit out3_s=P2^0;

sbit out1_w=P0^5;
sbit out2_w=P0^6;
sbit out3_w=P0^7;

sbit out1_n=P3^2;
sbit out2_n=P3^1;
sbit out3_n=P3^0;

unsigned int i,j,k=0,x1=0,y1=0,z1=0,t1=0;

void delay_2sec();
void delay_5sec();

void main()
```

```
{
        P2=0X38;
        P0=0X1C;
        P1=0X38;
        P3=0x38;
        while(1)
        {
        x1=0;
        y1=0;
        z1=0;
        t1=0;
        if(in1_w==1)
        x1=1;
        if(in1_w==1&&in2_w==1)
        x1=2;
        if(in1_w==1&&in2_w==1&&in3_w==1)
        x1=3;

        if(in1_n==1)
        y1=1;
        if(in1_n==1&&in2_n==1)
        y1=2;
        if(in1_n==1&&in2_n==1&&in3_n==1)
        y1=3;

        if(in1_e==1)
        z1=1;
        if(in1_e==1&&in2_e==1)
        z1=2;
        if(in1_e==1&&in2_e==1&&in3_e==1)
        z1=3;

        if(in1_s==1)
        t1=1;
        if(in1_s==1&&in2_s==1)
        t1=2;
```

```
if(in1_s==1&&in2_s==1&&in3_s==1)
t1=3;



    out1_w=0;
    out2_w=0;
    out3_w=1;

    out1_s=1;
    out2_s=0;
    out3_s=0;

    out1_e=1;
    out2_e=0;
    out3_e=0;

    out1_n=1;
    out2_n=0;
    out3_n=0;

for(k=0;k<=x1;k++)
    {
    delay_5sec();

    }
    out2_w=1;
    out3_w=0;
    delay_2sec();

    out1_n=0;
    out2_n=0;
    out3_n=1;

    out1_e=1;
    out2_e=0;
    out3_e=0;
```

```
        out1_s=1;
        out2_s=0;
        out3_s=0;

        out1_w=1;
        out2_w=0;
        out3_w=0;

for(k=0;k<=y1;k++)
        {
        delay_5sec();
        }
        out2_n=1;
        out3_n=0;
        delay_2sec();

        out1_e=0;
        out2_e=0;
        out3_e=1;

        out1_s=1;
        out2_s=0;
        out3_s=0;

        out1_n=1;
        out2_n=0;
        out3_n=0;

        out1_w=1;
        out2_w=0;
        out3_w=0;
for(k=0;k<=z1;k++)
        {
        delay_5sec();
        }
```

```
                out2_e=1;
                out3_e=0;
                delay_2sec();

                out1_s=0;
                out2_s=0;
                out3_s=1;

                out1_e=1;
                out2_e=0;
                out3_e=0;

                out1_n=1;
                out2_n=0;
                out3_n=0;

                out1_w=1;
                out2_w=0;
                out3_w=0;
        for(k=0;k<=t1;k++)
                {
                delay_5sec();
                }
                out2_s=1;
                out3_s=0;
                delay_2sec();


        }

}

/********************* 5s delay ******************/
void delay_5sec()
{
for(j=0;j<5;j++)
```

```
{
for(i=0;i<1000;i++)
{
        TMOD=0X01;
        TL0=0X69;
        TH0=0XFC;
        TR0=1;
        TF0=0;
        while(TF0==0);
        TF0=0;
        TR0=0;
}
}
}

/********************* 10s delay ******************/
void delay_2sec()
{
for(j=0;j<2;j++)
{
for(i=0;i<1000;i++)
{
        TMOD=0X01;
        TL0=0X69;
        TH0=0XFC;
        TR0=1;
        TF0=0;
        while(TF0==0);
        TF0=0;
        TR0=0;
}
}
}
```

Advantages: -

1. Smooth flow of traffic in every direction of streets.
2. Reduction of human effort for traffic control.
3. Reduction in waiting time of vehicles in specific directions.
4. Pollution control due to reduction in idle running time of vehicles.
5. No accumulation of population in every direction

Future work: -

1. It can be used for detection of smuggled items along with metal detectors.
2. It can be used in force sensing for detection of over loaded vehicles
3. It can be used for punishing the persons which breaks the traffic signals along with the barcode reader.
4. IR sensing itself can be used for alarm system along with the controller.
5. It can act like a counting machine for analyzing the average number of vehicles passing in certain duration which will allow to calculate life span of the roads.

Conclusions: - The traffic density control system is a future oriented system, which deals with the population accumulation problem directly. If modifications are carried out then it can prevent the accidents as well as animal density on the road. It is the process of producing ultrasonic wave of 20 to 35 KHz which is irritating for animals. It cannot be head by human and keeps the animals away. The flexibly of programming provides the beauty of applications in case of controllers. It can be a major step for AI in any system.

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