Department of Electrical and Electronic Engineering

Project Report Submission

Semester:Fall2021
CourseCode:EEE366***/ECE366***
Course Title: Microprocessors Laboratory

Project Title: *Token based service providing system for customer care.*

section:*03*
Group No: *06*

Group members:

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Date of Submission: *31/12/2021*

Introduction:

Token no based service providing system for a customer is the system where customer is given a token number from a token slip machine and customers take the service according to token number . In banks and many other service centers we observe this kind of operating system where the given number of token is shown simultaneously and customers take the service from that display booth. Here this project is done by a microcontroller named ATmega 32 with two 7-segment displays . The token based system is a time consuming system where a customer does not need to wait for a long time in the same queue rather than the customer service providers can call if the queue is free.

Objective:

A token number display system is where customers will be provided service according to their display number . Here the numbers will be shown in 7 segment displays simultaneously. We build the circuit using ATmega32 , Push button, resistor and 7 seven display to see how our the system works . Basically we designed the system in such way that if one booth is busy then another booth can work simultaneously so that people don't need to wait for long time .

We used interrupts to make our system work . Interrupt is a method of giving attention to a task which is not scheduled as an usual task .If we want to break the flow and attend a different task then we use interrupt . Whenever such situation occurs ,microcontroller raises a flag to the corresponding task. We used a 7 segment display which can show numbers from 0-9. So we designed a token number display system in such a way that we can use our interrupts and our 7 segment display properly .

Apparatus and Software:

1.ATmega32

2.7- segment Display

3. Button

4. Resistor

Software:

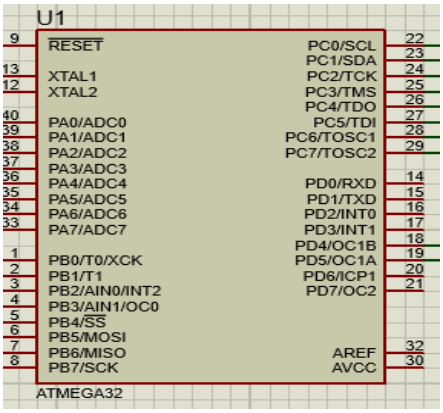
1.Proteus

2.Code vision AVR

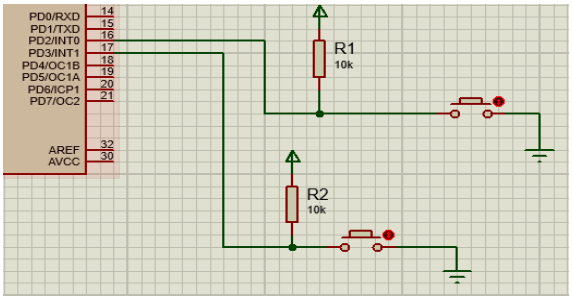
Specification:

This project is specified to show the token no on display board simultaneously where the customer can see his/her token no. While varying the token number we use push buttons as external interrupts to count the token no. The whole control will be processed by the main processing unit ATmega32 microcontroller and two 7-segment displays to show the token no.

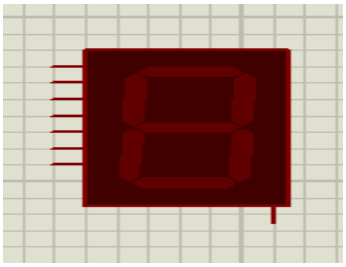
ATmega32: ATmega32 microController is a low power CMOS technology based controller.ATmega 32 is a 8 bit AVR microcontroller that make it convenient to program AVR controller while satisfying most of the embedded system.The special features of the following microcontroller indicated its internal calibrated RC oscillator and external and internal Interrupt source.To operate this microcontroller we need a voltage range with in 4.5v-5.5v.Since we are s displaying a 7 segment display where ATmega specified 0-16MHz. PortC and PortA are output ports. PortD PIN 2 and 3 use for the external interrupts.



Push Button: We use push buttons as external interrupts. PORTD2 and POIRTD3 are the interrupts for int0 and int1.We use pull up resistor and power Vcc to send 1 in out microcontroller. When we press the button it sends 0 to our microcontroller as a command input so that now the interrupts can work.



7-segment Display :The *7-segment display*, also written as "seven segment display", consists of seven LEDs (hence its name) arranged in a rectangular fashion as shown. Each of the seven LEDs is called a segment because when illuminated the segment forms part of a numerical digit (both Decimal and Hex) to be displayed.



Each one of the seven LEDs in the display is given a positional segment with one of its connection pins.The LED pins are connected together and wired to form a common pin. In our project we use &-seg cc display to show our token number from 1-9 serial.

Non-technical constraints:

Social Impact:

The social impact consists of environmental considerations in which ethics has been highlighted. We build a token number display system in such a way that we can save others time and energy and no need to make customers stand in long queues in sunlight or rain. Also we can assure that people are getting better service.

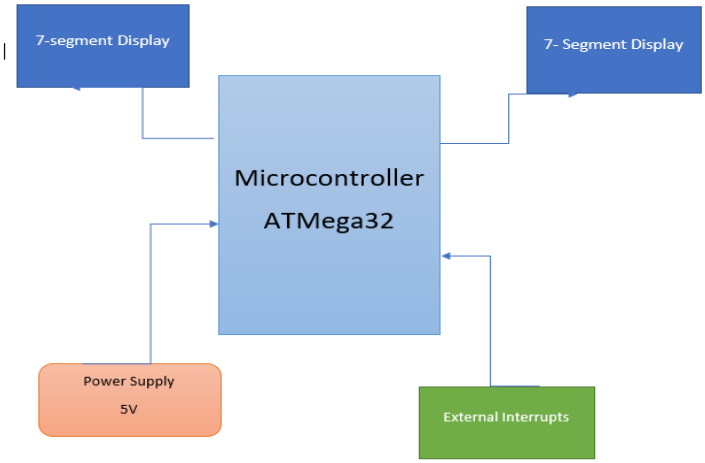
Health Impact:

We considered aged people's health so that they can get service quickly. Also they don't need to wait in a line for a longer time . Also we can consider sick people's condition .

Economic impact:

Atmega32 is far less expensive than the Arduino UNO, so we can simply build a token number system with it. As a consequence, the economical effect is reduced.

Methodology:



Here we use ATmega 32 microcontroller as our control unit for the project. We programmed our microcontroller in AVR code vision.We asked to show the token number which is given to the customers. To show the number we used 7 segment displays.To show the number simultaneously we had to use the external interrupts.

Now coming to the construction details of this project , we had to start the counting by pushing the button which we called as external interrupts in our code. The interrupt 0 and interrupt1. To enable this interrupts we declared it in our GICR register GICR|=(1<<INT1) | (1<<INT0) | (0<<INT2) , To enable the flag register for the INT0 and INT1 we declared GIFR=(1<<INTF1) | (1<<INTF0) | (0<<INTF2); And to determine our system edge as falling edge we enable MCUCR register.We use push buttons as external interrupts. PORTD2 and POIRTD3 are the interrupts for int0 and int1.We use pull up resistor and power Vcc to send 1 in out microcontroller. When we press the button it connects with the GND and sends 0 to our microcontroller as a command input so that now the interrupts can work.If we do not press any button it will send 1 and the system will not work. Our two displays connected with the microcontroller PORTA and PORTC. Moreover, to show the digits in 7-segments we declared the character digits.As to start counting the token number firstly we push our int0 button. after pressing it will start counting, for

Display 1 it will show 1 for the first customer and in display 2 it will show 2 for the 2nd customer. and If we press int1 first it will also show 1 for display 1 and 2 for display2. Hence, the 1st boot is busy and the 2nd booth is free, then the service provider will press the 2nd button and it will show the next number.It also goes the same for the 1st booth. If the 1st service provider presses the button the display will show the next number.In our code to declared the interrupt we use the global interrupt enable #asm("sei"). And for counting we use counter digit.

Design choices & alternatives:

Design approach 1: Aurdino:

The analysis of numerous projects and study has provided us with a comprehensive notion for an alternative design. The alternative concept we had in mind was to create the same token number system using an Arduino UNO instead of an Atmega32. Arduino is a fair and democratic electronics platform with simple hardware and software.we can design a token display system using the popular prototyping board – the Arduino and 7-segment LEDs.This system can be designed to initialize token numbers to zero on power-up. The user can increase or decrease token numbers using two push buttons provided as a user interface. The token number can never be negative, so the token counter can never be decremented below zero.

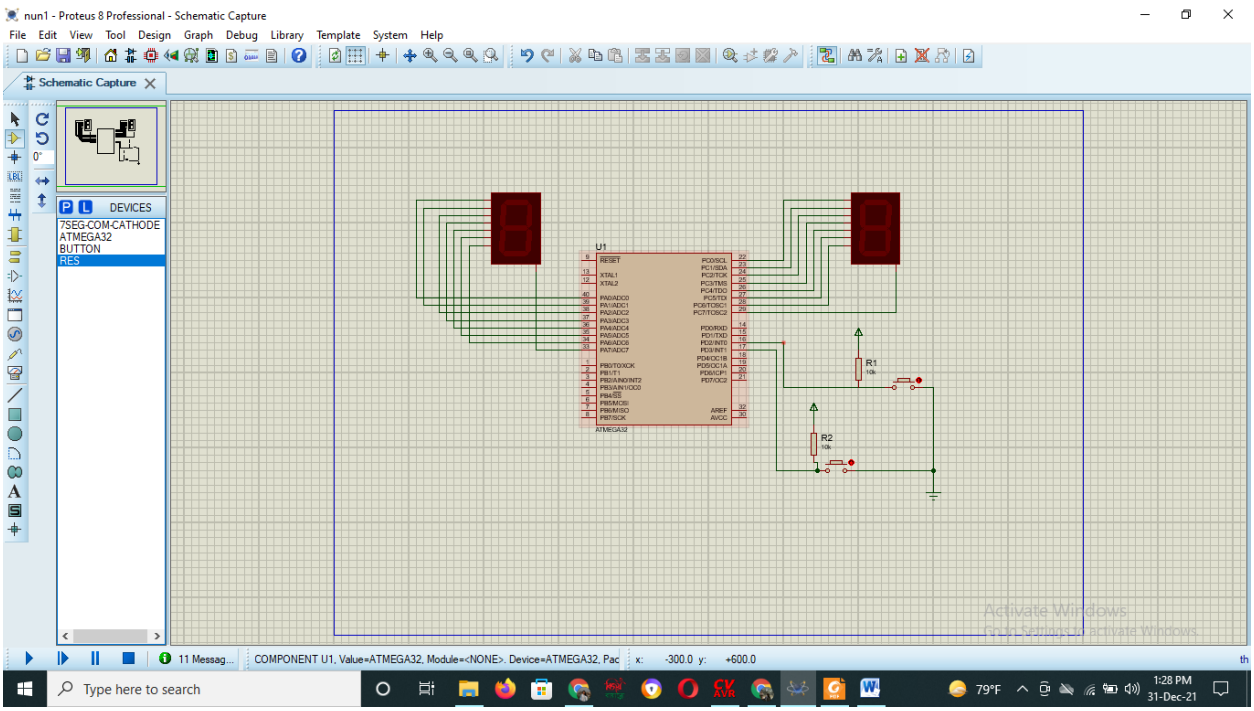
Design approach 2:Atmega 8 Microcontroller:

We can build token number display project is using ATmega8 Microcontroller and ULN2003 for driving large LED display,16V Capacitor,100,10K Ohm Resistors,Tactile Switches, BC558.The service operator operates the display to show the token number against which he is ready to take the service. The customer having the displayed token number can report to the service provider's counter to receive the service.

Justification of the best approach:

ATMEGA32 is easy to program AVR controller. With appreciable program memory it can satisfy most EMBEDDED SYSTEMS.Also Atmega32 is less expensive than Aurdino .

Circuit diagram



code:

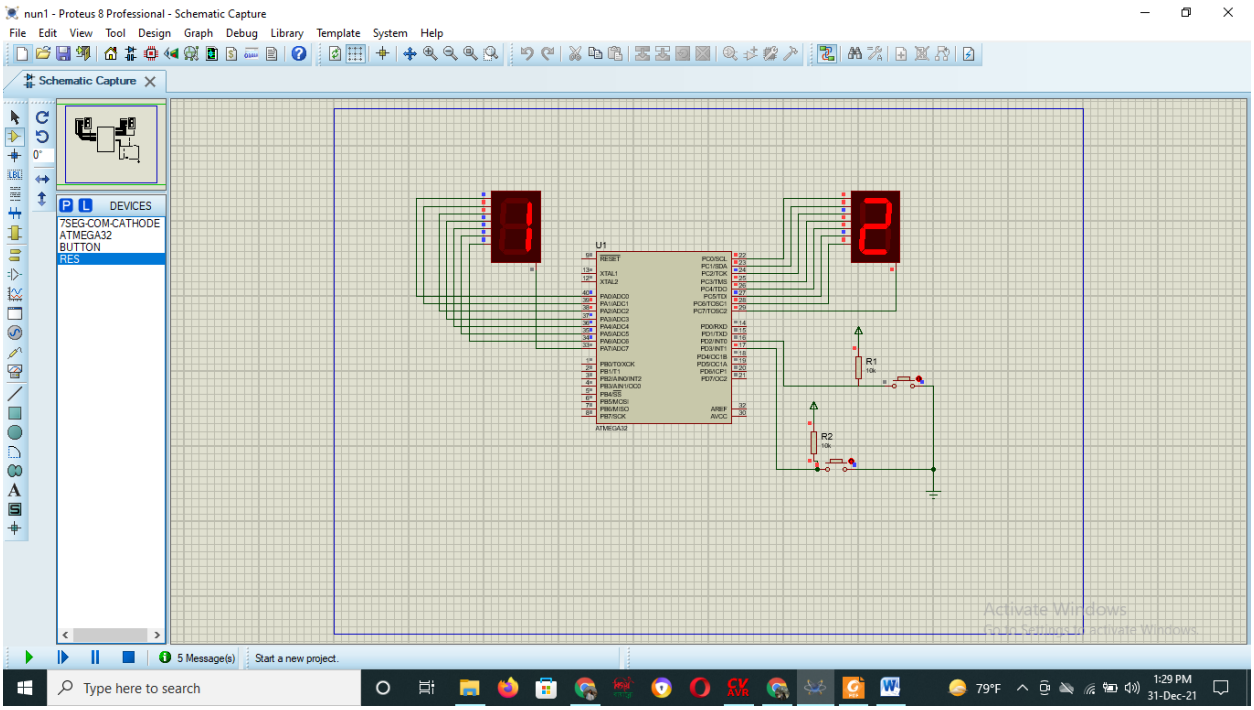
```
#include <mega32.h>

#define data_ddr DDRC

#define data_port PORTC

#define data_ddr1 DDRA

#define data_port1 PORTA
```

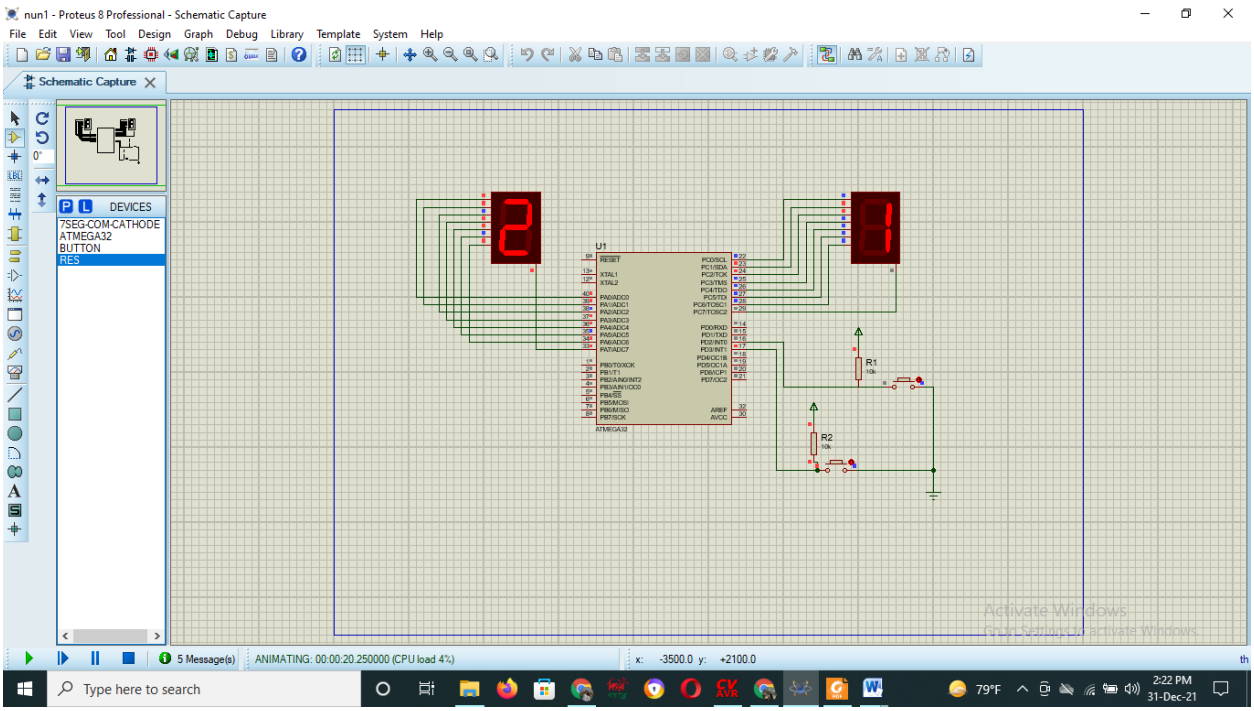
```
int COUNT=0;

char digit_cathode[10]={0x3F,0x06,0x5B,0x4F,0x66,0x6D,0x7D,0x07,0x7F,0x6F};

interrupt [EXT_INT0] void ext_int0_isr(void)

{

COUNT++;

data_port1=digit_cathode[COUNT];

}

interrupt [EXT_INT1] void ext_int1_isr(void)

{

#asm("sei")

COUNT++;

data_port=digit_cathode[COUNT];

}

void main(void)

{

data_ddr1=0xFF;

data_ddr=0xFF;

GICR|=(1<<INT1) | (1<<INT0) | (0<<INT2);

MCUCR=(1<<ISC11) | (0<<ISC10) | (1<<ISC01) | (0<<ISC00);

MCUCSR=(0<<ISC2);

GIFR=(1<<INTF1) | (1<<INTF0) | (0<<INTF2);
```

```
#asm("sei")

while (1)

{

}

}
```

Results & discussion:

Results :

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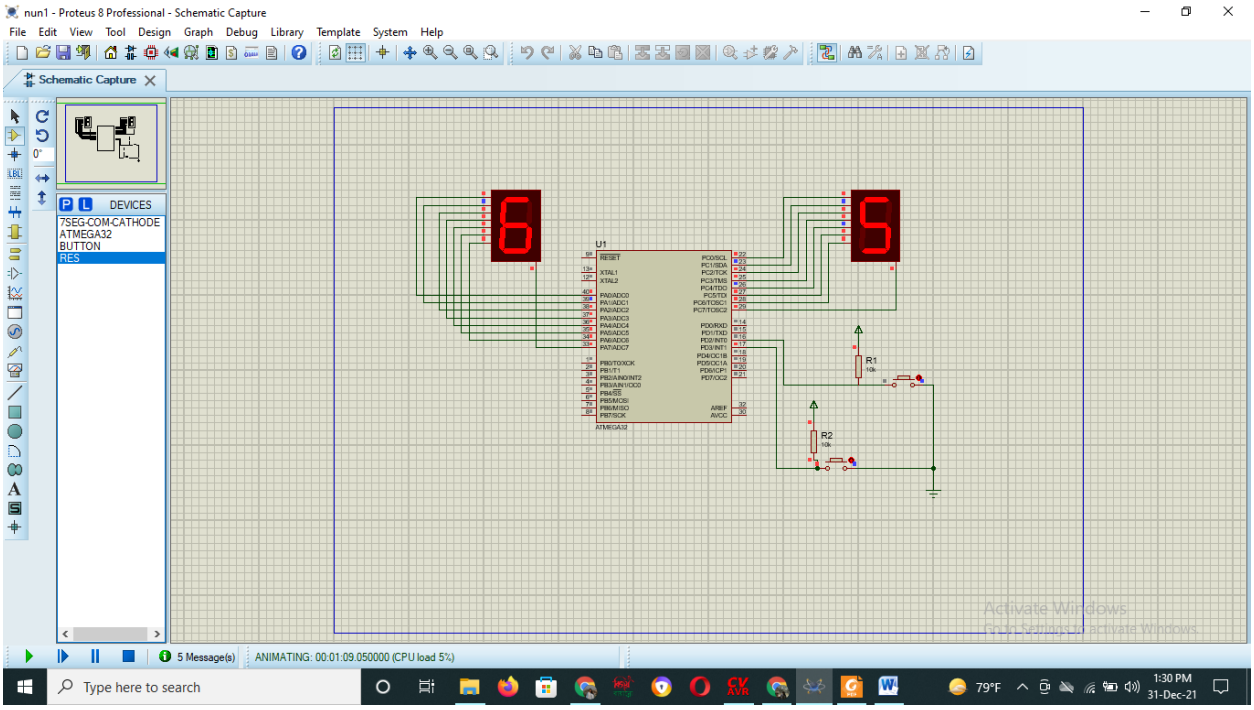
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After running the device we saw after pressing interrupt_zero , the display of PORTA (data_port1)started showing value and after pressing interrupt_one, the display of PORTC(data_port) started showing value. we designed the system in such a way that if display1 shows one value then another display will show the next value of the display1 . By pressing interrupts we can change 2 the values of the displays .We designed this in such a way that if one display takes longer time than we can press interrupts to see next number in another display simultaneously without making people wait.

Discussion :

The importance and application of Interrupts is enormous in every work-field and our daily life.We can do multiple tasks using interrupts .Initially we have encountered some obstacles while working on code and designing circuit. We have faced trouble configuring 7 segment display and how we will connect them . Also we faced trouble while implementing logic of how our both displays will get value simultaneously. However, after setting up well, it worked properly.

Applications:

Token Display System are ideal for Banks, Airports, Public dealing offices, Hospitals, Doctors Clinics, Restaurants and other such places where people have to wait in line for their turn.

Future scope:

Adding timer counter and lcd display : We can add timer counter and lcd display to see for how much time a customer is taking service . Then the lcd will display the token number along with hour ,minute ,seconds .

Multiple Digit Display in 7 segment : We can use multiple 7 segment displays to show 2-3 digit token numbers by connecting control ports in different pins and using digit separation technique .

Showing specific problems in Display : Also we can build a system that will show a customer's problem in display along with a token number.

References:

[1] George, L. (2012). Using Push Button Switch with Atmega32 and Atmel Studio. ElectroSome. https://electrosome.com/push-button-switch-atmega32-microcontroller-atmel-studio/amp/?fbclid=IwAR3pIcJOGJoI-bx-MwAe0rerwYvUXVy5P2IQgBd7zTbT9QQkbHXyHnxD6N4

[2]Token number display system using microcontroller. (2017). Atmega32-Avr. https://www.scribbr.com/apa-citation-generator/new/webpage/

Google drive link of source code and schematic

https://drive.google.com/drive/folders/1H_UORerDYbsF5JT7dmHgA5G-QGtkBZQj?usp=sharing