

AUTOMATED MOVABLE RAILWAY PLATFORM FOR RAILWAY CROSSING

S.Balakrishna¹, V.Lahari², S.Aparna², S.Saikumar²

Electronics and Communication Engineering Dept^{1,2}, TKR College of Engineering and Technology,
Affiliated to JNTU Hyderabad, Telangana, India

Abstract- *The main aim of this project is to simplify pedestrian crossing over railway track with a movable platform extension instead of a staircase. The prime reason for accidents in Indian railway station arrangement is that the “trains crossing on adjacent tracks in opposite direction”. In order to overcome this scenario our platform design uses single track between platforms so that passengers can board the train from both sides. Once train departed the platforms will be connected through the movable platform extensions so that the passengers can walk over them and cross the platforms. When a train is about to arrive at the station the buzzer alarms rings so that the passengers will walk away from the moving platform extension and once cleared platform will open for the train. In case if clearing the platform got delayed then the train will be stopped by sending necessary control signal from the railway platform control unit. The train status is monitored through the IR sensors to identify the exact position within station premises. The train’s status will be displayed on LCD displays over the platform for the passenger convenience. The platform control unit consists of Atmega16 microcontroller unit. In order to communicate with the train RF communication modules are used with transmitter at platform control unit and receiver being on the train control unit.*

Keywords- IR Sensors, ATmega16 Micro controller, Servomotor.

I.INTRODUCTION

The recent survey from the social analytic were said that the most disadvantage in Indian railway is climbing up the overhead steps for the physically challenged people. Our proposed system mainly deals with the rectification of this disadvantage. We introducing the new concept of Artificial Railway Platform^[2]. For successful approach we are using three IR sensors and for execution we are using Servomotor and for controlling we are using Atmega16 micro controller.

1.1 EXISTING SYSTEM

Now the braking is applied directly to the trains. So the interchanging of poles becomes too late, so the train will stop with some time delay. On viewing the platform crossing, it is difficult for the physically challenged people. Since it has steps over the tracks^[1]. Normally manual braking system is used to avoid collision. In addition to this we are using switching of tracks and train timing adjustments which is time consuming process. Manual braking too works only if it is noticed by the train driver. No artificial platform to minimize the distance to travel from one platform to other.

1.2 DRAWBACKS IN EXISTING SYSTEM

- Accidents may occurs.
- During platform passengers may fall in tracks.
- We cannot change the tracks immediately.
- Trains also cannot stopped immediately.

1.3 PROPOSAL SYSTEM

Our platform design uses single track between platforms so that passengers can board the train from both sides. Once train departed the platforms will be connected through the movable platform extensions so that the passengers can walk over them and cross the platforms. When a train is about to arrive at the station the buzzer alarms rings so that the passengers will walk away from the moving platform extension and once cleared platform will open for the train.

The train status is monitored through the IR sensors to identify the exact position within station premises. The train’s status will be displayed on LCD displays over the platform for the passenger convenience. The platform control unit consist of Atmega16 micro controller unit. In order to communicate with the train RF communication modules are used with transmitter at platform control unit and receiver being on the train control unit.

1.4 ADVANTAGES OF PROPOSAL SYSTEM

- Efficient tracking of train with respect to platform..
- Passangers can board the train from both sides of platform..
- Automatic platform leads to less time consumption.
- Reduces train accidents.

II. COMPONENTS USED

HARDWARE USED

ATMega16 embedded micro controller, regulated power supply, servo motor, 434MHz RF Transmitter STT-433, 434MHz RF Receiver STR-433, IR LED's, Piezoelectronic Buzzer's, IR sensors .

SOFTWARE USED

WinAVR, Proteus, .

2.1 MICROCONTROLLER

(XCK/T0) PB0	1	40	PA0 (ADC0)
(T1) PB1	2	39	PA1 (ADC1)
(INT2/AIN0) PB2	3	38	PA2 (ADC2)
(OC0/AIN1) PB3	4	37	PA3 (ADC3)
(SS) PB4	5	36	PA4 (ADC4)
(MOSI) PB5	6	35	PA5 (ADC5)
(MISO) PB6	7	34	PA6 (ADC6)
(SCK) PB7	8	33	PA7 (ADC7)
RESET	9	32	AREF
VCC	10	31	GND
GND	11	30	AVCC
XTAL2	12	29	PC7 (TOSC2)
XTAL1	13	28	PC6 (TOSC1)
(RXD) PD0	14	27	PC5 (TDI)
(TXD) PD1	15	26	PC4 (TDO)
(INT0) PD2	16	25	PC3 (TMS)
(INT1) PD3	17	24	PC2 (TCK)
(OC1B) PD4	18	23	PC1 (SDA)
(OC1A) PD5	19	22	PC0 (SCL)
(ICP1) PD6	20	21	PD7 (OC2)

Fig 2.1 ATMega16 Micro Controller

ATMega16 belongs to a class of 16bit microcontrollers.It has 16K bytes of In-system self programmable flash program memory,512 Bytes EEPROM,1K byte Internal SRAM,Optional boot code section with independent lock bits,true Read-while-write operation,programming Lock for software security.

2.2 IR SENSORS



Fig 2.2 IR SENSORS

An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings. It does this by either emitting or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

2.3 SERVO MOTOR

Servo refers to an error sensing feedback control which is used to correct the performance of a system. Servo or RC **Servo Motors** are DC motors equipped with a servo mechanism for precise control of angular position. The RC servo motors usually have a rotation limit from 90° to 180°. Some **servos** also have rotation limit of 360° or more. But servos do not rotate continually. Their rotation is restricted in between the fixed angles.

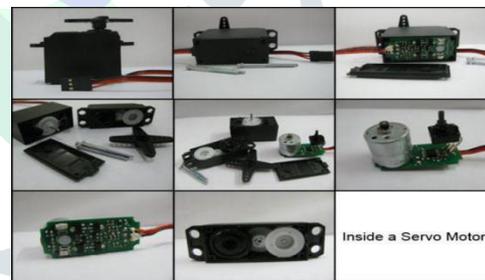


Fig 2.3.1 Servo motor

A servo motor mainly consists of a DC motor, gear system, a position sensor which is mostly a potentiometer, and control electronics.

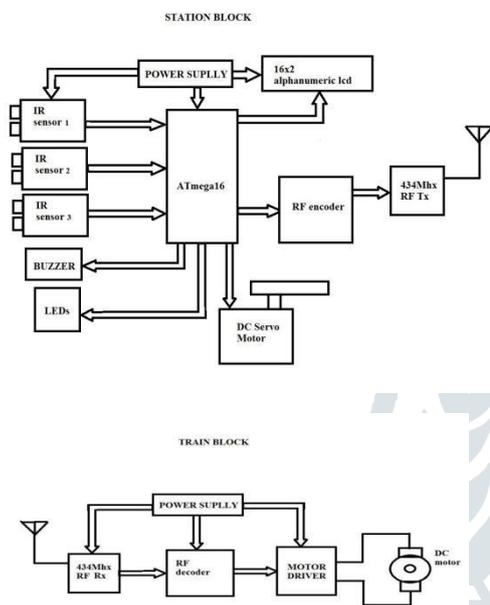
The DC motor is connected with a gear mechanism which provides feedback to a position sensor which is mostly a potentiometer. From the gear box, the output of the motor is delivered via servo spline to the servo arm. The potentiometer changes position corresponding to the current position of the motor. So the change in resistance produces an equivalent change in voltage from the potentiometer.

The difference signal is amplified and provided to the DC motor. So the signal applied to the DC servo motor is a damping wave which diminishes as the desired position is attained by the motor.

III BLOCKDIAGRAM

We introducing the new concept of Artificial Railway Platform. For successful approach we are using three IR sensors and for execution we are using Servomotor and for controlling we are using Atmega16 micro controller.

The power supply is given to the controller pins of power supply. Servomotor is used for the forward and reverse movement of the platform. When the train^[3] is far away from the artificial platform the signal sends to micro controller, and then the output signal from the controller is send to servo motor. It will keep the platform connected.



When the train comes near the artificial platform and crosses the first IR sensor, the IR sensor senses the train and gives its output to the micro controller, then the output of the controller is send to servomotor. Then servomotor moves the artificial platform^[5] backwards by making buzzer sound and makes artificial platform opened and also micro controller sends the information to the alphanumeric LCD to display “TRAIN ARRIVING ,PLATFORM OPENING”. And also shows the red light.

When the train crosses the second IR sensor, the sensor senses the train and passes the signal to the micro controller, then the output of the micro controller is sends the STOP command to RF receiver which is present in train, the train stops at the platform for the particular time period which is assigned to the time delay circuit. Then the micro controller passes the signal to the alphanumeric LCD to display “TRAIN ARRIVED ,GET ON BOARD”. After the completion of the time delay the micro controller gives the START command to the RF receiver which makes train start

from the plat form and micro controller also sends the signal to the alphanumeric LCD to display “TRAIN STARTED”.

When the train crosses the third IR sensor, the sensor senses the train and passes the signal to the micro controller and then the output from the controller is send to servomotor. Then the servomotor makes artificial platform move forward and stays connected along with buzzer sound. Micro controller also sends the information to the alphanumeric lcd to display “PLATFORM CLOSED,FREE TO WALK”.LED displays green light.

IV CIRCUIT DIAGRAM

The schematic diagram automated movable railway platform explains the interfacing section of each component with micro controller and WIFI modem which is to be identified.

In this we are connecting IR sensors to PORTA of ATmega16 micro controller, this sensors will sense the train and sends the signal to the controller.

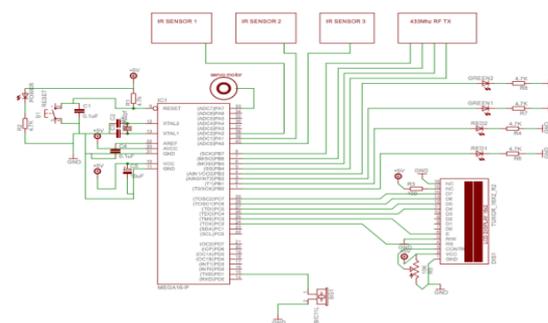


Fig 4:Circuit diagram

And LED’s are connected to PORTB(pin0-pin3) of the controller. Red light is on when the train is arriving or at the station. Green light is on when the platform is clear and the train is departed.

RF 434MHz transmitter is connected to PORT B(pin4-pin7) of the controller. It transmits the signal to the RF 434MHz receiver present in the train.

Alphanumeric LCD is connected to PORT C of the controller. It displays the status of the train and artificial platform.

The buzzer is connected to PORT D of the controller. It is ON when the artificial platform is connected or disconnected.

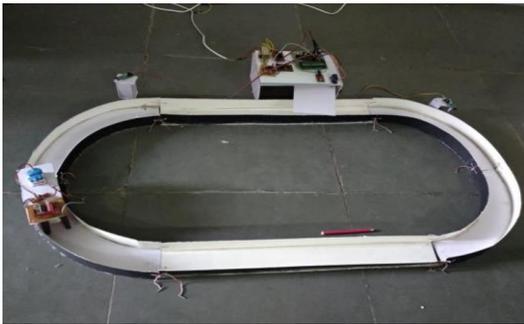
V RESULT

Fig 5.2.1: Overall view of project

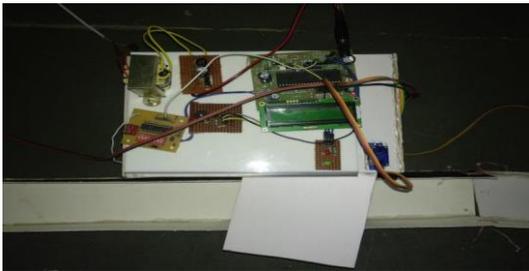


Fig 5.2.2: Platform module

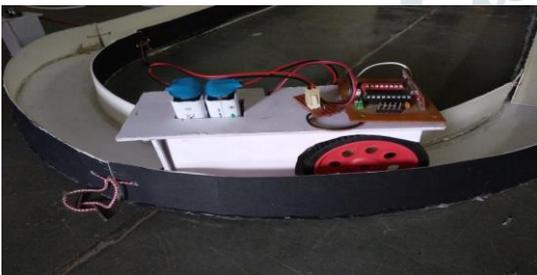


Fig 5.2.3: Train module

VI PROGRAM CODE

```
#define setbit(adrs,pos) adrs=(adrs|(0x01<<pos))
#define clrbit(adrs,pos) adrs=(adrs&~(0x01<<pos))

#define getbit(adrs,pos) ((adrs&(0x01<<pos))>>pos)

#include<avr/io.h>
#include<util/delay.h>

void lcd_data(unsigned char data);//dec
```

```
void lcd_cmd(unsigned char cmd);//dec
void lcd_string( const char mystr[16]);//dec
```

```
volatile unsigned char gate_speed=0;// gate speed
control variable
```

```
void main(void)
{
```

```
// lcd initialization
```

```
DDRC=0xff;
```

```
PORTC=0x00;
```

```
_delay_ms(100);
```

```
lcd_cmd(0x02);// LCD CONFIGURATION
```

```
lcd_cmd(0x28);// 4bit 2line 5x7dot
```

```
lcd_cmd(0x0e);// display on cursor on
```

```
lcd_cmd(0x06);// data entry mode
```

```
lcd_cmd(0x01);// clear screen
```

```
lcd_cmd(0x80);// row 1
```

```
// =====
```

```
// IR sensor initialization
```

```
clrbit(DDRA,PA2);//sensor 1 PA2 as input
```

```
clrbit(DDRA,PA1);//sensor 2 PA1 as input
```

```
clrbit(DDRA,PA0);//sensor 3 PA0 as input
```

```
clrbit(PORTA,PA2);//internal pull up, default high on
pin
```

```
clrbit(PORTA,PA1);//internal pull up, default high on
pin
```

```
clrbit(PORTA,PA0);//internal pull up, default high on
pin
```

```
// =====
```

```
// Servo motor initialization
```

```
setbit(DDRA,PA6);//servo motor PA6 as output
```

```
clrbit(PORTA,PA6); // bit value to zero
```

```

//=====
// RF TX module initialization
    setbit(DDRB,PB7);//RF3 PB7 as output
    setbit(DDRB,PB6);//RF2 PB7 as output
    setbit(DDRB,PB5);//RF1 PB7 as output
    setbit(DDRB,PB4);//RF0 PB7 as output
    clrbit(PORTB,PB7);// train stop
//=====
// buzzer initialization setbit(DDRD,PD1);//BUZZER
PD1 as output
//=====
// LED initialization
    setbit(DDRB,PB3);//GREEN2 PB3 as output
    setbit(DDRB,PB2);//GREEN1 PB2 as output
    setbit(DDRB,PB1);//RED2 PB1 as output
    setbit(DDRB,PB0);//RED1 PB0 as output
//=====

    lcd_cmd(0x01);//clear display
    lcd_cmd(0x80);//row 1
    lcd_string("TRAIN ARRIVING");
    lcd_cmd(0xc0);//row 2
    lcd_string("PLATFORM OPENING");
    for(gate_speed=0;gate_speed<100;gate_speed++)//
platform opening for train
    {
        setbit(PORTA,PA6);
        _delay_us(500+(gate_speed*10));
        clrbit(PORTA,PA6);
        _delay_us(17500);
    }
    _delay_ms(3000);

for(gate_speed=0;gate_speed<100;gate_speed++)
//platfrom closed on start
    {
        setbit(PORTA,PA6);
        _delay_us(500);
        clrbit(PORTA,PA6);
        _delay_us(17500);
    }
while(1)
{
    if(getbit(PINA,PA2)==1) // sensor 1 before
station
    {
        clrbit(PORTB,PB7);// train stop
        clrbit(PORTB,PB3);// green lights off
        clrbit(PORTB,PB2);// green lights off

        setbit(PORTB,PB1);// red lights on
        setbit(PORTB,PB0);// red lights on
        setbit(PORTD,PD1);// buz on

        lcd_cmd(0x01);//clear display
        lcd_cmd(0x80);//row 1
        lcd_string("TRAIN ARRIVING");
        lcd_cmd(0xc0);//row 2
        lcd_string("PLATFORM OPENING");
        for(gate_speed=0;gate_speed<100;gate_speed++)//
platform opening for train
        {
            setbit(PORTA,PA6);
            _delay_us(500+(gate_speed*10));
            clrbit(PORTA,PA6);
            _delay_us(17500);
        }
        _delay_ms(3000);

        clrbit(PORTD,PD1);// buz off

        lcd_cmd(0x01);//clear display

        lcd_cmd(0x80);//row 1
        lcd_string("PLATFORM OPENED");
    }
}

```

```

setbit(PORTB,PB7);// train start
_delay_ms(2000);//
===== change delay asper train
reach
}
if(getbit(PINA,PA1)==1)// sensor 2 at the
station
{
clrbit(PORTB,PB7);// train stop

lcd_cmd(0x01);//clear display

lcd_cmd(0x80);//row 1
lcd_string("TRAIN ARRIVED");

lcd_cmd(0xc0);//row 2
lcd_string("GET ONBOARD");

_delay_ms(5000);

lcd_cmd(0x01);//clear display

lcd_cmd(0x80);//row 1
lcd_string("TRAIN STARTING");

_delay_ms(2000);
lcd_cmd(0x01);//clear display

lcd_cmd(0x80);//row 1

lcd_string("TRAIN STARTED");

setbit(PORTB,PB7);// train start

_delay_ms(1000);///
===== change delay asper train
depart
}
if(getbit(PINA,PA0)==1) // sensor 3 after station
{
lcd_cmd(0x01);//clear display

lcd_cmd(0x80);//row 1
lcd_string("TRAIN LEFT");

lcd_cmd(0xc0);//row 2
lcd_string("PLATFROM CLOSING");

for(gate_speed=0;gate_speed<100;gate_speed++)//
platform closed
{
setbit(PORTA,PA6);
_delay_us(1500-(gate_speed*10));
clrbit(PORTA,PA6);
_delay_us(17500);
}

_delay_ms(2000);

lcd_cmd(0x01);//clear display

lcd_cmd(0x80);//row 1

lcd_string("PLATFROM CLOSED");

lcd_cmd(0xc0);//row 2
lcd_string("FREE TO WALK");

```

```

        setbit(PORTB,PB3);// green lights on
        setbit(PORTB,PB2);// green lights on
        clrbit(PORTB,PB1);// red lights off
        clrbit(PORTB,PB0);// red lights off
    }
} //end of while
} //end of main

void lcd_data(unsigned char data)//def
{
    unsigned char local_var1,local_var2,var3;
    //local_var1=data;
    local_var2=data<<4;
    setbit(PORTC,PC2); // RS high

    var3=(PORTC & 0X0F);
    local_var1=(data & 0xF0);
    PORTC=(var3|local_var1);

    setbit(PORTC,PC3);//EN
    _delay_ms(10);
    clrbit(PORTC,PC3);
    _delay_ms(10);

    var3=(PORTC & 0X0F);
    local_var1=(local_var2 & 0xF0);
    PORTC=(var3|local_var1);

    setbit(PORTC,PC3);
    _delay_ms(10);
    clrbit(PORTC,PC3);
    _delay_ms(10);
}

void lcd_cmd(unsigned char cmd)//def
{
    unsigned char local_var1,local_var2,var3;
    local_var1=cmd;
    local_var2=cmd<<4;
    clrbit(PORTC,PC2);//RS low command

    var3=(PORTC & 0X0F);
    local_var1=(cmd & 0xF0);
    PORTC=(var3|local_var1);

    setbit(PORTC,PC3);
    _delay_ms(10);
    clrbit(PORTC,PC3);
    _delay_ms(10);

    var3=(PORTC & 0X0F);
    local_var1=(local_var2 & 0xF0);
    PORTC=(var3|local_var1);

    setbit(PORTC,PC3);
    _delay_ms(10);
    clrbit(PORTC,PC3);
    _delay_ms(10);
}

void lcd_string( const char mystr[16])//dec
{
    unsigned char local_cnt=0;

    for(local_cnt=0;(mystr[local_cnt]!=0)&&(local_cnt<16)
    ;local_cnt++)
    {
        lcd_data(mystr[local_cnt]);
    }
}

```

}

AUTHORS BIODATA

ADVANTAGES

- Efficient tracking of train with respect to platform.
- Passengers can board the train from both sides of platform.
- Automatic platform leads to less time consumption.
- Reduces train accidents.
- Highly helpful to physically challenged people



S. Balakrishna, recieved his B.Tech degree in Electronics and Communication Engineering from Jawaharlal Nehru Technological University in 2012 and he completed his M.Tech from Jawaharlal Nehru Technological University in 2014. He worked as Assistant Professor in TKR college of Engineering and Technology, HYD.

CONCLUSION

Automatic movable railway platform use the brilliant office to the physically challenged people in railway intersection to cross the platform without utilizing flyovers. By using this project we can avoid collision. Indian railways can use this project to enhance the service to people. This frame work gives an extreme change of Indian Railway System. The framework gives completely programmed control. We had tested this kit and it is working properly.



S. Aparna, persuing B.Tech final year in Electronics and Communication Engineering from TKR college of Engineering and Technology in 2018-2019, HYD.



V. Lahari, persuing B.Tech final year in Electronics and Communication Engineering from TKR college of Engineering and Technology in 2018-2019, HYD.

REFERENCES

- [1] M. Khan, X. Zhou, "Stochastic optimization model and solution algorithm for robust double-track train-timetabling problem", *IEEE Trans.*
- [2] L. Li, H. Zhang, X. Wang, W. Lu, Z. Mu, "Urban transit coordination using an artificial transportation system", *IEEE Trans.*
- [3] R. D. Pascoe, T. N. Eichorn, "What is communication-based train control", *IEEE Veh.*
- [4] C. Briso-Rodriguez, J. Cruz, J. Alonso, "Measurements and modeling of distributed antenna systems in railway tunnels", *IEEE Trans.*
- [5] L. Zhu, F. R. Yu, B. Ning, T. Tang, "Cross-layer design for video transmissions in metro passenger information systems", *IEEE Trans.*



S. SaiKumar, persuing B.Tech final year in Electronics and Communication Engineering from TKR college of Engineering and Technology in 2018-2019, HYD.