IS 1900 (Business Project)

Individual Contribution

Raguraj S. (205080K)

Anti-Sleep alarm with Alcohol & flame detector

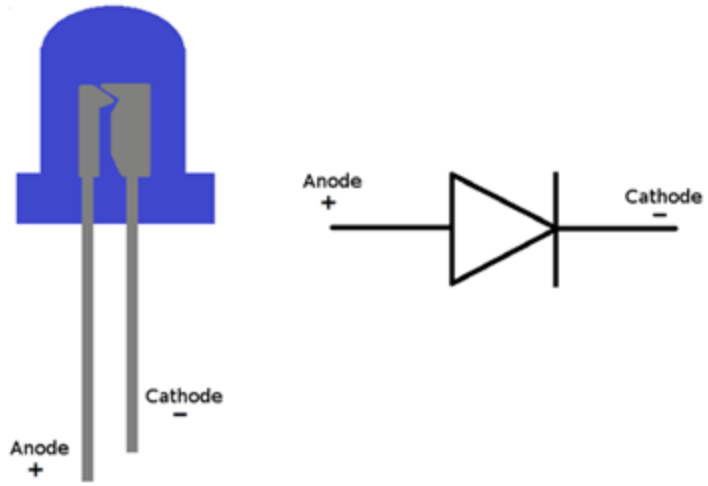
Group No :08

Responsibilities

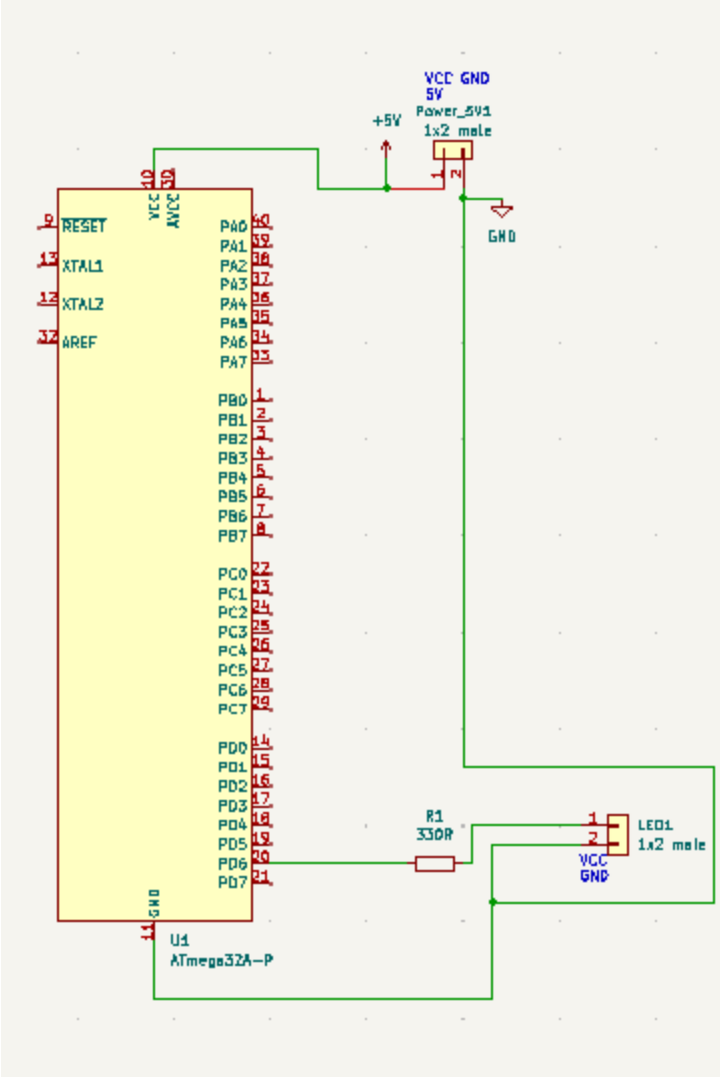
- Gyroscope module
- LED and Buzzer
- Potentiometer
- DC Motor
- Push Button

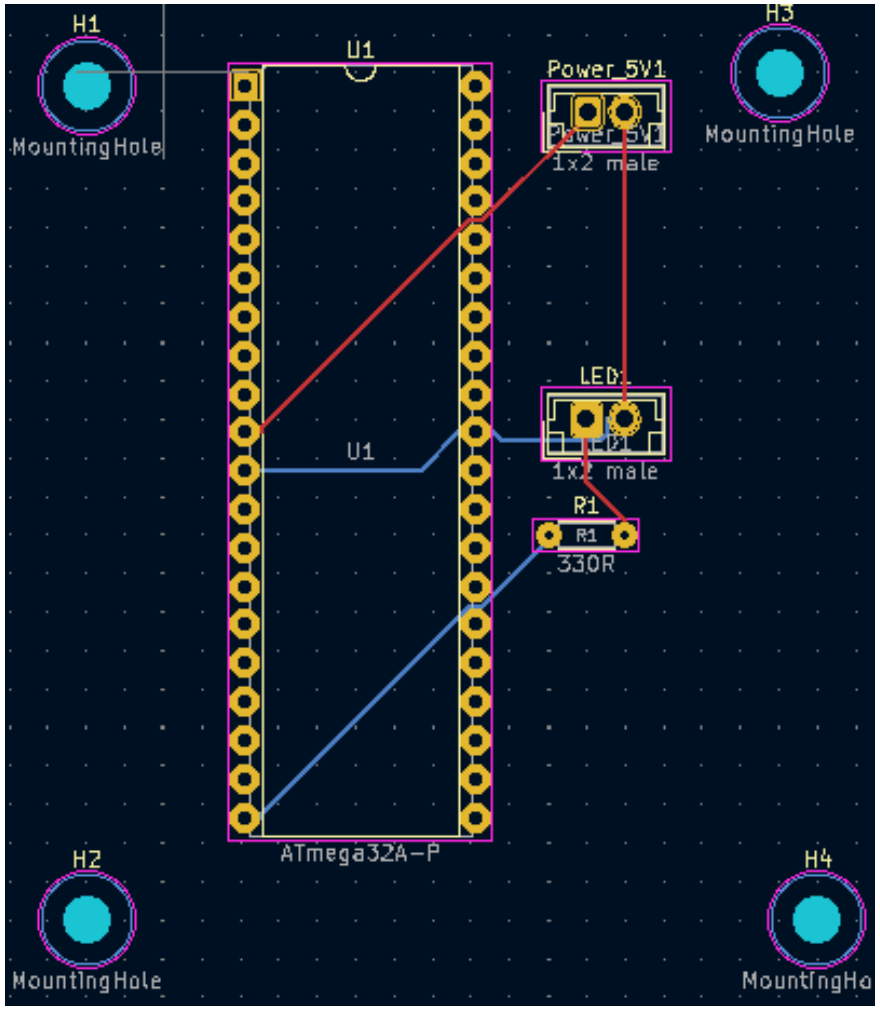
LED - Orange

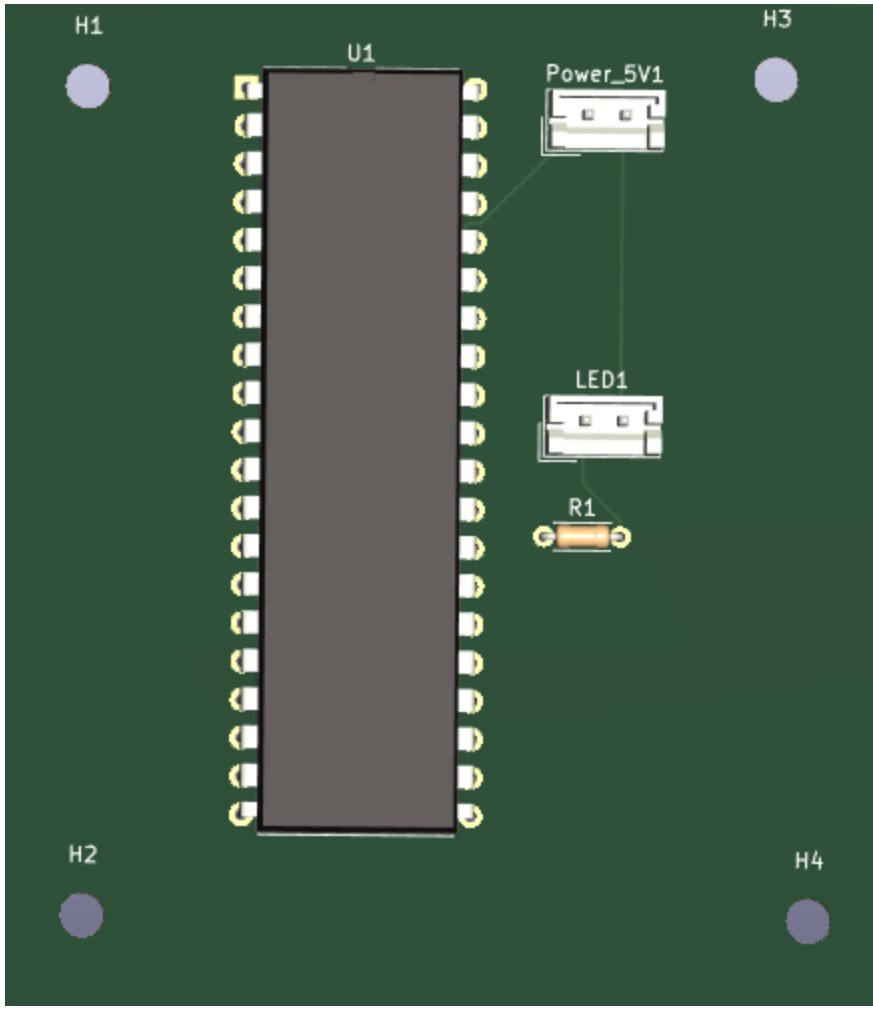
- Voltage Range (RED) : 3 to 10V DC
- Current: 30mA
- Number of Pins : 2 (Anode and Cathode)
- Operating Temperature Range : −40° to +80°C
- Output : Light
- Purpose : To add Hazard Light to the system



Schematic, PCB, Silkscreen of LED

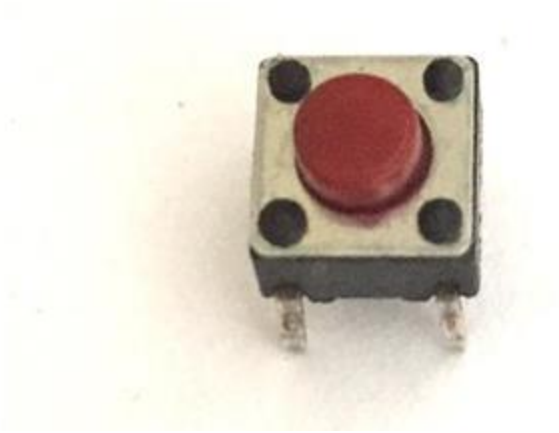






Push Button

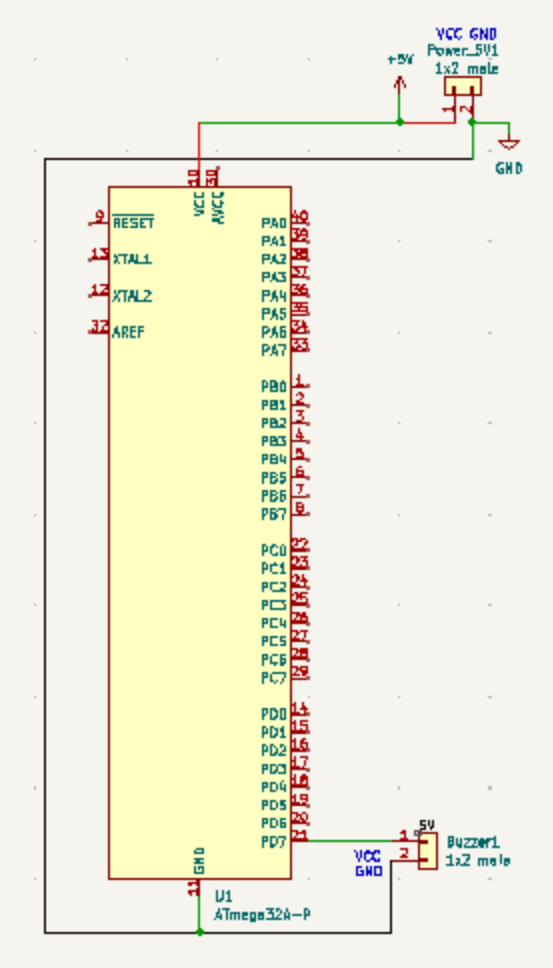
- Mode of Operation: Tactile feedback
- Power Rating: Maximum 50mA 24V DC
- Operating Temperature Range: -20 to +70 ℃
- We are using push button to allow driver to stop the alarm when sleepiness is identified in driver

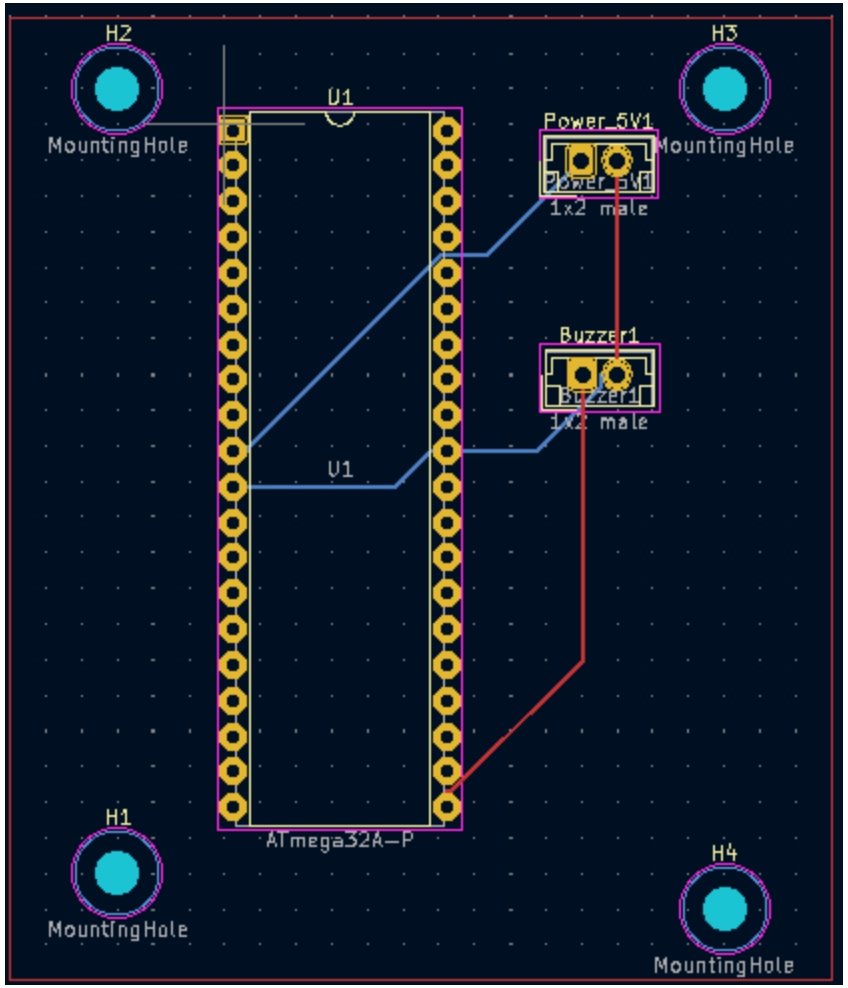


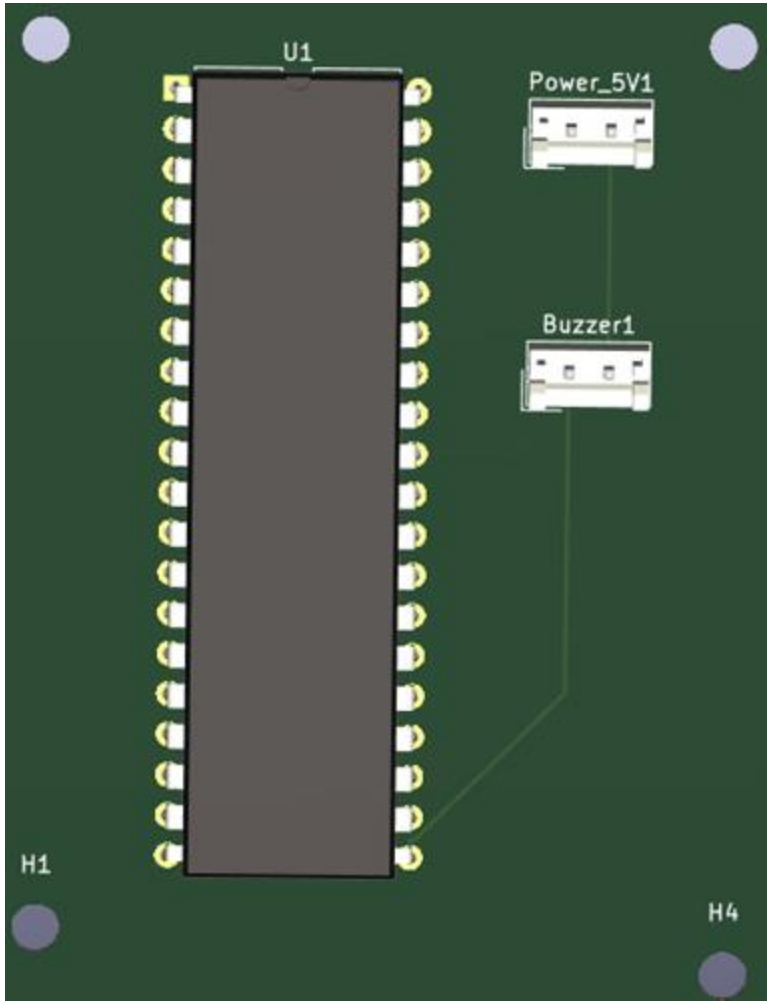
Buzzer

- Voltage Range : 4V to 8V DC
- Rated Voltage : 6V DC
- Rated Current : ≤ 30 mA
- Number of Pins : 2 (Positive and Negative)
- Output : High Pitch Beep Sound - Continuous
- Purpose : To add sound alert to system

Schematic, PCB, Silkscreen of Buzzer

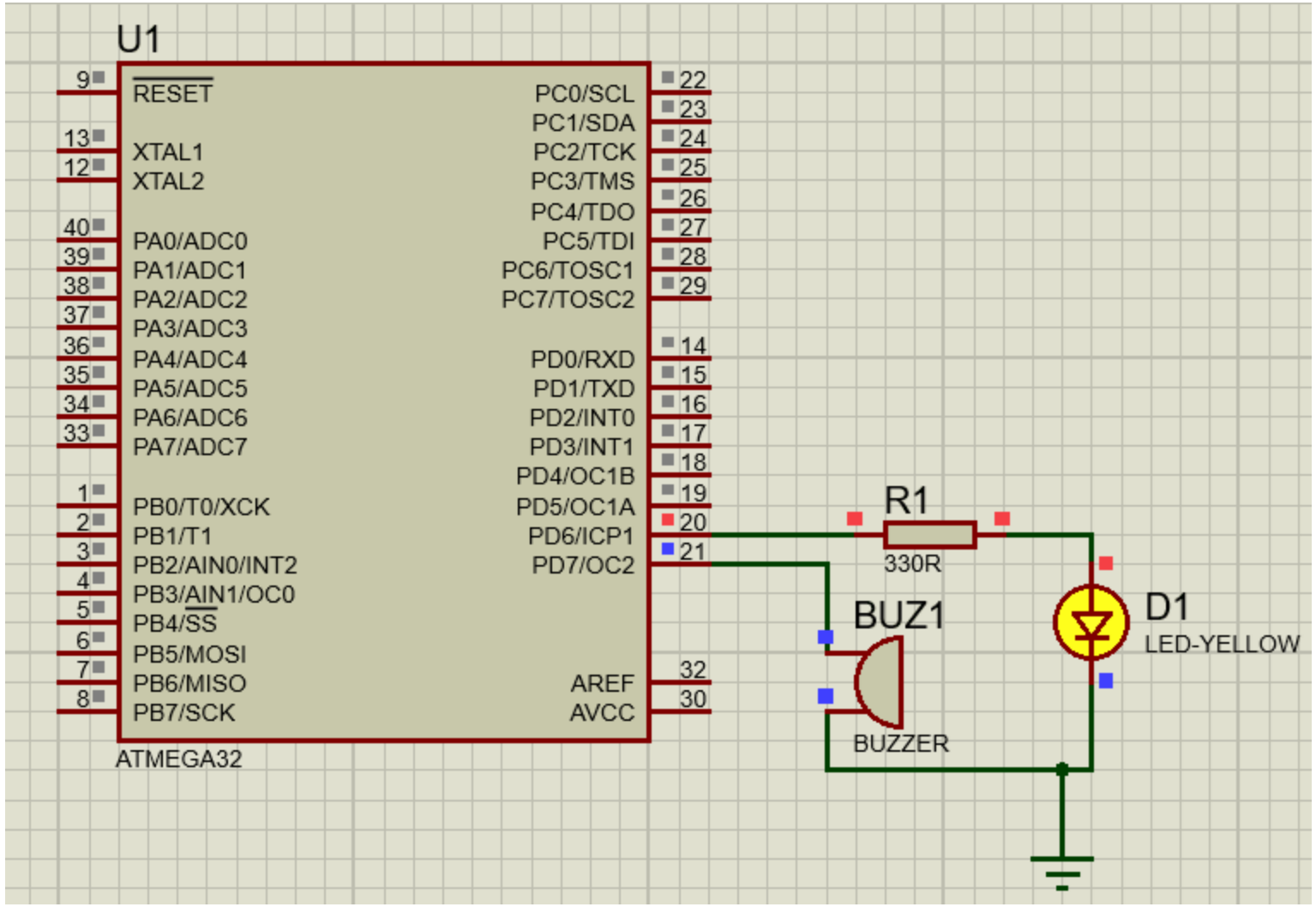






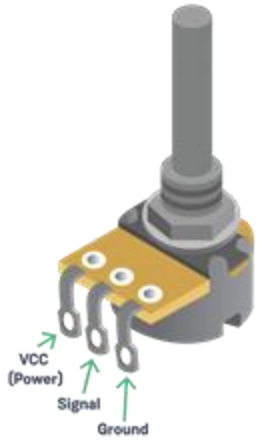
Code for LED and Buzzer and Simulation

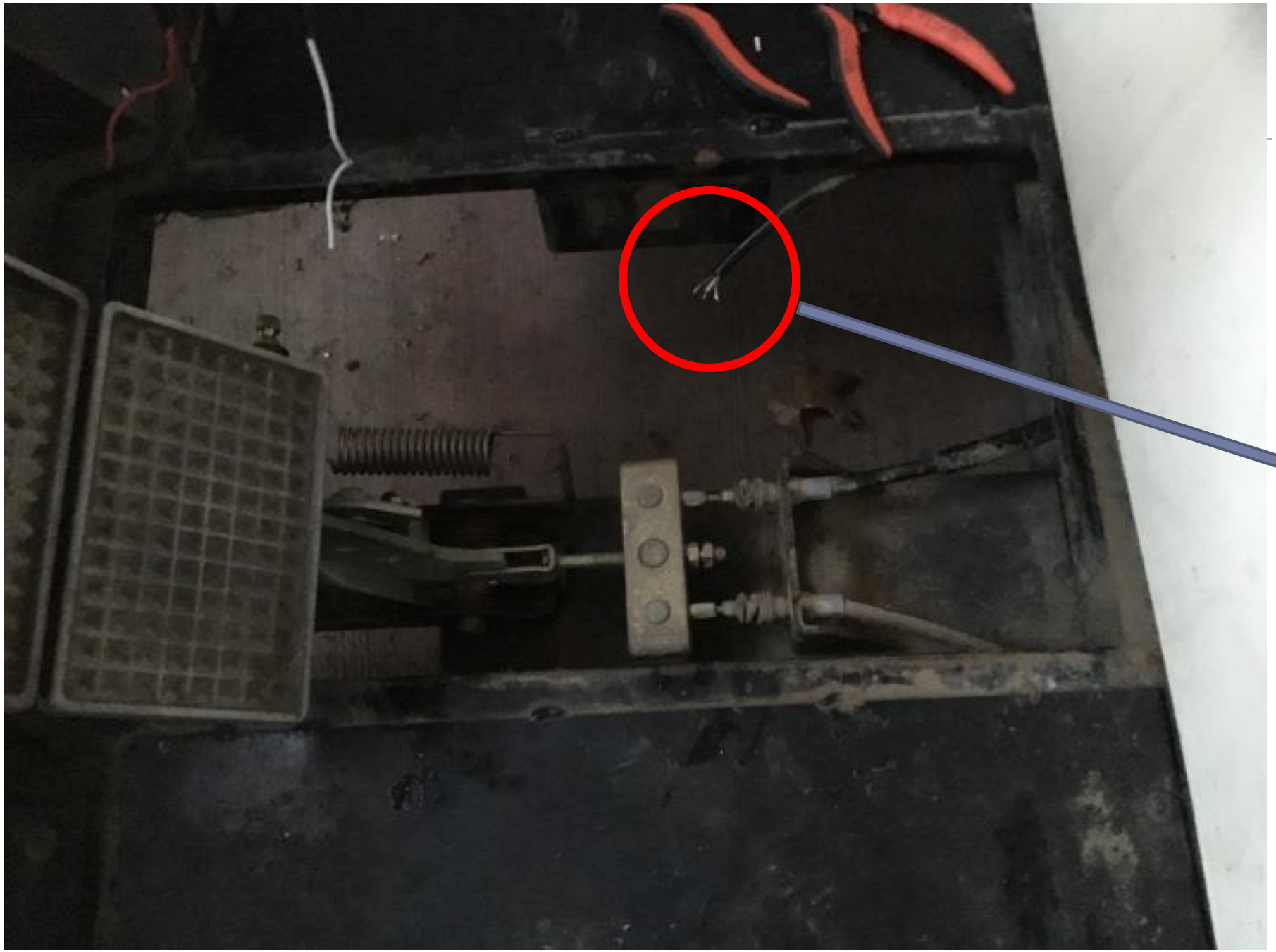
```c
#define F_CPU 8000000UL
#include <avr/io.h>
#include <util/delay.h>
int main()
{
    DDRD = 0xC0;
    while(1){
        PORTD = 0x40;
        _delay_ms(1000);
        PORTD = 0x80;
        _delay_ms(1000);
        PORTD = 0x00;
        _delay_ms(1000);
    }
    return 0;
}
```



Potentiometer

- Standard Resistance : 0 to 1000 Ohms (1K Ohms)
- Maximum Operating Voltage : 200V
- Operating Temperature : -10° C to +75° C
- Pins : Ground, VCC, Analog signal
- Purpose : to simulate the Accelerator

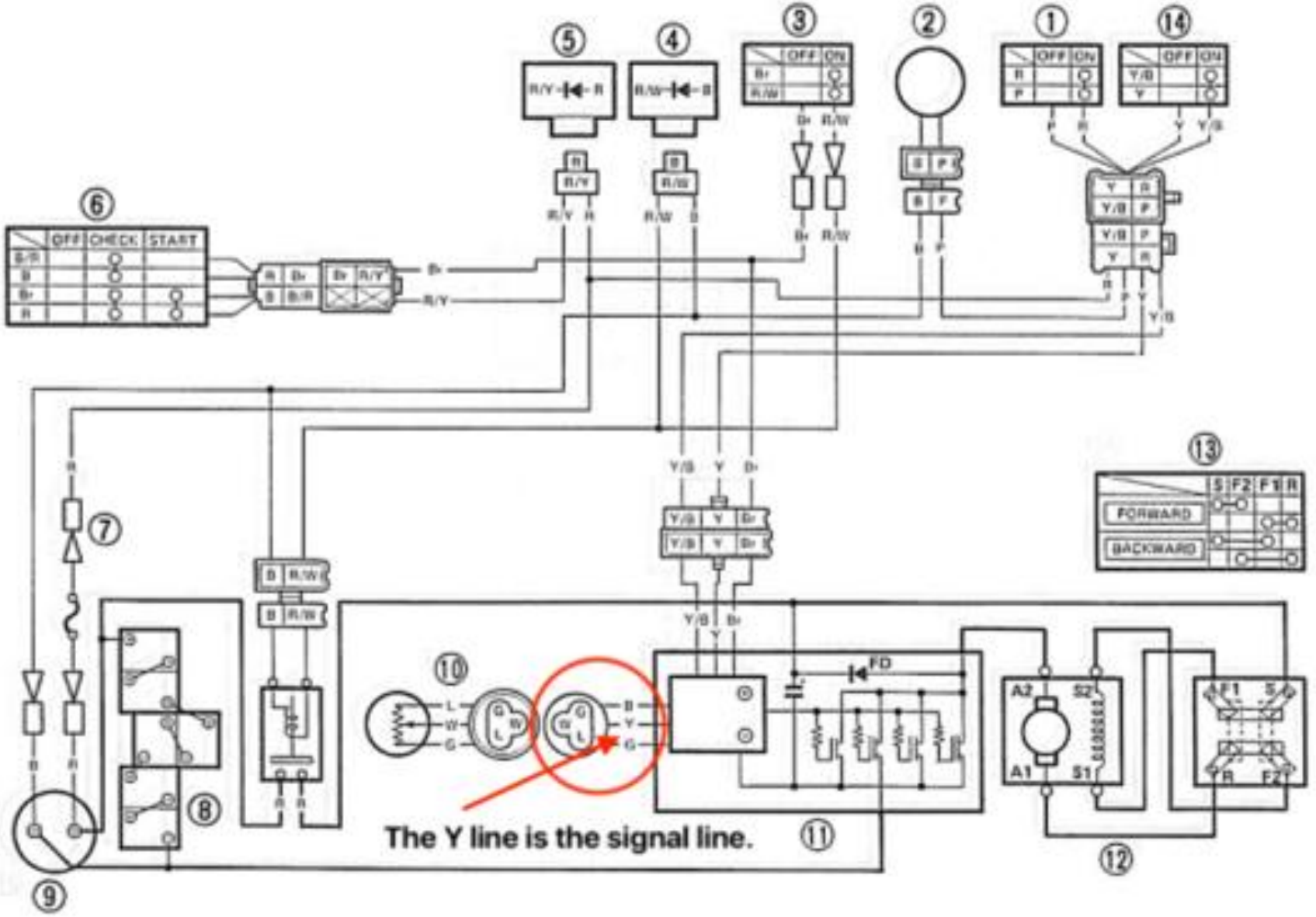




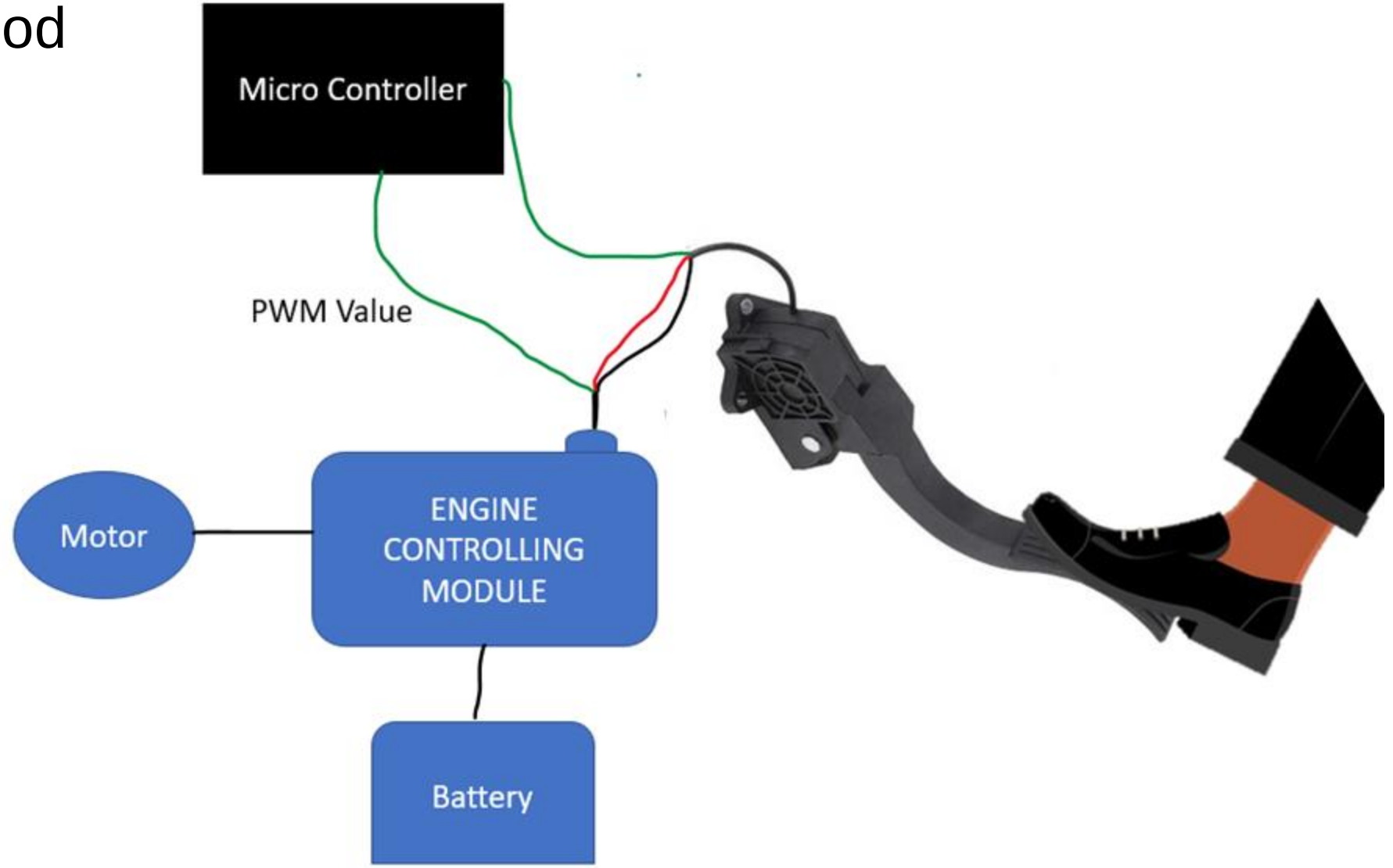
Accelerator signal cable (VCC, GND and Signal)

Circuit Diagram

Vehicle's view

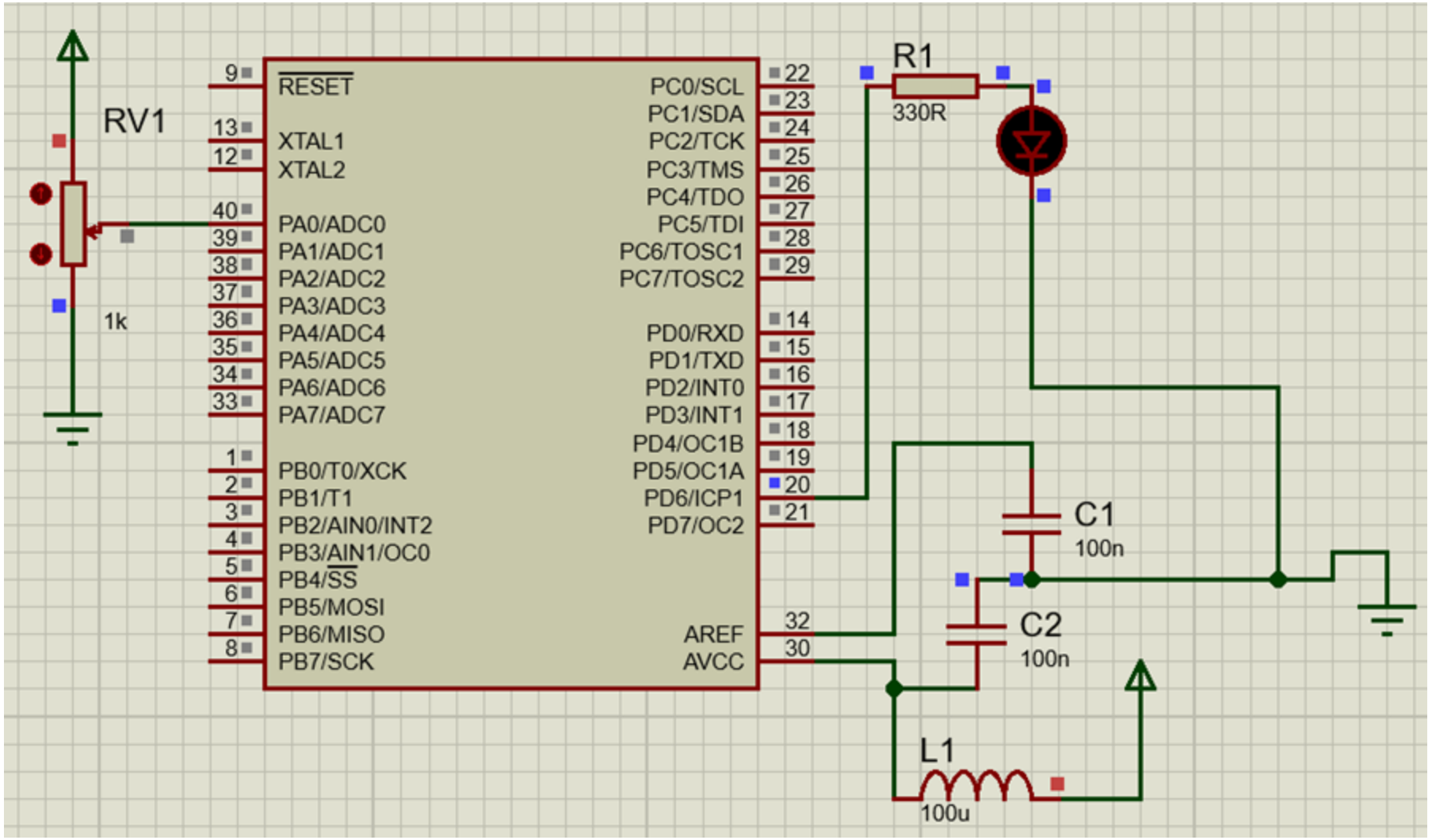


Connection Method

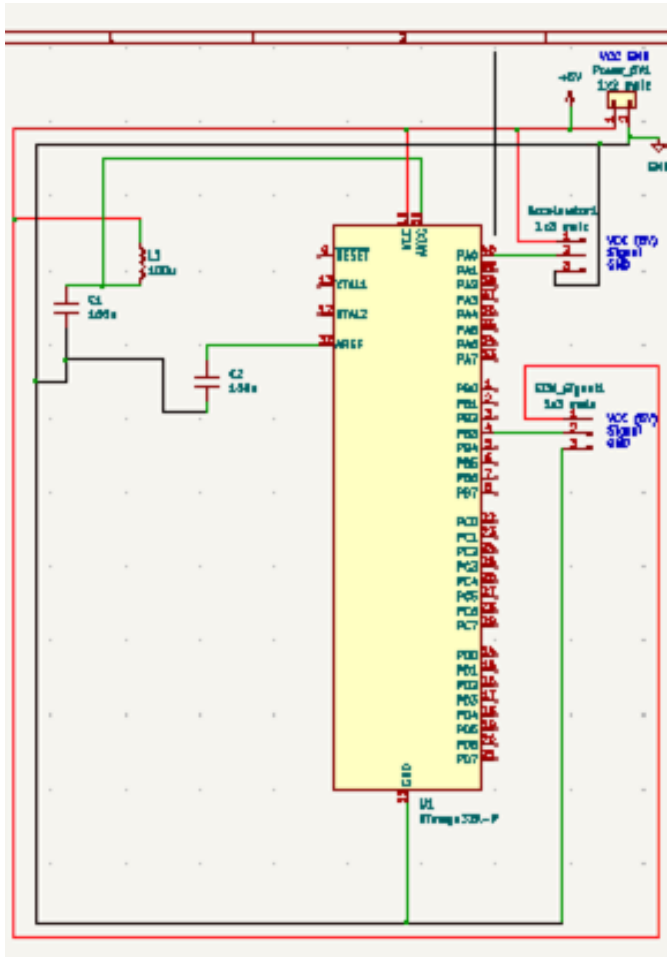


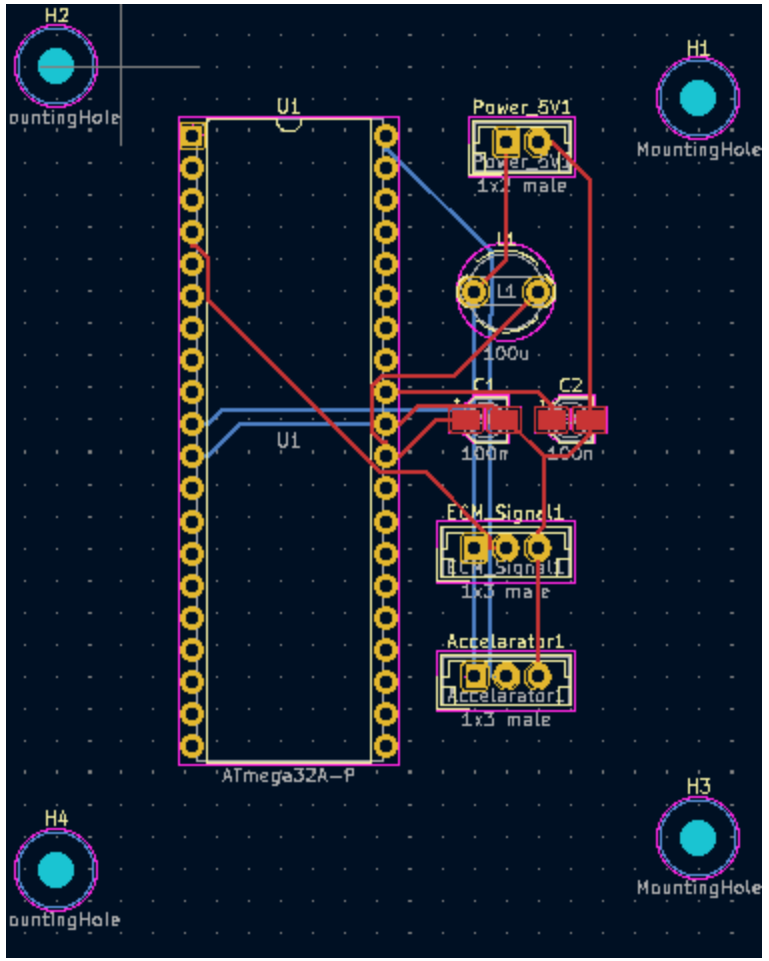
Code and Simulation

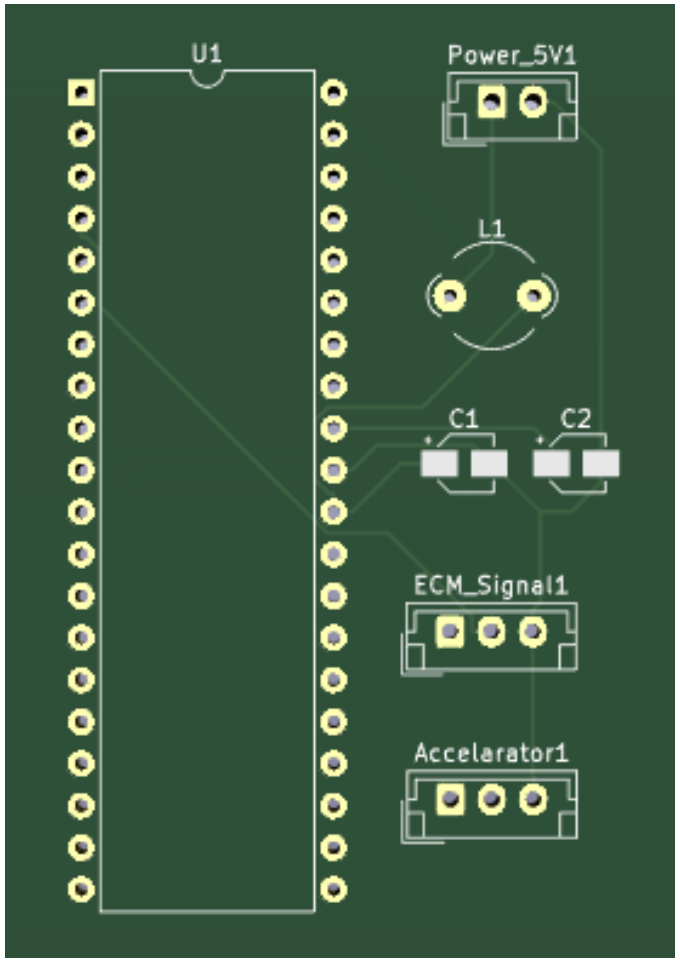
```c
#define F_CPU 8000000UL
#include <avr/io.h>
#include <util/delay.h>
#include <stdlib.h>
#include "adc.h"
int main(){
    int value;
    DDRD=0x40;
    ADC_Init();
    while(1){
        value=ADC_Read(0);
        if(value>=500){
            PORTD=0x40;
        }else{
            PORTD=0x00;
        }
    }
    return 0;
}
```



Schematic, PCB, Silkscreen of Potentiometer





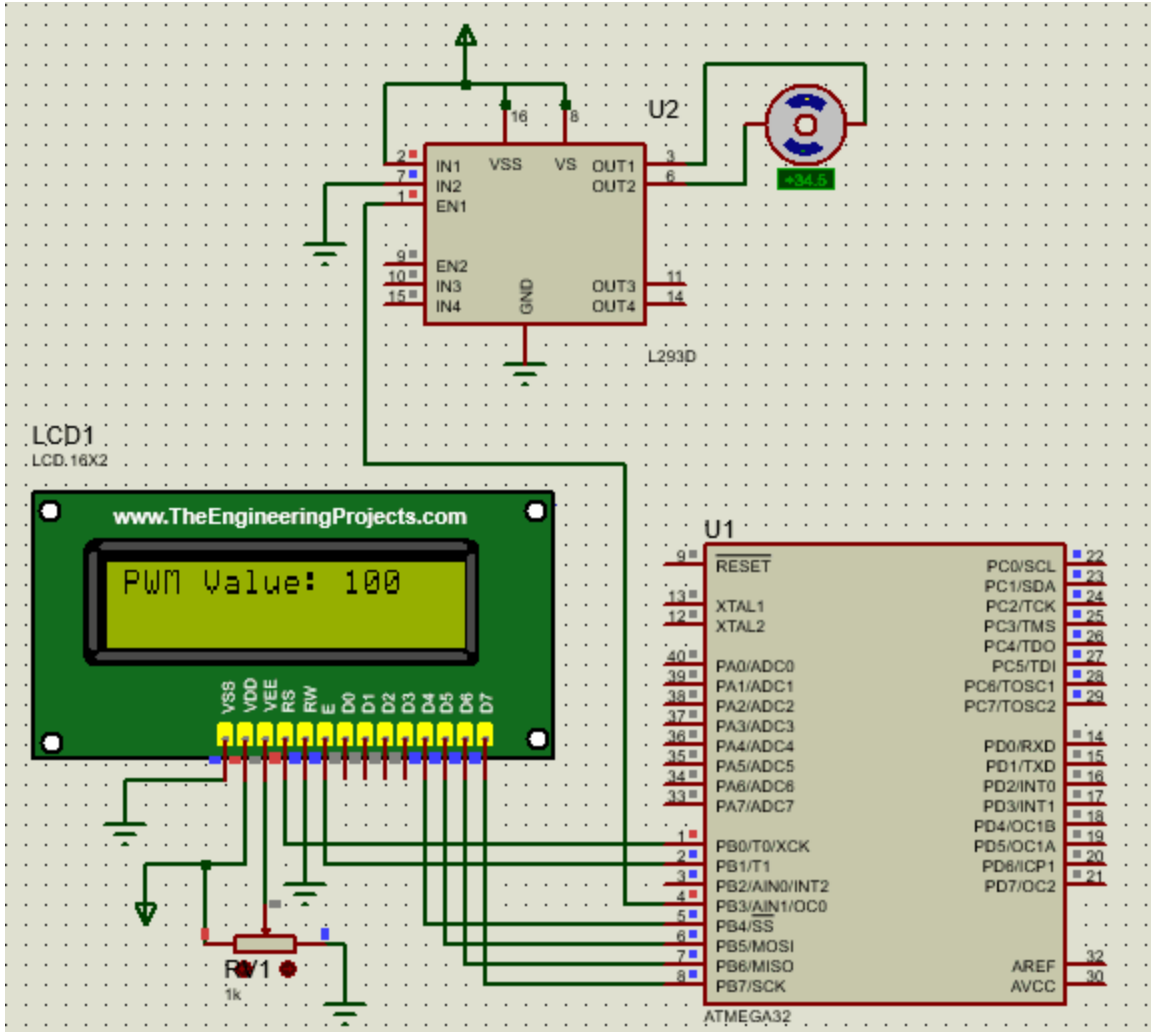


DC Motor

- Input Voltage : 5V
- No Load Speed : 12623 RPM
- No Load Current : 0.06A
- Torque : 2.09 milli Nm
- Lifetime : 17 Hours
- Weight : 10 g
- Operation Temperature : -20 to 70 °C
- Purpose is to simulate the Wheels of the vehicle
- Number of Pins : 2 (Positive and Negative Terminals)

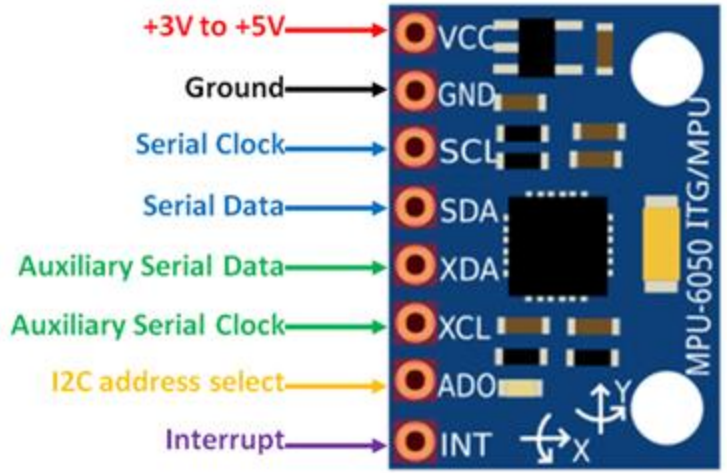
Code – Motor

```
#define F_CPU 8000000UL
#include "avr/io.h"
#include <util/delay.h>
#include <stdlib.h>
#include "LCD.h"
#include "pwm.h"
int main (){
    PWM_init(); LCD_Init();
    DDRC=0xFF;
    LCD_String("PWM Value: 100");
    while (1){
        int val=100;
        OCR0=val;
    }
}
```



Gyroscope Module

- 3-aixs accelerometer and 3-axis gyroscope values combined
- Power Supply: 3-5V
- Communication : I2C protocol
- In-built Temperature sensor
- (DMP) Digital Motion Processor inside it which is powerful enough to perform complex calculation and thus free up the work for Microcontroller.
- Pins : 8 pins
- Purpose : To identify head position of the driver



Gyrsocope Module : Sleeping Head Position Sample Values

Normal Position of the head : in Z Axis : -2(up) to 2(down)						
Normal Position of the head : in X Axis : 3(left) to -3(right)						
Normal Position of the head : in Y Axis : 8 or 9						
Axis	Left			Right		
X	5	6	7	-4	-5	-6
Y	8	7	6	8	7	6
Axis	Up			Down		
Z	3	4	5	-3	-4	-5

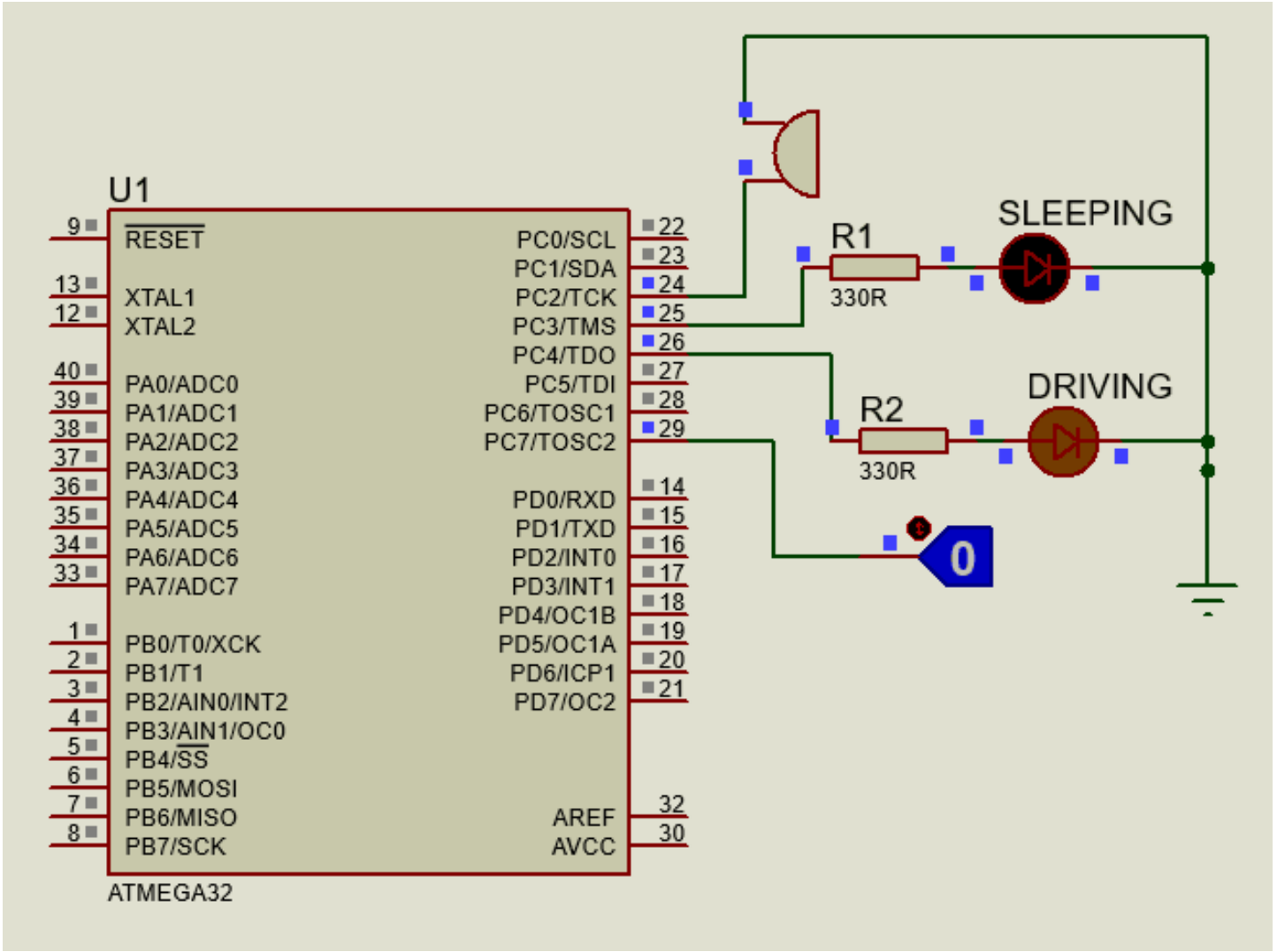
All values in m/s2 : Metre per Second Squard : Measurement for Accelaration	
Output from MPU 6050 Unit : g : Accelaration of Gravity	
10m/s2 = 1.020g	
Used Application : Sensors Multitool : Android	PlayStore

Low Medium High

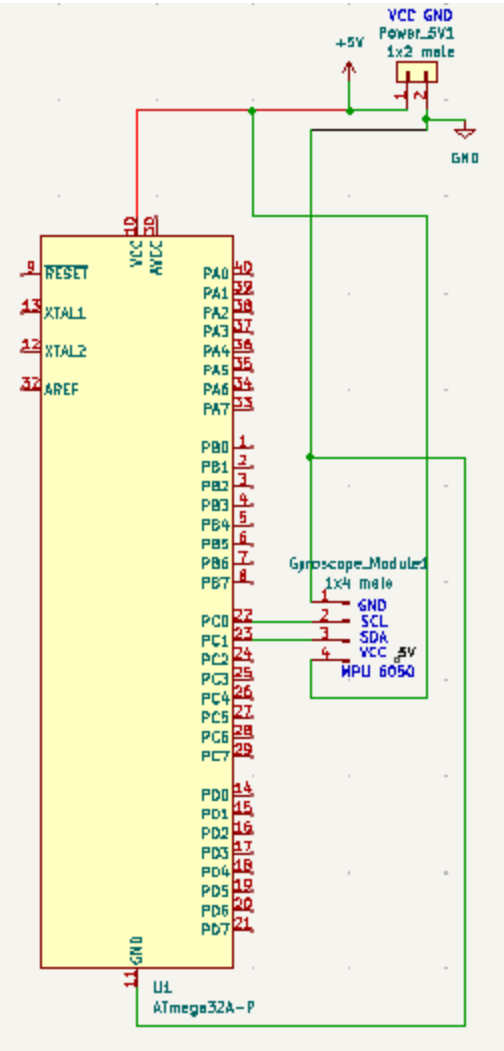
```
int isDriverSleepingGyro(float Xa,float Ya,float Za){
    if((Za>-2.0 && Za<2.0) && (Xa>-3.0 && Xa<3.0) && (Ya>=8.0 && Ya<=9.0)){
        return 0;//driver is not sleeping
    }else{
        return 1;//driver is sleeping
    }
}
```

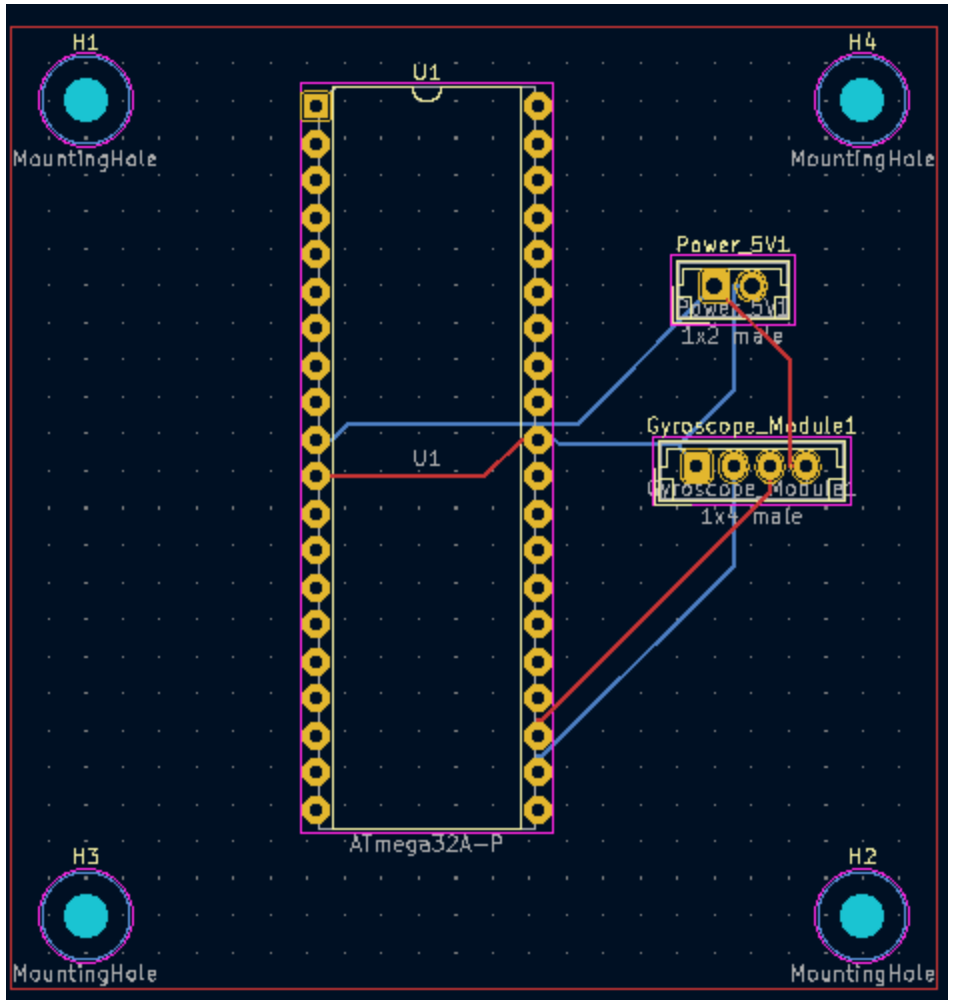
Gyroscope Module – Simulation

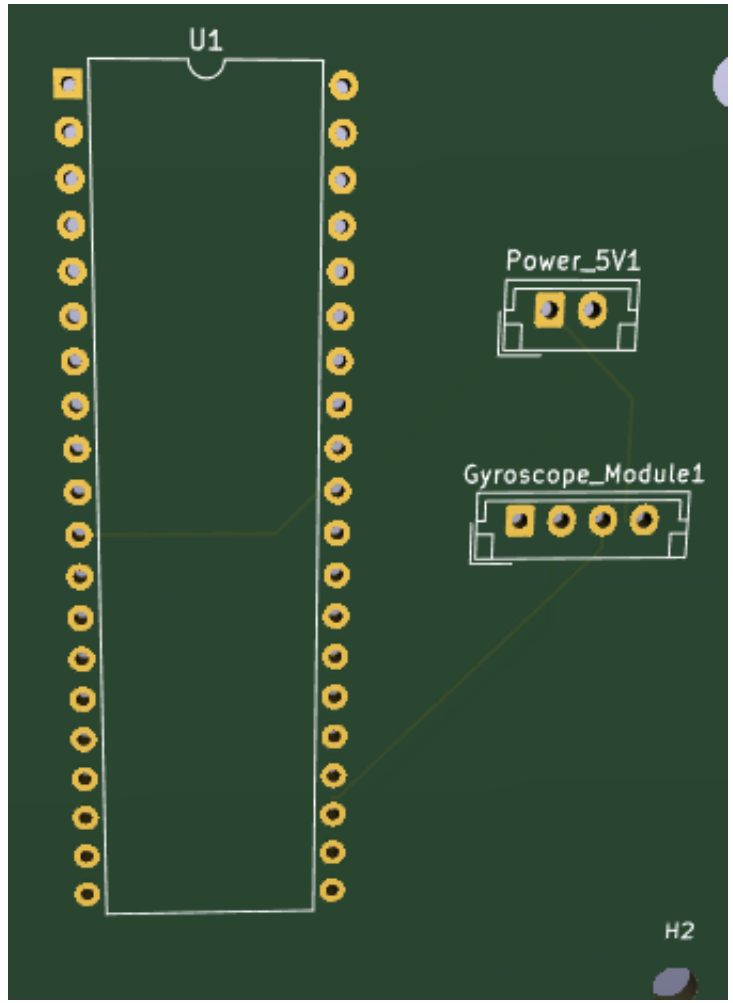
```c
#define F_CPU 8000000UL
#include <avr/io.h>
#include <util/delay.h>
#include <inttypes.h>
#include <stdlib.h>
#include <stdio.h>
#include "MPU6050_res_define.h"
#include "I2C_Master_H_file.h"
#include "mpu6050.h"
#include "LCD.h"
#include "registerFunctions.h"
int main(){
    DDRC=0xC0;
    while(1){
        float X,Y,Z;
        if((PINC&0x80)==0x80){X = 22.0;Y = 8.0;Z = 1.0;
        }else{X = 2.0;Y = 8.0;Z = 1.0;
        }
        if(isDriverSleepingGyro(X,Y,Z)){
            portHigh(PORTC,3);
            _delay_ms(500);
            portHigh(PORTC,2);
            _delay_ms(500);
            portLow(PORTC,3);
            _delay_ms(500);
            portLow(PORTC,2);
            _delay_ms(500);
        }else{
            portHigh(PORTC,4);
            _delay_ms(500);
            portLow(PORTC,4);
            _delay_ms(500);
        }

    }
}
```



Schematic, PCB, Silkscreen of Gyroscope Module

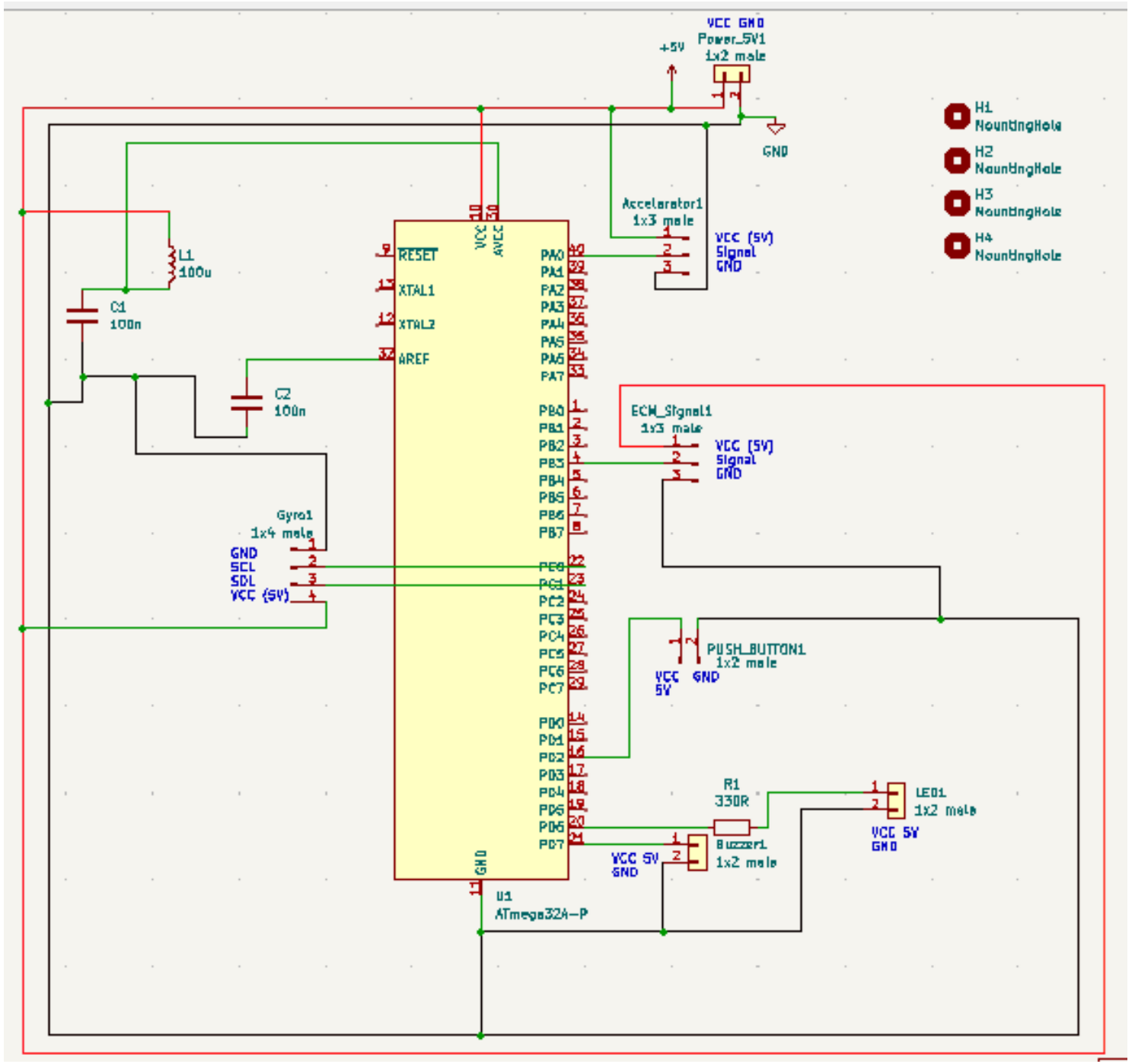




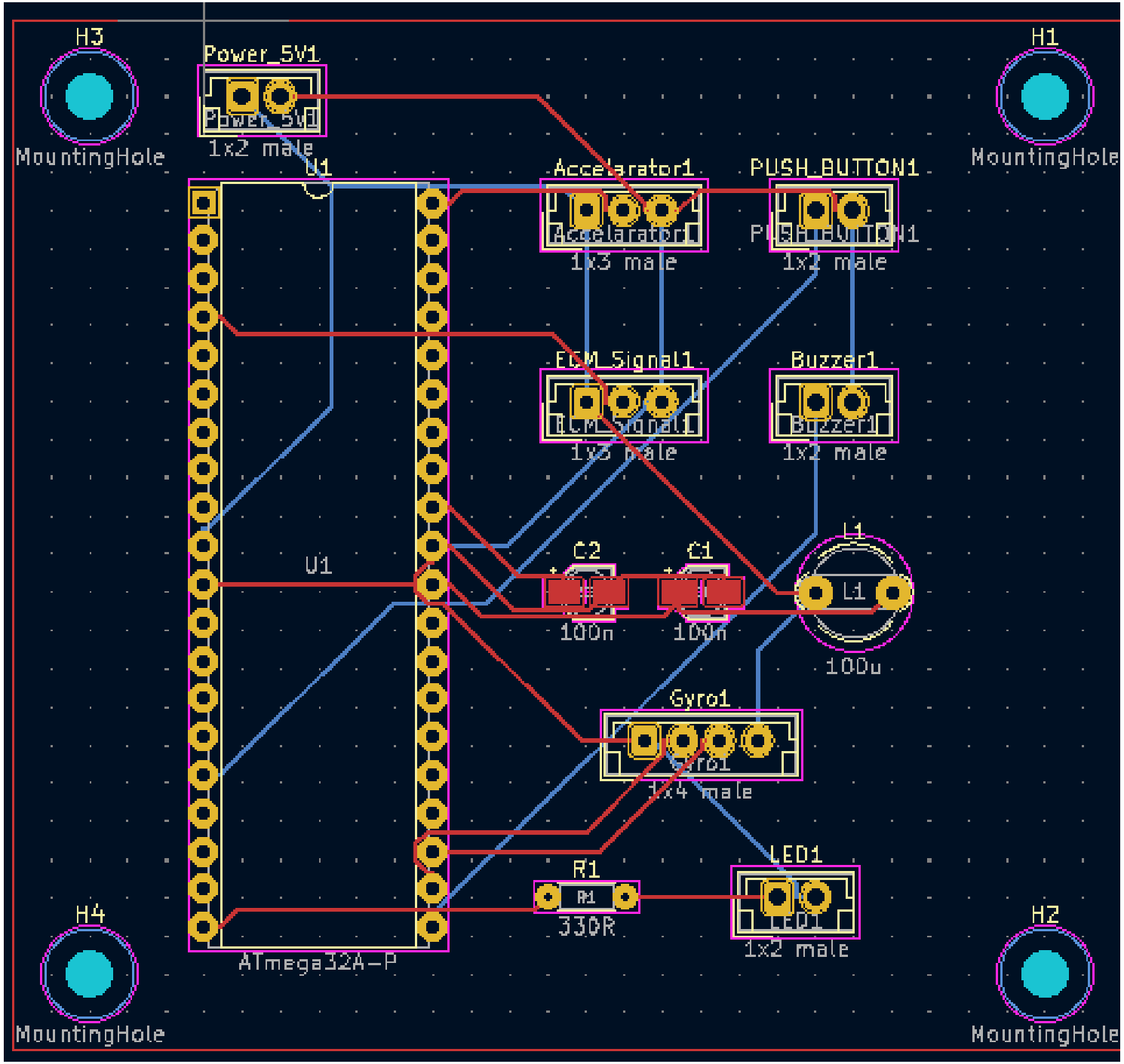


Complete Simulation

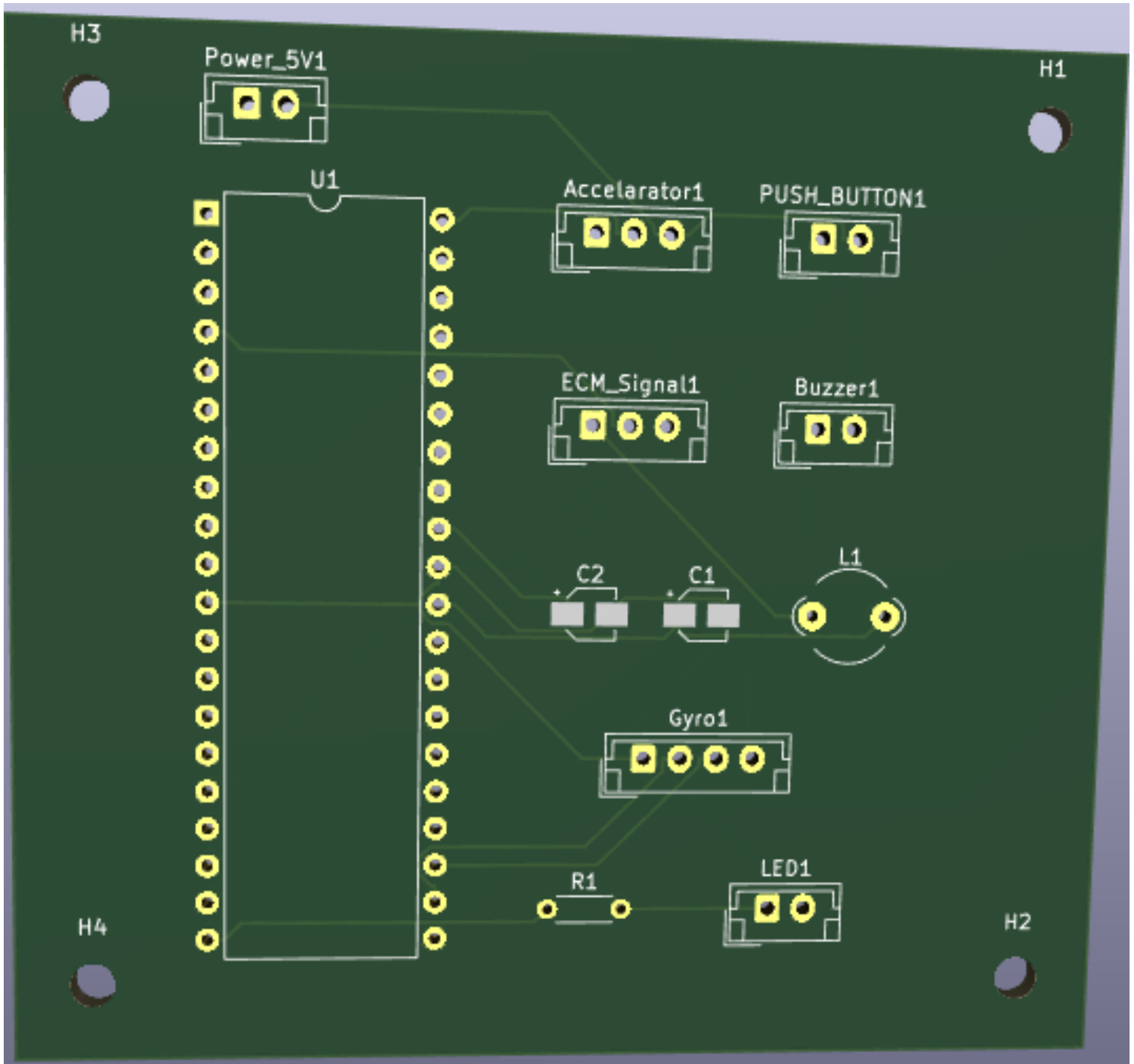
Schematic Diagram



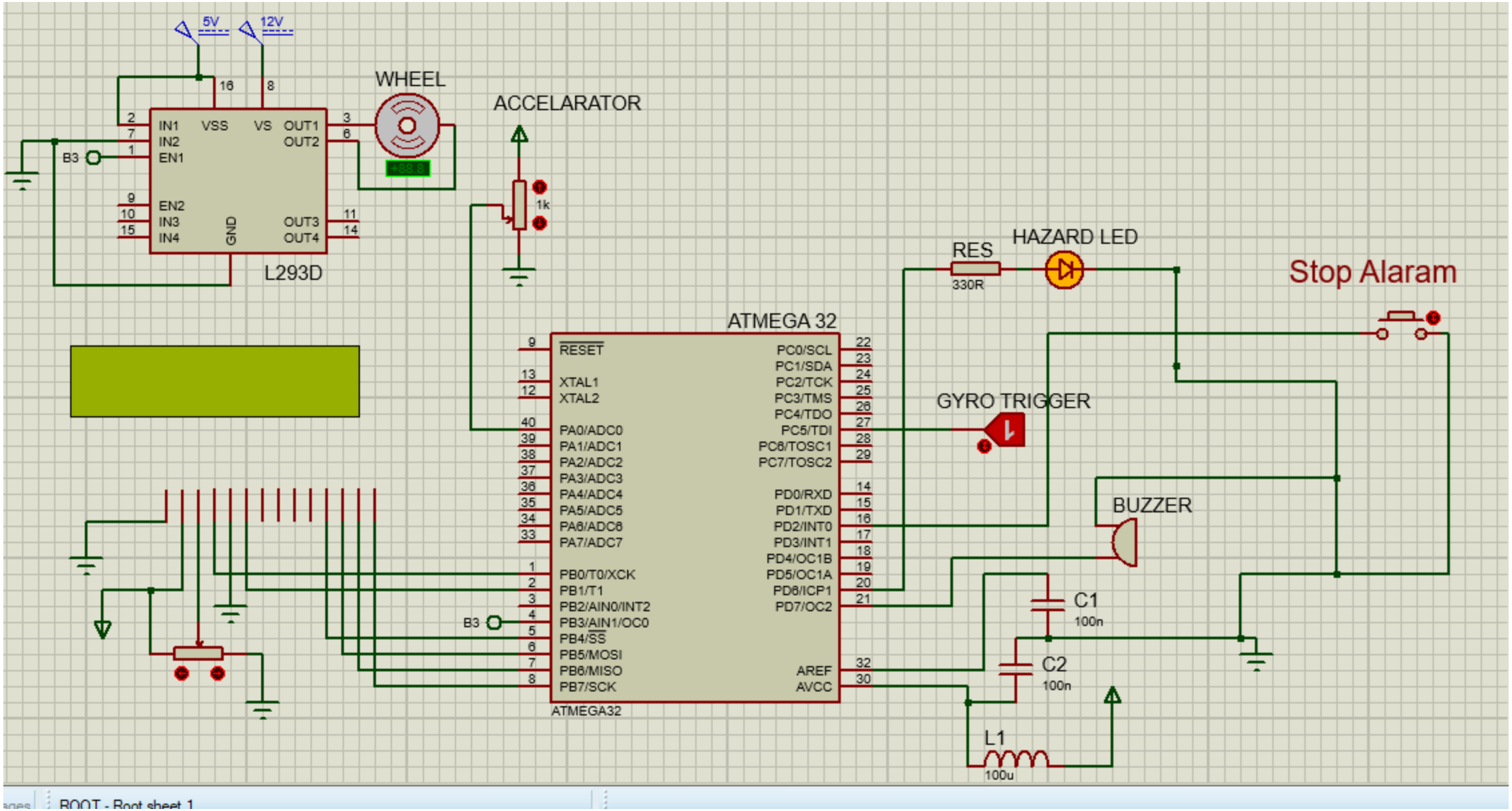
PCB Design


H3
MountingHole
Power_5V1
1x2 male
H1
MountingHole
U1
Accelerator1
1x3 male
PUSH_BUTTON1
1x2 male
ECM_Signal1
1x3 male
Buzzer1
1x2 male
C2
100n
C1
100n
L1
100u
U1
Gyro1
1x4 male
R1
330R
LED1
1x2 male
ATmega32A-P
H4
MountingHole
H2
MountingHole

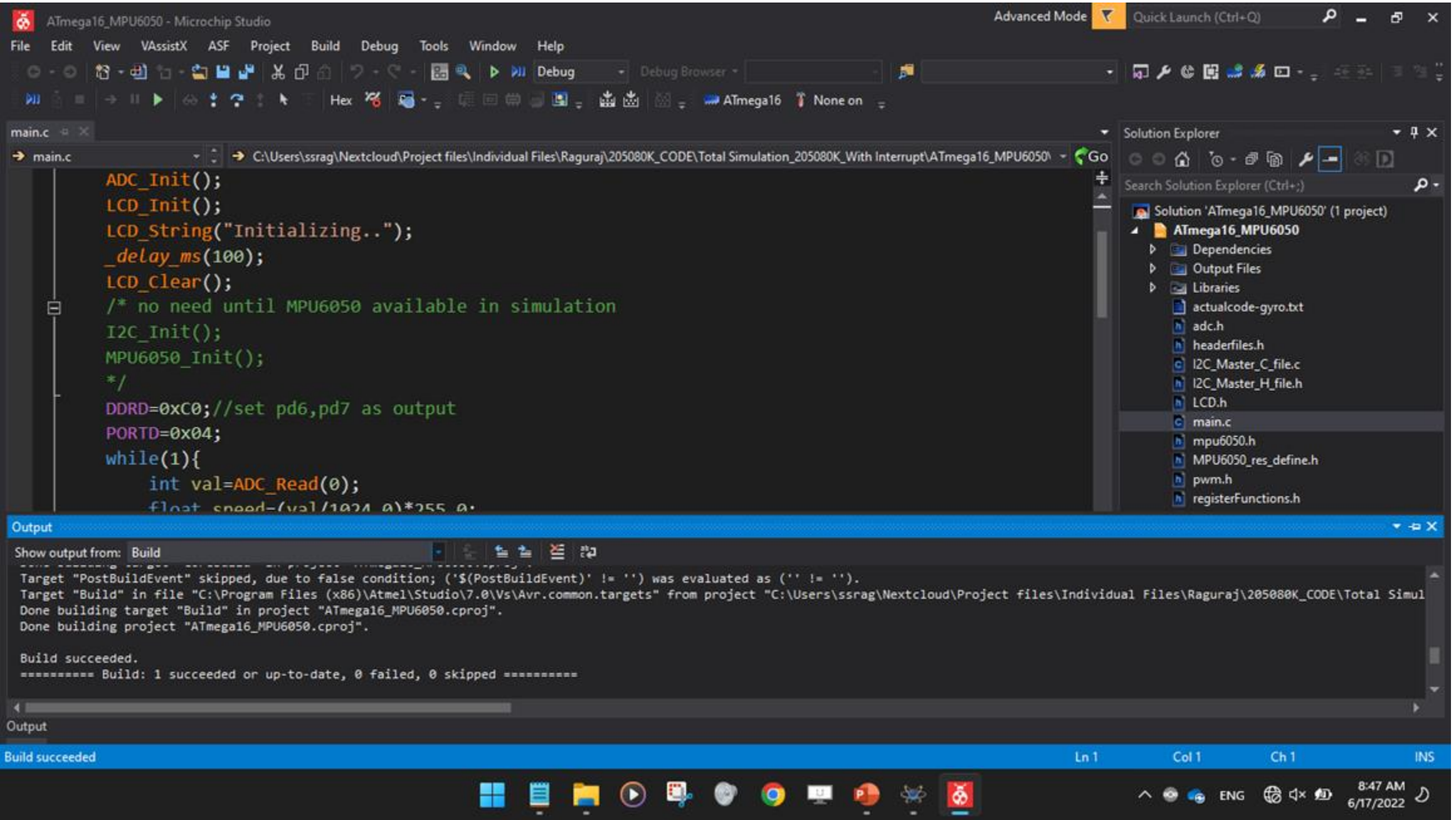
Silkscreen


H3
Power_5V1
H1
U1
Accelarator1
PUSH_BUTTON1
ECM_Signal1
Buzzer1
C2
C1
L1
Gyro1
R1
LED1
H4
H2

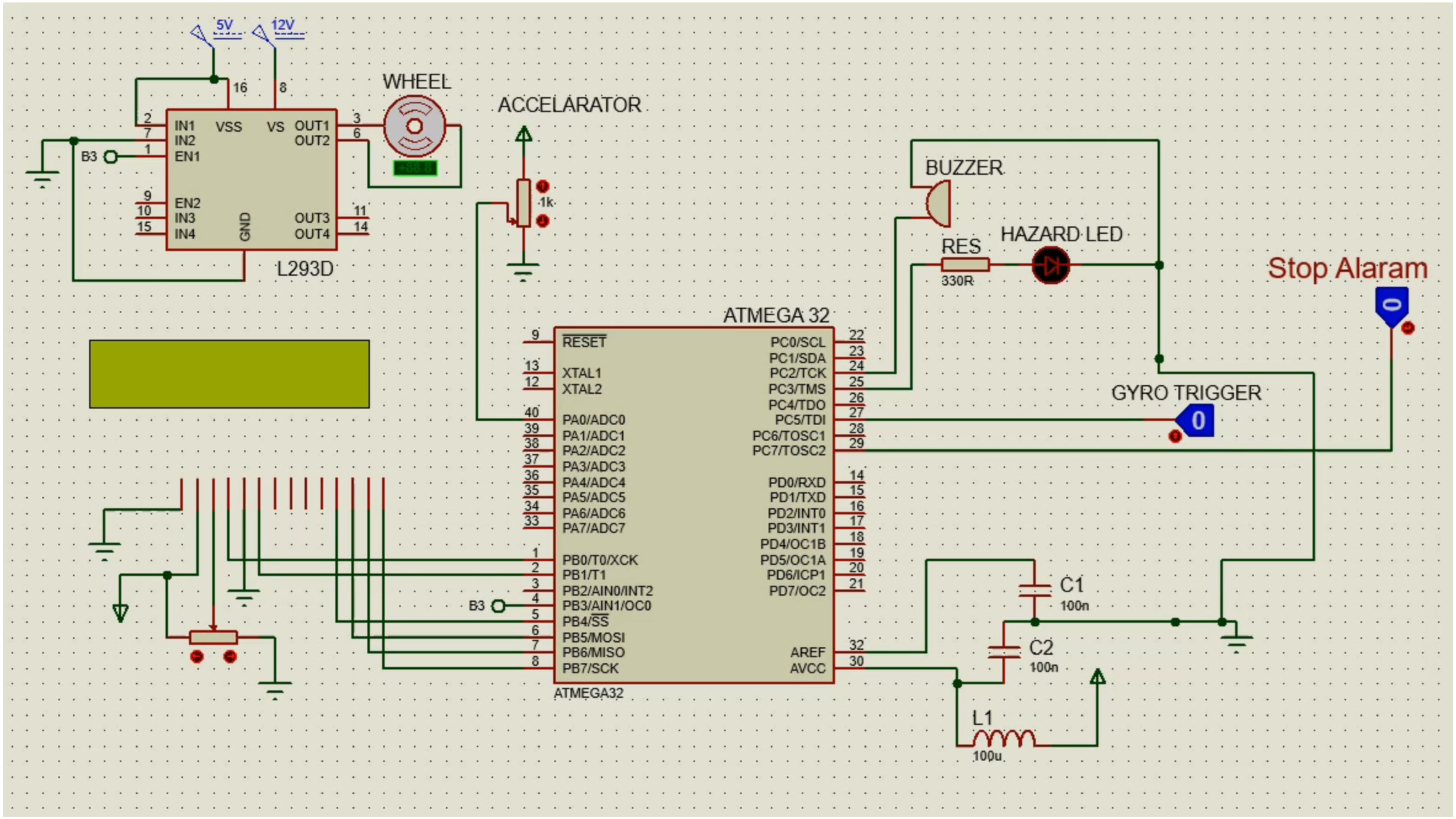
Complete Simulation – Circuit diagram



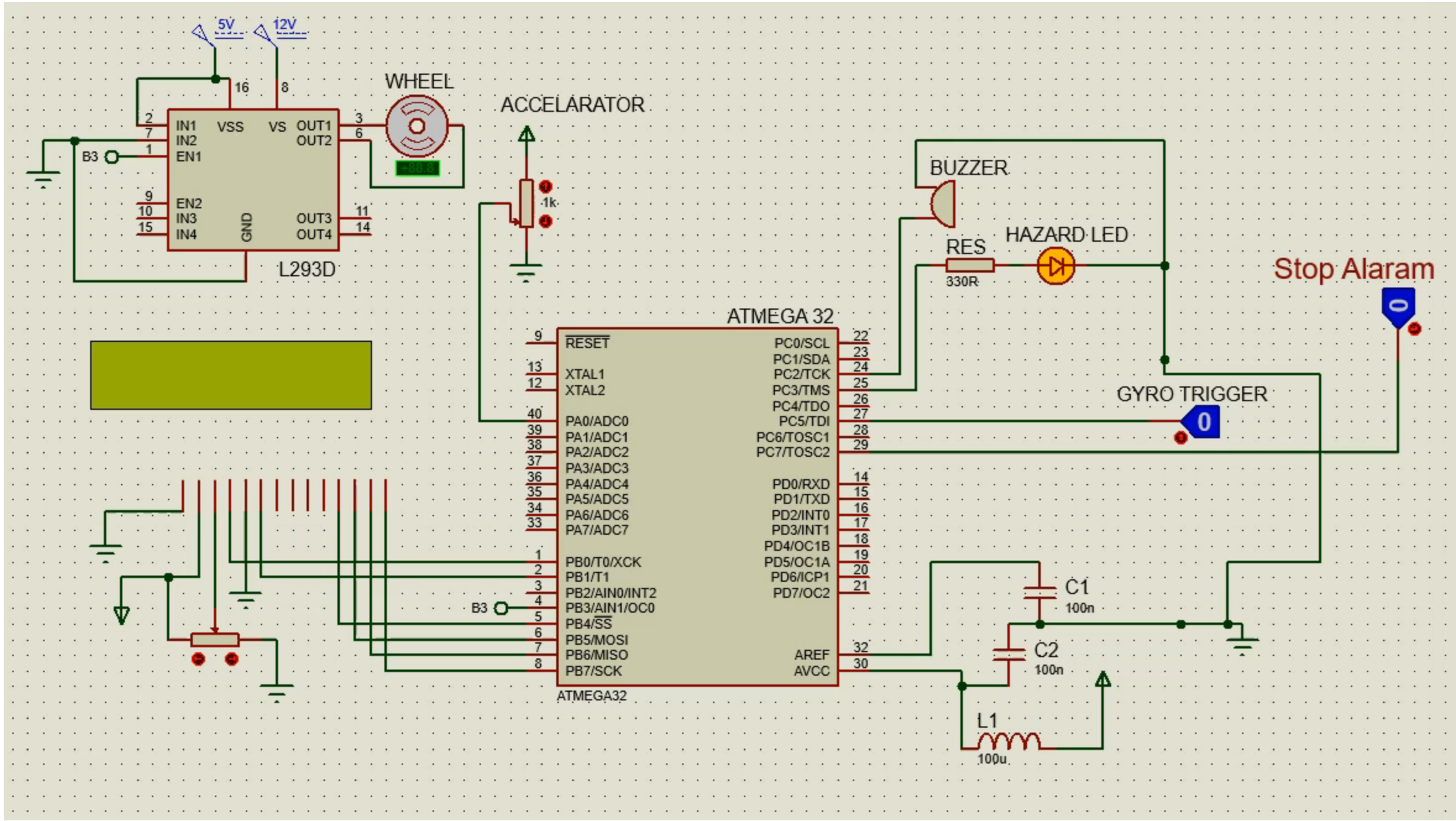
Complete Simulation – Code



When Driver failed to press switch within 2 seconds


5V
12V
16
8
WHEEL
ACCELARATOR
2
7
1
IN1
IN2
EN1
VSS
VS
OUT1
OUT2
3
6
B3
9
10
15
EN2
IN3
IN4
GND
OUT3
OUT4
11
14
L293D
1k
BUZZER
RES
330R
HAZARD LED
Stop Alaram
ATMEGA 32
9
RESET
13
12
XTAL1
XTAL2
40
39
38
37
36
35
34
33
PA0/ADC0
PA1/ADC1
PA2/ADC2
PA3/ADC3
PA4/ADC4
PA5/ADC5
PA6/ADC6
PA7/ADC7
1
2
3
4
5
6
7
8
PB0/T0/XCK
PB1/T1
PB2/AIN0/INT2
PB3/AIN1/OC0
PB4/SS
PB5/MOSI
PB6/MISO
PB7/SCK
B3
ATMEGA32
22
23
24
25
26
27
28
29
PC0/SCL
PC1/SDA
PC2/TCK
PC3/TMS
PC4/TDO
PC5/TDI
PC6/TOSC1
PC7/TOSC2
14
15
16
17
18
19
20
21
PD0/RXD
PD1/TXD
PD2/INT0
PD3/INT1
PD4/OC1B
PD5/OC1A
PD6/ICP1
PD7/OC2
32
30
AREF
AVCC
GYRO TRIGGER
0
C1
100n
C2
100n
L1
100u

When Driver press switch within 2 seconds


5V
12V
16
8
WHEEL
ACCELARATOR
IN1
IN2
EN1
VSS
VS
OUT1
OUT2
EN2
IN3
IN4
GND
OUT3
OUT4
B3
L293D
1k
BUZZER
RES
330R
HAZARD LED
Stop Alaram
ATMEGA 32
RESET
XTAL1
XTAL2
PA0/ADC0
PA1/ADC1
PA2/ADC2
PA3/ADC3
PA4/ADC4
PA5/ADC5
PA6/ADC6
PA7/ADC7
PB0/T0/XCK
PB1/T1
PB2/AIN0/INT2
PB3/AIN1/OC0
PB4/SS
PB5/MOSI
PB6/MISO
PB7/SCK
PC0/SCL
PC1/SDA
PC2/TCK
PC3/TMS
PC4/TDO
PC5/TDI
PC6/TOSC1
PC7/TOSC2
PD0/RXD
PD1/TXD
PD2/INT0
PD3/INT1
PD4/OC1B
PD5/OC1A
PD6/ICP1
PD7/OC2
AREF
AVCC
ATMEGA32
GYRO TRIGGER
C1
100n
C2
100n
L1
100u

Thank You

Questions