UPPSALA
UNIVERSITET

Report for Microcontroller Project

ANTITHEFT SYSTEM FOR BIKES

Group 2

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Contents

1 Introduction

Uppsala is a student town where the bike is the most common means of transport for most of the students. Also, Bike theft is a common issue in the city. The objective of this project is to design an Anti-theft system based on the knowledge gained by this course. This system is very cost effective and promising.

2 Hardware Components

2.1 Atmega 328

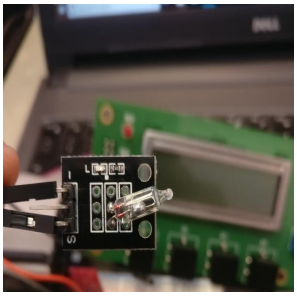
The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10- bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPSper MHz.[1]

2.2 24 PIN LCD ADAPTOR

The adapter has 4 buttons in it which we used for our project as the input buttons. The output which reads as dots states that the program code is running and If there is a value it will get us an output stating "On" or else it keeps sending "dots". The Buttons were connected from the LCD display to the Micro controller as per the connections shown in Lab 2. The schematic diagram of the connections are towards the end of the document.

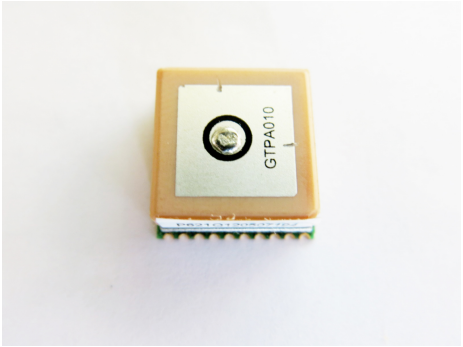
2.3 TILT SENSOR

The tilt sensor has a metallic ball inside which acts as a switch. when the ball is on one end, the circuit is closed and vice-versa. when the sensor is disturbed, based on the position of the ball, values are sent to the micro controller. [2]

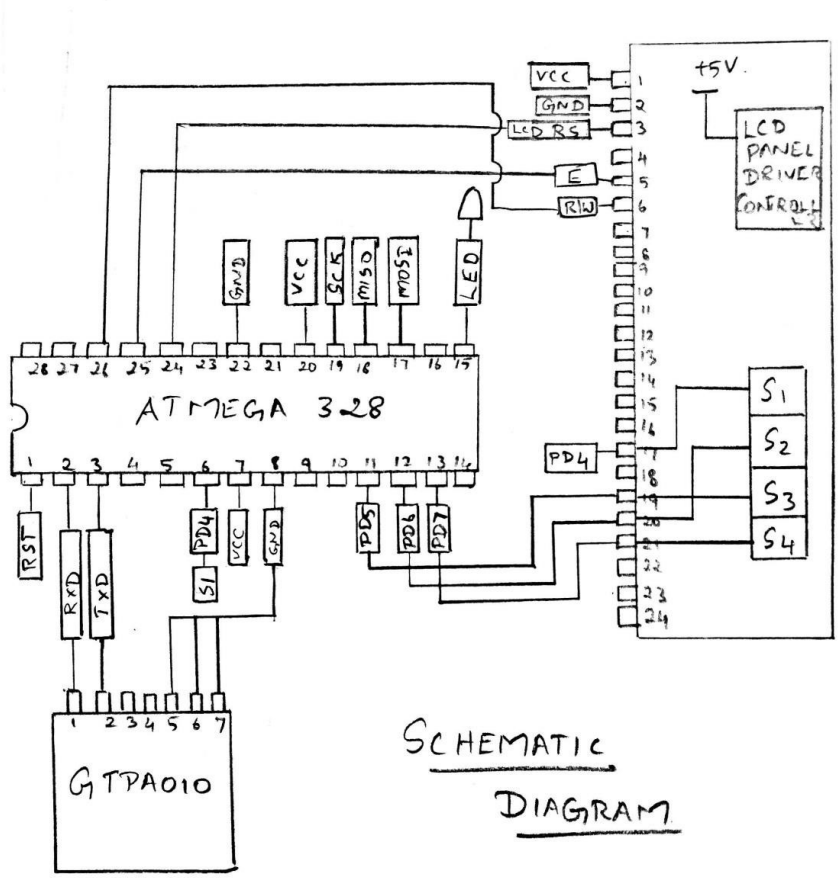


2.4 GTPA010 GPS Receiver (Future Scope)

The Global Top FGPMMOPA6C is an ultra-compact POT (Patch On Top) GPS Module, The module utilizes the MediaTek new generation GPS Chipset MT3339 that achieves the industry's highest level of sensitivity (-165dBm) and instant Time-to-First Fix (TTFF) with lowest power consumption for precise GPS signal processing to give the ultra-precise positioning under low receptive, high velocity conditions. Up to 12 multi- tone active interference canceller (ISSCC2011 award), customer can have more flexibility in system design. Supports up to 210 PRN channels with 66 search channels and 22 simultaneous tracking channels, FGPMMOPA6C supports various location and navigation applications, including autonomous GPS, SBAS(note) ranging (WAAS, EGNO, GAGAN, MSAS), AGPS. FGPMMOPA6C is excellent low power consumption characteristic (acquisition 82mW, tracking 66mW), power sensitive devices, especially portable applications. [3]



3 SCHEMATIC DIAGRAM



ATMEGA 328 pin diagram is added towards the end in the appendix's column for reference.

4 Program Code

Listing 1.1 Code

```
1  //MICRO CONTROLLER ANTITHEFT PROJECT
2  //Author:Srivijay and Kughan
3  ATmega8, 48, 88, 168, 328
4
5  /Reset PC6|1   28|PC5
6  PD0|2   27|PC4
7  PD1|3   26|PC3      LCD.RW PD2|4   25|PC2      LCD.E PD3|5   24|PC1      LCD.
       RS PD4|6   23|PC0
8  Vcc|7   22|Gnd Gnd|8   21|Aref PB6|9   20|AVcc
9  PB7|10  19|PB5 SCK  LCD.D7
10 PD5|11  18|PB4 MISO LCD.D6
11 PD6|12  17|PB3 MOSI LCD.D5
12 PD7|13  16|PB2      LCD.D4
13 LED    PB0|14  15|PB1      switch 1
14 */
15
16 #define F_CPU 1000000UL  // 1MHz internal clock
17
18 #include <avr/io.h>
19 #include <util/delay.h>
20 #include "lcd.h"
21
22
23 void check();
24
25 void ledSwitch(int state);
26
27 void tilt(int a); volatile int alarm = 0; int main()
28 {
29
30 DDRD = 0x00;//PORTD as input
31 PORTD = 0b11110000;
32
33 DDRB = 0xFF;//PORTB as output lcd_init(LCD_DISP_ON); // initialize LCD
34
35 while(1)
36 {
37 //lcd_puts("ON");
38 lcd_puts("."); _delay_ms(100);
39 // Any of the 4
40 //             if (bit_is_set(PIND,4) && bit_is_set(PIND,5) && bit_is_set(PIND
       ,6) &&
41 bit_is_set(PIND,7))
42 if ((~PIND & (1<<4)) | (~PIND & (1<<5)) | (~PIND & (1<<6)) | (~PIND &
43 (1<<7)))
44
45
46 //if (PIND & (0b11110000))
47 {
48 lcd_puts("ON\n");
49 check();
50 }
51 if((~PIND & (1 << 3)))
52 {
53 tilt(1);
54 }
55 else
56 {
57 if ((~PIND & (1<<4)) && (~PIND & (1<<5)))
58 {
59 tilt(0);
```

```
}
}

}
}
//(~PIND & (1 << 3))



// Checks whether the correct code has been input void check()
{

// PIN5 & 7 should be pressed AND PIN4 & 6 should not be pressed
/
if ((~PIND & (1<<4)) && (~PIND & (1<<5)))
{
if (alarm == 1)
{

}
}
else
{

ledSwitch(0);
if (alarm == 0)
{
ledSwitch(1);
}
}

}

// Turns LED on/off based on argument void ledSwitch(int state)
{

if (state == 1)
{
PORTB = PORTB | (1 << PB1);//turn on LED
alarm = 1;
} else if(state == 0)
{
PORTB = PORTB & ~(1 << PB1);//turn OFF LED
alarm = 0;
}
}
void tilt(int a)
{

if(a==1)
{
ledSwitch(1);
}
else if(a==0)
{
ledSwitch(0);
}

}
```

5 Conclusion

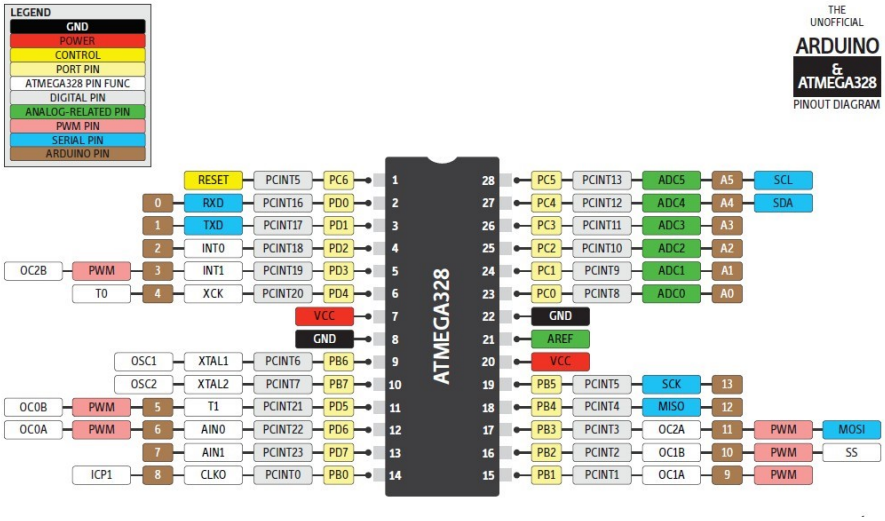
We were able to interface the microcontroller with the tilt sensor and 24 pin display. there are two possibilities to raise an alarm. One is upon entering the incorrect code or Forcefully moving the bike. This could be detected by using the value of the Tilt sensor.The only way

to turn off the alarm is by entering the correct code.we were happy to witness the working of this protocol and presented the same in the project presentation. the GPS receiver sensor was also interfaced and the outcome was seen on the CRO in the lab. The future scope of this project would be to use GSM and get the current location of the Bike on the users Mobile device.

6 Appendix

6.1 Atemga328

328.jpg



References

[1] microchip. (2019) Atmega328. Accessed: 2019-02-10. [Online]. Available: https://www.microchip.com/wwwproducts/en/ATmega328

[2] B. Ellison. (2019) How do tilt sensors work? Accessed: 2019-02-10. [Online]. Available: https://www.azosensors.com/article.aspx?ArticleID=318

[3] G. Tech. (2019) Fgpmmopa6c gps standalone module data sheet. Accessed: 2019-02-10. [Online]. Available: https://cdn-shop.adafruit.com/datasheets/GlobalTop-FGPMMOPA6C-Datasheet-V0A-Preliminary.pdf