#include <avr/io.h>

#define *F\_CPU* 16000000

#include <util/delay.h>

#include <stdlib.h>

#define enable 5

#define registerselection 6

void send\_a\_command(unsigned char command);

void send\_a\_character(unsigned char character);

void send\_a\_string(char \*string\_of\_characters);

void func1();

void func2();

void func3();

void func4();

void func5();

void func6();

//Simple Wait Function

int main(void)

{

DDRB = 0xFF;

DDRA = 0;

DDRD = 0xFF;

*\_delay\_ms*(50);

ADMUX |=(1<<REFS0)|(1<<REFS1);

ADCSRA |=(1<<ADEN)|(1<<ADATE)|(1<<ADPS0)|(1<<ADPS1)|(1<<ADPS2);

send\_a\_command(0x01); //Clear Screen 0x01 = 00000001

*\_delay\_ms*(50);

send\_a\_command(0x38);

*\_delay\_ms*(50);

send\_a\_command(0b00001111);

*\_delay\_ms*(50);

ADCSRA |=(1<<ADSC);

while(1)

{

func1();

*\_delay\_ms*(100);

func2();

*\_delay\_ms*(100);

func3();

*\_delay\_ms*(100);

func4();

*\_delay\_ms*(100);

func5();

*\_delay\_ms*(100);

func6();

*\_delay\_ms*(100);

}

}

void func1()

{

*int16\_t* COUNTA = 0;

char SHOWA [3];

ADMUX = 0b11000000;

COUNTA = ADC;

if (COUNTA>156 && COUNTA<196)

{

send\_a\_string ("SOIL SAMPLE IS");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("LOAMY SAND ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>310 && COUNTA<330)

{

send\_a\_string ("SOIL SAMPLE IS");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("LOAM SOIL ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>496 && COUNTA<536)

{

send\_a\_string ("SOIL SAMPLE IS");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("ALLUVIAL SOIL ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>430 && COUNTA<460)

{

send\_a\_string ("SOIL SAMPLE IS");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("RED SOIL ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else

{

send\_a\_string ("none");

send\_a\_command(0x80);

send\_a\_string ("none");

send\_a\_command(0x80 + 0x40 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

}

void func2()

{

*int16\_t* COUNTA = 0;

char SHOWA [3];

ADMUX = 0b11000001;

COUNTA = ADC;

if (COUNTA>700 && COUNTA<760)

{

send\_a\_string ("NITROGEN LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 10%-25% . ");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("UREA ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>630 && COUNTA<690)

{

send\_a\_string ("NITROGEN LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 40%-60%");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("UREA NITRATE");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>530 && COUNTA<590)

{

send\_a\_string ("NITROGEN LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 50%-75%");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("NOT REQUIRE");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>490 && COUNTA<540)

{

send\_a\_string ("NITROGEN LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 75%-90%");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("NOT REQUIRE");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else

{

send\_a\_string ("none");

send\_a\_command(0x80);

send\_a\_string ("none");

send\_a\_command(0x80 + 0x40 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

}

void func3()

{

*int16\_t* COUNTA = 0;

char SHOWA [3];

ADMUX = 0b11000010;

COUNTA = ADC;

if (COUNTA>500 && COUNTA<560)

{

send\_a\_string ("PHOSPOROUS LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 10%-25% . ");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("M.A.P. ");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>430 && COUNTA<500)

{

send\_a\_string ("PHOPOROUS LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 25%-40%");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("A.P.P.");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>370 && COUNTA<430)

{

send\_a\_string ("PHOSPOROUS LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("40-60%");

send\_a\_string ("FERTILIZER USED :");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("PHOSPHATE");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>310 && COUNTA<370)

{

send\_a\_string ("PHOSPOROUS LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 75%-90%");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("NOT REQUIRE");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else

{

send\_a\_string ("none");

send\_a\_command(0x80);

send\_a\_string ("none");

send\_a\_command(0x80 + 0x40 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

}

void func4()

{

*int16\_t* COUNTA = 0;

char SHOWA [3];

ADMUX = 0b11000011;

COUNTA = ADC;

if (COUNTA>600 && COUNTA<660)

{

send\_a\_string ("POTASSIUM LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 10%-25% . ");

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("POTASH");

send\_a\_command(0x01);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>550 && COUNTA<610)

{

send\_a\_string ("POTASSIUM LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 25%-50%");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0x40 + 8);

send\_a\_command(0x01);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("POTASH ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>490 && COUNTA<550)

{

send\_a\_string ("POTASSIUM LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("BETWEEN 50%-75%");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("SULPHATE POTASH");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>340 && COUNTA<400)

{

send\_a\_string ("POTASSIUM LEVEL:");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("ABOVE 90%");

*\_delay\_ms*(100);

send\_a\_command(0x01);

send\_a\_string ("FERTILIZER USED :");

send\_a\_command(0x01);

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("NOT REQUIRE");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else

{

send\_a\_string ("none");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("none");

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

}

void func5()

{

*int16\_t* COUNTA = 0;

char SHOWA [3];

ADMUX = 0b11000100;

COUNTA = ADC;

if (COUNTA>520 && COUNTA<540)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 4.5 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>540 && COUNTA<560)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 5.0 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>560 && COUNTA<580)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 5.5 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>580 && COUNTA<600)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 6.0 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>600 && COUNTA<620)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 6.5 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>620 && COUNTA<640)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 7.0 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>640 && COUNTA<680)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 7.5 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>680 && COUNTA<700)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 8.0 ");

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>720 && COUNTA<740)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 8.5 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>740 && COUNTA<760)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 9.0 ");

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>760 && COUNTA<780)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 9.5 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>800 && COUNTA<820)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 10.0 ");

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else if (COUNTA>820 && COUNTA<840)

{

send\_a\_string ("PH LEVEL :");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string (" 10.5 ");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

else

{

send\_a\_string ("none");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("none");

*\_delay\_ms*(100);

send\_a\_command(0x80 + 0);

*\_delay\_ms*(50);

send\_a\_command(0x01);

}

}

void func6()

{

*int16\_t* COUNTA = 0;

char SHOWA [3];

ADMUX = 0b11000101;

COUNTA = ADC/4;

send\_a\_string ("temperature ");

send\_a\_command(0x80 + 0x40 + 0);

send\_a\_string ("val = ");

send\_a\_command(0x80 + 0x40 + 8);

*itoa*(COUNTA,SHOWA,10);

send\_a\_string(SHOWA);

send\_a\_string (" ");

send\_a\_command(0x80 + 0);

send\_a\_command(0x01);

}

void send\_a\_command(unsigned char command)

{

PORTB = command;

PORTD &= ~ (1<<registerselection);

PORTD |= 1<<enable;

*\_delay\_ms*(20);

PORTD &= ~1<<enable;

PORTB = 0;

}

void send\_a\_character(unsigned char character)

{

PORTB = character;

PORTD |= 1<<registerselection;

PORTD |= 1<<enable;

*\_delay\_ms*(20);

PORTD &= ~1<<enable;

PORTB = 0;

}

void send\_a\_string(char \*string\_of\_characters)

{

while(\*string\_of\_characters > 0)

{

send\_a\_character(\*string\_of\_characters++);

}

}

v