

**FAKULTET ELEKTROTEHNIKE, STROJARSTVA
I BRODOGRADNJE**

MIKROREGULATORI I UGRADBENI MREŽNI SUSTAVI

ZAVRŠNI PROJEKT

**Slanje trenutne temperature prostorije na predefiniranu e-mail
adresu**

Zadatak: Temperatura prostorije- mail Slanje trenutne temperature prostorije (analogni senzor) na predefiniranu email adresu (arduino je klijent, koristiti se FESB mailom)

Popis materijala:

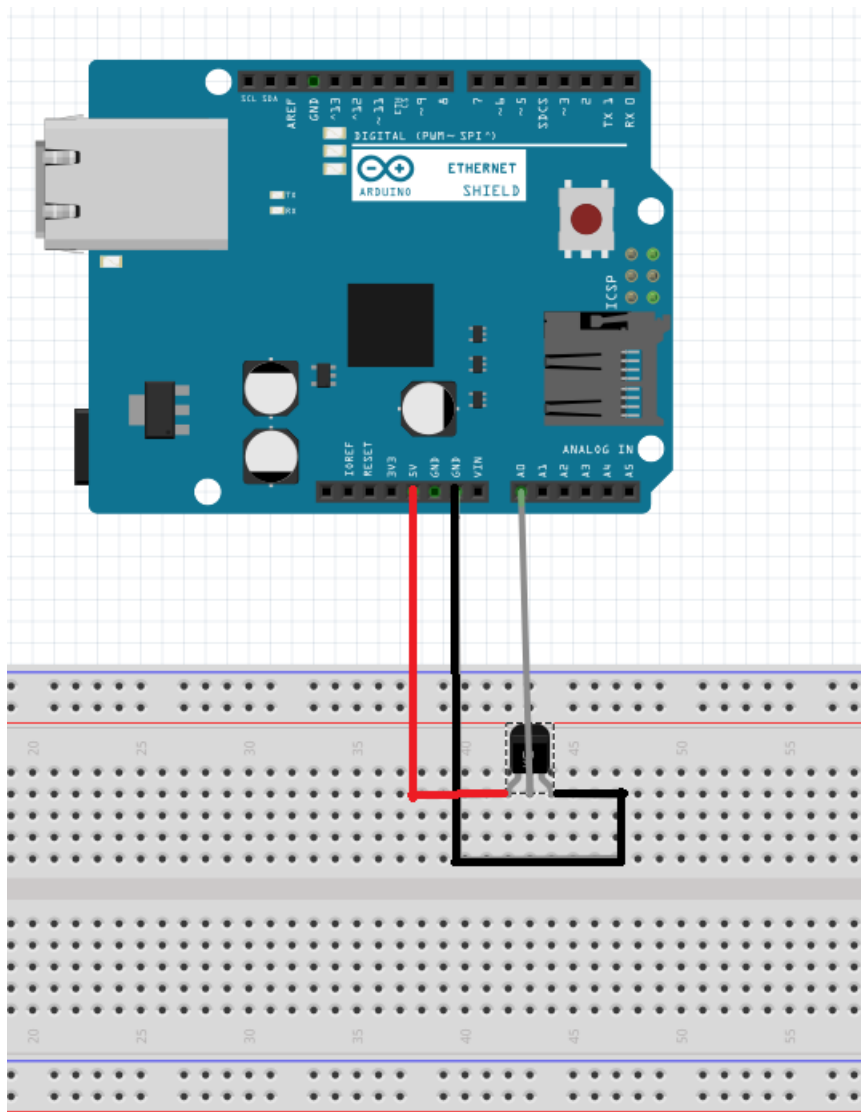
- Arduino UNO
- Arduino Ethernet shield
- Senzor za temperature LM35
- Breadboard
- Jumper wires

Način rada:

Kod možemo podijeliti na dva dijela:

1. dio koji je odgovoran za očitavanje temperature
2. dio koji je odgovoran za slanje e-mail poruka.

Prije detaljnijeg objašnjenja koda, pogledajmo shemu spajanja:



Temperaturni senzor TP35 je spojen na napajanje od +5V, na GND i srednji pin je spojen na analogni ulaz A0. Senzor je spojen na Ethernet shield, no, Ethernet shield je spojen na Arduino UNO. Pinovi sa Arduino UNO se preslikavaju na Ethernet shield.

Arduino UNO je USB vezom spojen na računalo a Ethernet shield je spojen na lokalnu mrežu preko internet parice. Kako ovaj sklop funkcionira, biti će detaljnije objašnjeno u komentarima koda.

Senzor LM35:

- VCC: +5VDC
- A0
- GND: GND

- Kalibriran u Celzijevim stupnjevima
- Linearan, + 10.0 mV/°C
- Točnost od 0.5°C (na +25°C)
- Raspon mjerenja je od -55° do +150°C
- RAdi pri naponu od 4 do 30 volti
- Uzima manje od 60 μ A struje

Programski kod

Perkovic_-_Završni_Projekt

```
/*
Završni projekt: Slanje temperature e-mailom
*/

/* Koristen LM35 analogni senzior, 750mV=25°C, 10mV/°C */

int sensorValue;
int outputValue;
double outputValuetmp;
const int analogInPin = A0; /*Pin Analognog senzora*/
/* Kreirane su globalne varijable koje se koriste za preuzimanje i obradu podataka sa senzora */

#include <SPI.h>
/* This library allows you to communicate with
SPI (Serial Peripheral Interface) devices, with the Arduino as the master device. */

#include <Ethernet.h>
/*This library is designed to work with the Arduino Ethernet Shield,
Arduino Ethernet Shield 2, Leonardo Ethernet, and any other W5100/W5200/W5500-based devices.
The library allows an Arduino board to connect to the Internet.
The board can serve as either a server accepting incoming connections or a client making outgoing ones.*/

byte mac[] = { 0x90, 0xA2, 0xDA, 0x00, 0xF8, 0xAB }; // MAC adresa Ethernet shiolda
byte ip[] = { 161,53,168, 59}; // IP adresa mreže
byte gateway[] = { 161, 53, 168, 1 };
/*A gateway is a piece of networking hardware used in telecommunications
 * for telecommunications networks that allows data to flow from one discrete network to another.
 * Gateways are distinct from routers or switches in that they communicate using more than one protocol
 * and can operate at any of the seven layers of the open systems interconnection model (OSI).
The term gateway can also loosely refer to a computer or computer program configured to perform
the tasks of a gateway, such as a default gateway or router.*/
```

```

byte mac[] = { 0x90, 0xA2, 0xDA, 0x00, 0xF8, 0xAB }; // MAC adresa Ethernet shielda
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The term gateway can also loosely refer to a computer or computer program configured to perform
the tasks of a gateway, such as a default gateway or router.*/

byte subnet[] = { 255, 255, 255,128};
/*A Subnet mask is a 32-bit number that masks an IP address,
and divides the IP address into network address and host address.*/

#define time 1000
#define emailInterval 60 // GDJE SE OVO KORISTI?

char message1[35], message2[35]; // GDJE SE OVO KORISTI?

IPAddress server(161,53,166,3); /*IP adresa mail serverea marjan.fesb.hr */

EthernetClient client;

/* funkcija za slanje emaila */
void sendEmail()
{
    Serial.println("spajanje na server...");

    if (client.connect(server,25))
    {
        // spajanje na server na portu 25, smtp
        /*Connects to a specified IP address and port.
        The return value indicates success or failure. Also supports DNS lookups when using a domain name.*/

        Serial.println("spojeno na server");
        // kod za slanje imaila (telnet naredbe)
        client.println("HELO fesb.hr"); delay(time); // Delay za 1000 ms
        client.println("MAIL FROM:<tperkovi@fesb.hr>"); delay(time);
        client.println("RCPT TO:<tperkovi@fesb.hr>"); delay(time);
        client.println("DATA"); delay(time);
        /* data (optional): the data to print (char, byte, int, long, or string)*/
        client.println("Subject: poruka");
        client.print(outputValuetmp);
        /* Šalje se vrijednost temperature koja je spremljena u varijabli outputValuetemp*/
        client.println(" °C");
        client.println(".");
        client.println("QUIT");
        client.stop(); /* Disconnect from the server.*/

    } else
    {
        Serial.println("veza nije uspjela!");
    }
}

```

```

void setup()
{
    Ethernet.begin(mac, ip); /* pocetak ethernet veze */
    Serial.begin(9600); /* pocetak serijske veze */
    delay(1000); /* pauza, da se veze stignu uspostaviti;*/
}

/* Ocitanje se vrši svakih 5s */
void loop() {

    /* Ocitanje i ispis temperature senzora */
    sensorValue = analogRead(analogInPin); /* Vrijednost sa senzora u mV */
    /*mapiranje vrijednosti sa AD pretvaraca u mV */
    outputValue = map(sensorValue, 0, 1023, 0, 5000);
    /* Pretvaram naponsku vrijednost senzora u celzijeve stupnjeve */

    outputValuetmp = (double) (outputValue-500)/10.0;
    /*Sada trebam outputValue pretvoriti u string i poslati mailom */
    sendEmail();
    /*pozivanje funkcije za slanje emaila*/

    /*ocitanje se izvršava svakih 5s */
    delay(5000);

    /*mikrokontroler ne može ništa drugo izvršavati ovih 5s!! */
}

```

