NTNU

elsys
ELEKTRONISK SYSTEMDESIGN & INNOVASJON

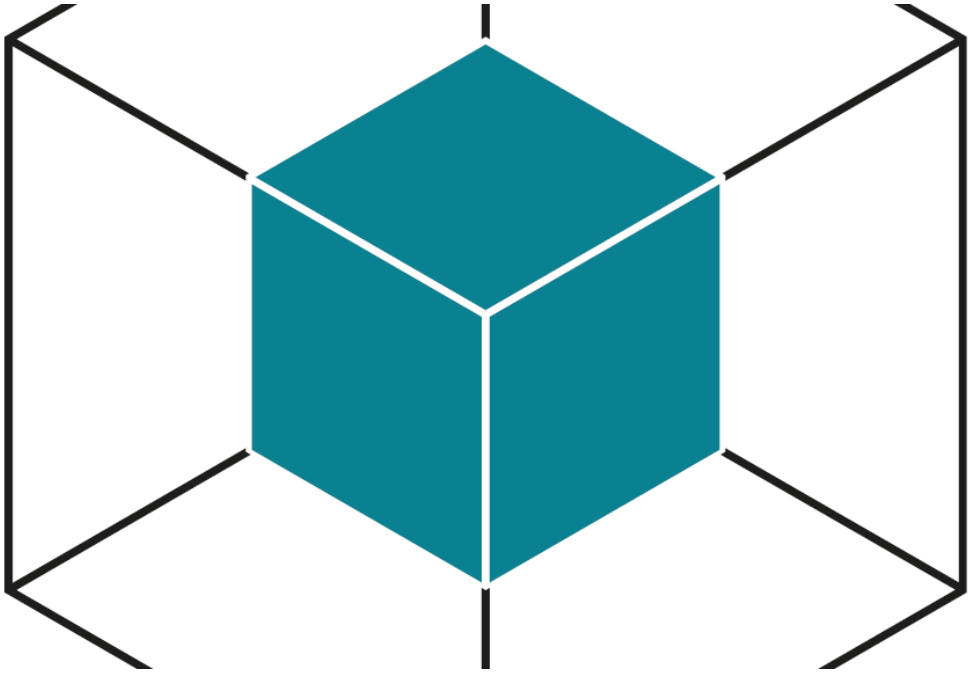
TTT4255 Elektronisk systemdesign, grunnkurs

P6: Servo-server

Elektronisk systemdesign og innovasjon

Ida Bjørnevik, Sven Amberg, Amalie Fridfeldt Hauge og Peter Magerøy

29.06.2023

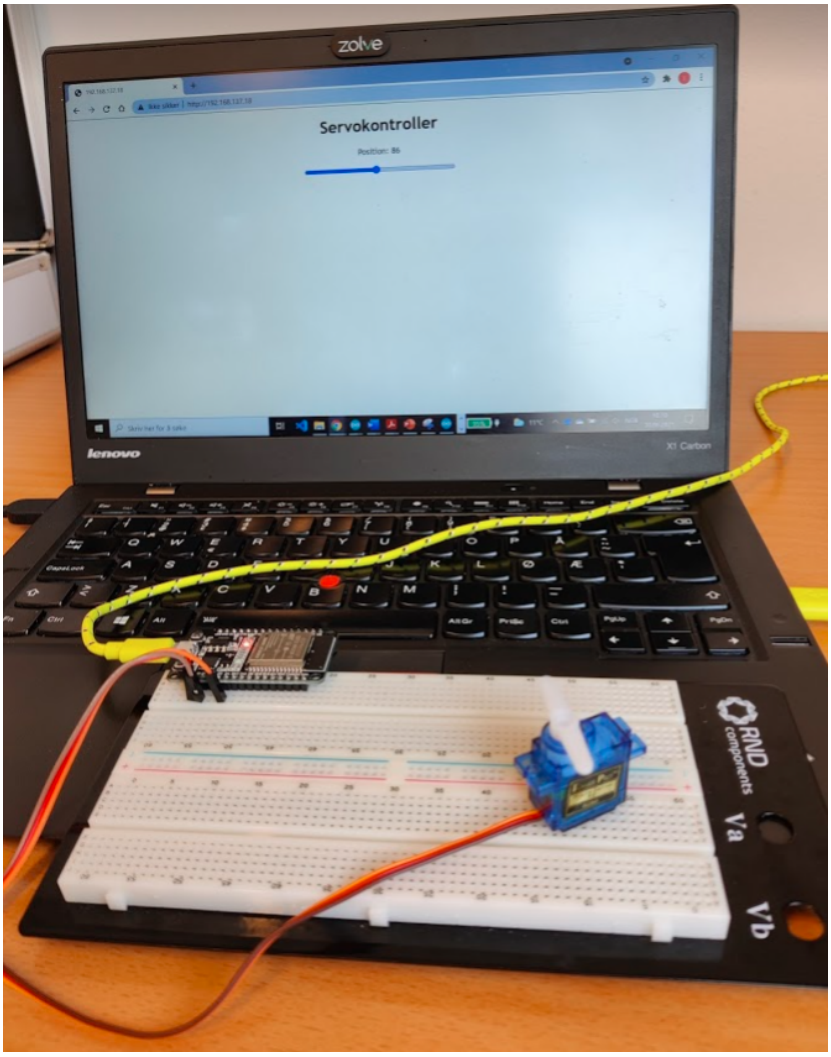


Innhold

Introduksjon

Passar for deg med som har kunnskap frå **A3-Servomotor** og **W1-Wifi**.

I dette prosjektet skal vi kontrollere ein servomotor over wifi. All kode ligg i .ZIP-fil på blackboard for å sleppe å skrive av. Prøv først å bruke rammeverket der du fyll inn kode sjølv, dersom du står fast kan du sjekke den fullstendige koden.



Figur 1: Servomotor kontrollert over wifi

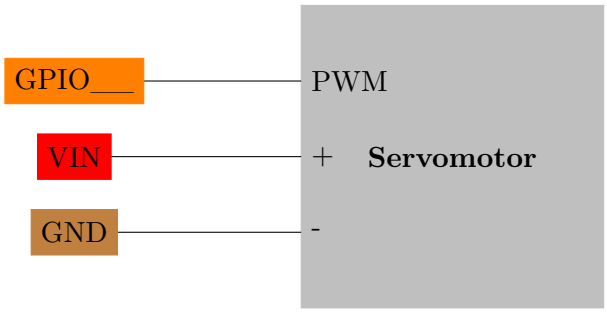
Prosjektet

Utstyrsliste

- ESP32
- Servomotor

Steg 1: Krets

Bruk modul **A3** for å kople servomotoren til ESP32, kretsskjema er vist i figur 2.



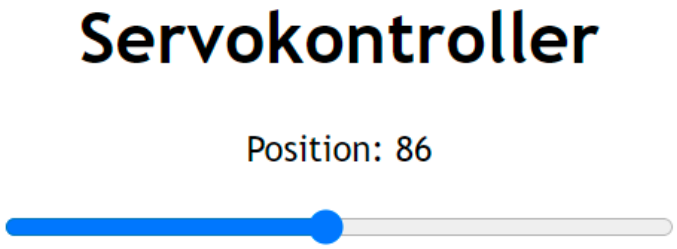
Figur 2: Kretsskjema servomotor kopla til ESP32.

Steg 2: Programmering

Koden er gitt i appendix, vel anten rammeverket eller fullstendig kode. Prøve gjerne å fylle inn kode i rammeverket først.

Både ESP32 og mobilen/PC må vere tilkopla same nett, det kan du gjere ved å dele nett frå eigen PC (vist i modul W1). Når du har kopla opp alt og skrive koden kan du laste opp koden. Spør kvarandre og læringsassistentane dersom dykk står fast!

Opne seriellmonitoren og hent ut IP-addressa som står der, på enheten som er tilkopla same nett som ESP32, opne den i nettlesaren. Her skal du kunne justere posisjonen til servomotoren ved å drage i glideren som er der. Det skal sjå ut som i .



Figur 3: Glider for å styre servo.

Ekstra

- Leit i koden og prøv å endre overskrifta på nettsida.
- Endre hastigheita servoen roterer på.

A Kode-rammeverk

```
/*
 * Inkluder nødvendige bibliotek (2stk)
*/

Servo myservo;  // create servo object to control a servo

// GPIO the servo is attached to
static const int servoPin = ; //Legg til rett pinverdi

// Replace with your network credentials
const char* ssid     = "Eksempel"; //Legg inn rett
   nettverksopplysningar.
const char* password = "12345";

// Set web server port number to 80
WiFiServer server(80);

// Variable to store the HTTP request
String header;

// Decode HTTP GET value
String valueString = String(5);
int pos1 = 0;
int pos2 = 0;

// Current time
unsigned long currentTime = millis();
// Previous time
unsigned long previousTime = 0;
// Define timeout time in milliseconds (example: 2000ms = 2s)
const long timeoutTime = 2000;

void setup() {
  /*
   * Start seriellovervåker med baudrate 115200.
  */

  myservo.attach(servoPin);  // attaches the servo on the servoPin
     to the servo object

  // Connect to Wi-Fi network with SSID and password

  /*
   * Kople til WiFi
```

```
  */

  // Print local IP address and start web server
  Serial.println("");
  Serial.println("WiFi connected.");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
  server.begin();
}

void loop(){
  WiFiClient client = server.available();   // Listen for incoming
     clients

  if (client) {                             // If a new client
     connects,
    currentTime = millis();
    previousTime = currentTime;
    Serial.println("New Client.");          // print a message out
       in the serial port
    String currentLine = "";                // make a String to
       hold incoming data from the client
    while (client.connected() && currentTime - previousTime <=
       timeoutTime) { // loop while the client's connected
      currentTime = millis();
      if (client.available()) {             // if there's bytes to
         read from the client,
        char c = client.read();             // read a byte, then
        Serial.write(c);                    // print it out the
           serial monitor
        header += c;
        if (c == '\n') {                    // if the byte is a
           newline character
          // if the current line is blank, you got two newline
             characters in a row.
          // that's the end of the client HTTP request, so send a
             response:
          if (currentLine.length() == 0) {
            // HTTP headers always start with a response code (e.g.
               HTTP/1.1 200 OK)
            // and a content-type so the client knows what's coming
               , then a blank line:
            client.println("HTTP/1.1 200 OK");
            client.println("Content-type:text/html");
            client.println("Connection: close");
            client.println();
```

```
// Display the HTML web page
client.println("<!DOCTYPE html><html>");
client.println("<head><meta name=\"viewport\" content
   =\"width=device-width, initial-scale=1\">");
client.println("<link rel=\"icon\" href=\"data:,\">");
// CSS to style the on/off buttons
// Feel free to change the background-color and font-
   size attributes to fit your preferences
client.println("<style>body { text-align: center; font-
   family: \"Trebuchet MS\", Arial; margin-left:auto;
   margin-right:auto;}");
client.println(".slider { width: 300px; }</style>");
client.println("<script src=\"https://ajax.googleapis.
   com/ajax/libs/jquery/3.3.1/jquery.min.js\"></script>
   ");

// Web Page
client.println("</head><body><h1>Servokontroller</h1>")
   ;
client.println("<p>Position: <span id=\"servoPos\"></
   span></p>");
client.println("<input type=\"range\" min=\"0\" max
   =\"180\" class=\"slider\" id=\"servoSlider\"
   onchange=\"servo(this.value)\" value=\""+valueString
   +"\"/>");

client.println("<script>var slider = document.
   getElementById(\"servoSlider\");");
client.println("var servoP = document.getElementById(\"
   servoPos\"); servoP.innerHTML = slider.value;");
client.println("slider.oninput = function() { slider.
   value = this.value; servoP.innerHTML = this.value; }
   ");
client.println("$.ajaxSetup({timeout:1000}); function
   servo(pos) { ");
client.println("$.get(\"/?value=\" + pos + \"&\"); {
   Connection: close};}</script>");

client.println("</body></html>");

//GET /?value=180& HTTP/1.1
if(header.indexOf("GET /?value=")>=0) {
  pos1 = header.indexOf('=');
  pos2 = header.indexOf('&');
  valueString = header.substring(pos1+1, pos2);

  //Rotate the servo
```

```
            myservo.write(valueString.toInt());
            Serial.println(valueString);
          }
          // The HTTP response ends with another blank line
          client.println();
          // Break out of the while loop
          break;
        } else { // if you got a newline, then clear currentLine
          currentLine = "";
        }
      } else if (c != '\r') {  // if you got anything else but a
          carriage return character,
        currentLine += c;      // add it to the end of the
            currentLine
      }
    }
  }
  // Clear the header variable
  header = "";
  // Close the connection
  client.stop();
  Serial.println("Client disconnected.");
  Serial.println("");
 }
}
```

B Fullstendig kode

```
#include <WiFi.h>
#include <Servo.h>

Servo myservo;  // create servo object to control a servo

// GPIO the servo is attached to
static const int servoPin = 4;

// Replace with your network credentials
const char* ssid     = "EksempelNettverk";
const char* password = "12345";

// Set web server port number to 80
WiFiServer server(80);

// Variable to store the HTTP request
String header;

// Decode HTTP GET value
String valueString = String(5);
int pos1 = 0;
int pos2 = 0;

// Current time
unsigned long currentTime = millis();
// Previous time
unsigned long previousTime = 0;
// Define timeout time in milliseconds (example: 2000ms = 2s)
const long timeoutTime = 2000;

void setup() {
  Serial.begin(115200);

  myservo.attach(servoPin);  // attaches the servo on the servoPin
     to the servo object

  // Connect to Wi-Fi network with SSID and password
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
```

```
  // Print local IP address and start web server
  Serial.println("");
  Serial.println("WiFi connected.");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
  server.begin();
}

void loop(){
  WiFiClient client = server.available();   // Listen for incoming
     clients

  if (client) {                             // If a new client
     connects,
    currentTime = millis();
    previousTime = currentTime;
    Serial.println("New Client.");          // print a message out
       in the serial port
    String currentLine = "";                // make a String to
       hold incoming data from the client
    while (client.connected() && currentTime - previousTime <=
       timeoutTime) { // loop while the client's connected
      currentTime = millis();
      if (client.available()) {             // if there's bytes to
         read from the client,
        char c = client.read();             // read a byte, then
        Serial.write(c);                    // print it out the
           serial monitor
        header += c;
        if (c == '\n') {                    // if the byte is a
           newline character
          // if the current line is blank, you got two newline
             characters in a row.
          // that's the end of the client HTTP request, so send a
             response:
          if (currentLine.length() == 0) {
            // HTTP headers always start with a response code (e.g.
               HTTP/1.1 200 OK)
            // and a content-type so the client knows what's coming
               , then a blank line:
            client.println("HTTP/1.1 200 OK");
            client.println("Content-type:text/html");
            client.println("Connection: close");
            client.println();

            // Display the HTML web page
            client.println("<!DOCTYPE html><html>");
```

```
client.println("<head><meta name=\"viewport\" content
   =\"width=device-width, initial-scale=1\">");
client.println("<link rel=\"icon\" href=\"data:,\">");
// CSS to style the on/off buttons
// Feel free to change the background-color and font-
   size attributes to fit your preferences
client.println("<style>body { text-align: center; font-
   family: \"Trebuchet MS\", Arial; margin-left:auto;
   margin-right:auto;}");
client.println(".slider { width: 300px; }</style>");
client.println("<script src=\"https://ajax.googleapis.
   com/ajax/libs/jquery/3.3.1/jquery.min.js\"></script>
   ");

// Web Page
client.println("</head><body><h1>Servokontroller</h1>")
   ;
client.println("<p>Position: <span id=\"servoPos\"></
   span></p>");
client.println("<input type=\"range\" min=\"0\" max
   =\"180\" class=\"slider\" id=\"servoSlider\"
   onchange=\"servo(this.value)\" value=\""+valueString
   +"\"/>");

client.println("<script>var slider = document.
   getElementById(\"servoSlider\");");
client.println("var servoP = document.getElementById(\"
   servoPos\"); servoP.innerHTML = slider.value;");
client.println("slider.oninput = function() { slider.
   value = this.value; servoP.innerHTML = this.value; }
   ");
client.println("$.ajaxSetup({timeout:1000}); function
   servo(pos) { ");
client.println("$.get(\"/?value=\" + pos + \"&\"); {
   Connection: close};}</script>");

client.println("</body></html>");

//GET /?value=180& HTTP/1.1
if(header.indexOf("GET /?value=")>=0) {
  pos1 = header.indexOf('=');
  pos2 = header.indexOf('&');
  valueString = header.substring(pos1+1, pos2);

  //Rotate the servo
  myservo.write(valueString.toInt());
  Serial.println(valueString);
```

```
            }
            // The HTTP response ends with another blank line
            client.println();
            // Break out of the while loop
            break;
          } else { // if you got a newline, then clear currentLine
            currentLine = "";
          }
        } else if (c != '\r') {  // if you got anything else but a
            carriage return character,
          currentLine += c;      // add it to the end of the
              currentLine
        }
      }
    }
    // Clear the header variable
    header = "";
    // Close the connection
    client.stop();
    Serial.println("Client disconnected.");
    Serial.println("");
  }
}
```