

DAFTAR PUSTAKA

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LAMPIRAN



KEMENTERIAN PENDIDIKAN, KEBUDAYAN, RISET DAN TEKNOLOGI
UNIVERSITAS HASANUDDIN
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BERITA ACARA UJIAN SARJANA

Pada hari ini **Kamis** tanggal **3 Agustus 2023** Pukul **10:30 WITA** – **Selesai** bertempat di **Meeting Room, Laboratorium Sistem Kendali dan Instrumentasi** telah dilaksanakan Ujian Sarjana bagi Saudara :

Nama : Ryan Prayudha

No. Stambuk : D41116524

Program Studi : Teknik Elektro

Judul Skripsi/TA : **“RANCANG BANGUN ROBOT KURSI BERODA UNTUK PENYANDANG DISABILITAS”**

Yang dihadiri oleh Tim Penguji Ujian Sarjana sebagai berikut :

No.	Nama	Jabatan	Tanda Tangan
1.	Muh. Anshar, S. T., M. Sc (Research), Ph.D	Pemb. I / Ketua	1.
2.	Dr. A. Ejah Umraeni Salam, S. T., M. T.	Pemb. II / Sekretaris	2.
3.	Prof. Dr. Ing. Faizal Arya Samman, S. T., M. T.	Anggota	3.
4.	Ida Rachmaniar Sahali, S.T., M. T.	Anggota	4.

Hasil keputusan panitia penilai Ujian Sarjana : **Lulus / Tidak lulus** dengan nilai angka dan huruf

Gowa, 3 Agustus 2023

Ketua/Sekretaris Panitia Ujian Sarjana

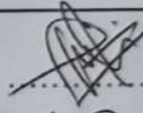
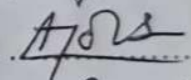
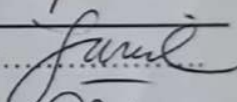
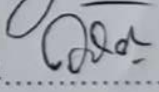
Muh. Anshar, S. T., M. Sc (Research), Ph.D



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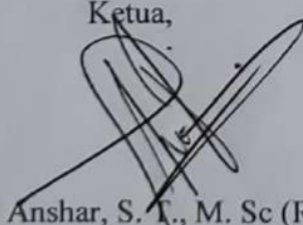
DAFTAR HADIR UJIAN SARJANA

Nama/Stambuk : Ryan Prayudha D41116524
Judul Skripsi/T. A : "RANCANG BANGUN ROBOT KURSI BERODA UNTUK PENYANDANG DISABILITAS"
Hari/Tanggal : Kamis, 3 Agustus 2023
Jam : 10.30 WITA – Selesai
Tempat : Meeting Room, Laboratorium Sistem Kendali dan Instrumentasi

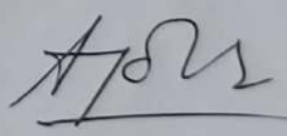
No.	Jabatan	Nama Dosen	Tanda Tangan
I.	Pembimbing I	1. Muh. Anshar, S. T., M. Sc (Research)., Ph.D	1. 
		2. Dr. A. Ejah Umraeni Salam, S. T., M. T.	2. 
		3. Prof. Dr. Ing. Faizal Arya Samman, S. T., M. T.	3. 
II.	Anggota Penguji	4. Ida Rachmaniar Sahali, S.T., M. T.	4. 

PANITIA UJIAN SARJANA

Ketua,


Muh. Anshar, S. T., M. Sc (Research)., Ph.D

Sekretaris,


Dr. A. Ejah Umraeni Salam, S. T., M. T.



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Nomor : **12908/UN4.7.7.1/PT.01.06/2023**

16 Juni 2023

Lamp : -

Hal : Usulan SK Pembimbingan Tugas Akhir

Kepada Yth : Bapak Wakil Dekan Bidang Akademik dan Kemahasiswaan
Fakultas Teknik UNHAS
Di-
Gowa

Dengan hormat,

Dalam rangka Pembimbingan tugas akhir, maka Bersama ini kami sampaikan nama mahasiswa dan Dosen Pembimbing Tugas Akhir:

Nama	Stambuk
1. Ryan Prayudha	1. D41116524

Dosen Pembimbing:

1. Muh. Anshar, S. T., M. Sc(Research)., Ph.D.
2. Dr. A. Ejah Umraeni Salam, S. T., M. T.

Dapat dibuatkan Usulan SK Pembimbing Tugas Akhir.

Demikian penyampaian kami, atas bantuan dan perhatiannya diucapkan terima kasih.

Gowa, 16 Juni 2023

Sekretaris Departemen Teknik Elektro



Dr. Ikhlas Kitta, ST, MT.

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Tembusan:

1. Arsip



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SURAT PENUGASAN

No. 12910/UN4.7.7.1/PT.01.06/2023

Dari : Dekan Fakultas Teknik Universitas Hasanuddin

Kepada : 1. Muh. Anshar, S. T., M. Sc(Research)., Ph.D.
2. Dr. A. Ejah Umraeni Salam, S. T., M. T.

Isi :1. Berdasarkan Surat Ketua Departemen Teknik Elektro Fakultas Teknik Nomor. 12908/UN4.7.7.1/PT.01.06/2023 tanggal tanggal 16 Juni 2023 tentang usul DOSEN PEMBIMBING SKRIPSI MAHASISWA, maka dengan ini kami menugaskan

Saudara untuk membimbing penulisan Laporan Tugas Akhir mahasiswa Teknik Elektro Fakultas Teknik Universitas Hasanuddin di bawah ini:

N a m a:

Ryan Prayudha

No. Stambuk:

D41116524

2. Surat penugasan pembimbing ini mulai berlaku sejak tanggal ditetapkannya dan berakhir sampai selesainya penulisan Laporan Tugas Akhir mahasiswa tersebut.
3. Agar penugasan ini dilaksanakan sebaik-baiknya dengan penuh rasa tanggung jawab.

Ditetapkan di Gowa,

Pada tanggal 16 Juni 2023

a.n. Dekan,

Wakil Dekan Bidang Akademik dan Kemahasiswaan



Dr. Amil Ahmad Ilham, S.T., M.IT.

NIP. 19731010 199802 1 001

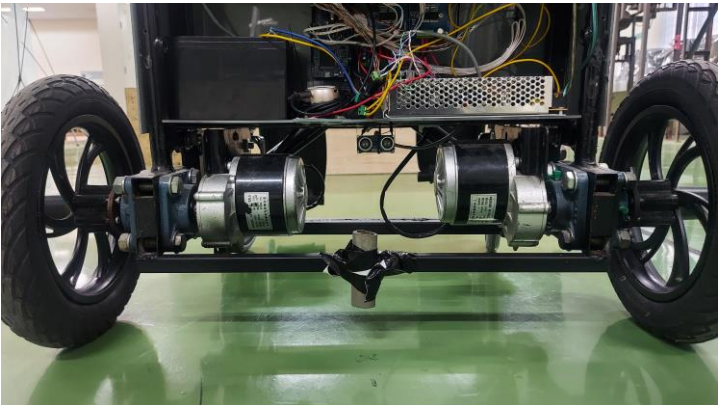
Tembusan:

1. Dekan FT-UH,
2. Ketua Departemen Teknik Elektro FT-UH
3. Mahasiswa yang bersangkutan



CERTIFICATE NO. ACP 26588

Lampiran Hasil Rancang Bangun Robot Kursi Beroda



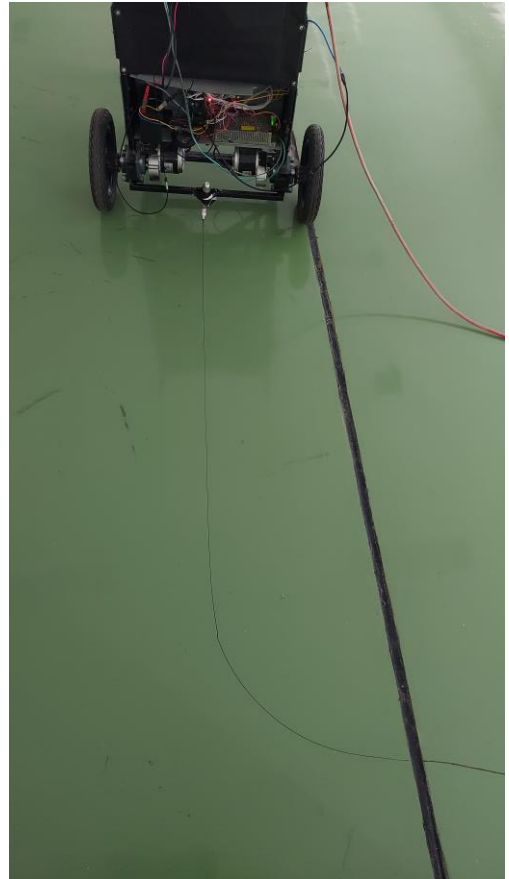
Lampiran Gerak Maju Robot Kursi Beroda



Lampiran Gerak Mundur Robot Kursi Beroda



Lampiran Hasil Gerak Robot Kursi Beroda



Lampiran Program Gerak Robot Kursi Beroda

```
#include <Wire.h>
#include "MOVIShield.h"
#include <NewPing.h>

const int led = 13;

float pressLength_milliSeconds = 0;
int optionOne_milliSeconds = 100;
int optionTwo_milliSeconds = 1000;
int M1_RPWM = 2; //5;
int M1_LPWM = 3; //6;
int M1_L_EN = 4; //7;
int M1_R_EN = 5; //8;

int M2_RPWM = 6; //9;
int M2_LPWM = 7; //10;
int M2_L_EN = 8; //11;
int M2_R_EN = 9; //12;

int Fwd = 35;
int BB1 = 35;
int BB2 = 37;
int BB3 = 36;
int BB4 = 38;
int Rev = 34;
int RiTurn = 37;
int LeTurn = 36;

int manualCount = 0;
float newpid, setpoint = 27, pidval, setpoint1 = 30;
int kecKanan, kecKiri, kecS = 30;
MOVI recognizer(true); // Get a MOVI object, true enables serial monitor
interface, rx and tx can be passed as parameters for alternate communication pins
on AVR architecture
volatile int sensor[5];
#define SONAR_NUM 5
#define MAX_DISTANCE 200
volatile byte flag, flagA = 0;
NewPing sonar[SONAR_NUM] = {
  NewPing(27, 29, MAX_DISTANCE), // kiri samping 0
  NewPing(31, 33, MAX_DISTANCE), //kiri depan 2
  NewPing(22, 24, MAX_DISTANCE), //kanan samping 3
  NewPing(26, 28, MAX_DISTANCE), //kanan depan 5
  NewPing(53, 52, MAX_DISTANCE) //belakang
```

```

};

char data;
int flag55;
int k, a = 69, b, d, c, f, adj1, adj2;
unsigned long interval = 10; // the time we need to wait
unsigned long previousMillis = 0;
unsigned long interval1 = 50; // the time we need to wait
unsigned long previousMillis1 = 0;
unsigned long interval2 = 10; // the time we need to wait
unsigned long previousMillis2 = 0;
unsigned long interval3 = 10; // the time we need to wait
unsigned long previousMillis3 = 0;
unsigned long interval4 = 50; // the time we need to wait
unsigned long previousMillis4 = 0;
unsigned long interval5 = 100; // the time we need to wait
unsigned long previousMillis5 = 0;
unsigned long interval6 = 100; // the time we need to wait
unsigned long previousMillis6 = 0;

unsigned long currentMillis;
unsigned long currentMillis1;
unsigned long currentMillis2;
unsigned long currentMillis3;
unsigned long currentMillis4;
unsigned long currentMillis5;
unsigned long currentMillis6;

volatile float kpki = 0.1, kpka = 0.1;
int kiki, kika;
volatile float kdki = 0, kdka = 0;

volatile float error, errors;
float error1, errors1;
int read;
int x = 0;
String inString = "";

void setup() {
  pinMode(BB4, INPUT);
  Serial.begin(9600);
  pinMode(21, INPUT);
  pinMode(led, OUTPUT); // Make LED port writeable
  digitalWrite(led, HIGH); // Blink LED.
  delay(1);
  digitalWrite(led, LOW);

```

```

delay(1);
for (int i = 2; i < 10; i++) {
  pinMode(i, OUTPUT);
}
for (int i = 2; i < 10; i++) { //making sure all idle
  digitalWrite(i, LOW);
}
for (int i = 32; i < 36; i++) {
  pinMode(i, INPUT);
}
digitalWrite(M1_L_EN, 1);
digitalWrite(M1_R_EN, 1);
digitalWrite(M2_L_EN, 1);
digitalWrite(M2_R_EN, 1);
recognizer.say("Pilih mode kendali");
recognizer.addSentence("Satu Maju");
recognizer.addSentence("Dua Mundur");
// recognizer.addSentence("Belok Kanan");
// recognizer.addSentence("Belok Kiri");
recognizer.train();
}

void loop() {
  if (digitalRead(BB1) == HIGH) {
    recognizer.say("Saya Masuk ke Mode Tombol");
    while (1) {
      runningTom();
    }
  }
  if ((digitalRead(BB3) == HIGH)) {
    recognizer.say("Saya Masuk Ke Mode Suara");
    while(1){
      modeVoice();
    }
  }
}

void motor(float pwmki, float pwmka) {

  pwmki = constrain(pwmki, -255, 255);
  pwmka = constrain(pwmka, -255, 255);

  if (pwmki <= -15 && pwmki > -255) {
    analogWrite(M2_RPWM, (int)(-pwmki));
    analogWrite(M2_LPWM, 0);
  }
  if (pwmki >= 15 && pwmki < 255) {

```

```

    analogWrite(M2_RPWM, 0);
    analogWrite(M2_LPWM, (int)pwmki);
}
if (pwmka >= 15 && pwmka < 255) {
    analogWrite(M1_RPWM, (int)pwmka);
    analogWrite(M1_LPWM, 0);
}
if (pwmka <= -15 && pwmka > -255) {
    analogWrite(M1_RPWM, 0);
    analogWrite(M1_LPWM, (int)(-pwmka));
}
if (pwmka > -15 && pwmka < 15) {
    analogWrite(M1_RPWM, 10);
    analogWrite(M1_LPWM, 10);
}
if (pwmki > -15 && pwmki < 15) {
    analogWrite(M2_RPWM, 10);
    analogWrite(M2_LPWM, 10);
}
// Serial.print(pwmki);
// Serial.print(" ");
// Serial.println(pwmka);
}

void runningTom() {
    pembacaanSensor();
    flag55=1;
    while (digitalRead(Fwd) == 1) {
        if(flag55 == 1){
            recognizer.say("Saya bergerak maju");
            flag55 = 0;
        }
        pembacaanSensor();
        motor(30 - x, 30 + x);
        Serial.println("maju utama");
        if (sensor[1] < 40 || sensor[3] < 40) {
            recognizer.say("Saya akan melewati rintangan");
            Serial.println("baca depan");
            while (1) {
                pembacaanSensor();
                motor(30, -30);
                Serial.println("belok kanan");
                if (sensor[0] <= 25) {
                    motor(0, 0);
                    delay(1000);
                    break;
                }
            }
        }
    }
}

```



```

    }
  }
  while (1) {
    pembacaanSensor();
    calpid();
    currentMillis5 = millis();
    if ((unsigned long)(currentMillis5 - previousMillis5) >= interval5) {
      b++; ///// pencacah waktu
      Serial.println("Nilai B = ");
      Serial.print(b);
      previousMillis5 = millis();
    }
    if(b >= a) {
      motor(30,-15);
      delay(3800);
      motor (0,0);
      delay(1000);
      break;
    }
  }
  while (1) {
    pembacaanSensor();
    motor(30, 38);
    delay(3500);
    recognizer.say("Saya sudah tiba di tujuan");
    break;
  }
}

while (digitalRead(Rev) == 1){
  if(flag55 == 1){
    recognizer.say("Saya berjalan mundur");
    flag55 = 0;
  }
  pembacaanSensor();
  motor(-30 - x, -30 + x);
  Serial.println("mundur utama");
  if (sensor[4] < 80) {
    recognizer.say("Saya akan melewati rintangan");
    Serial.println("baca belakang");
    while (1) {
      pembacaanSensor();
      motor(29, -29);
      Serial.println("belok kanan");
      if (sensor[2] <= 25) {

```

```

        motor(0, 0);
        delay(1000);
        break;
    }
}
while (1) {
    pembacaanSensor();
    motor (-30,-30);
    delay(2700);
    break;
}
while (1){
    pembacaanSensor();
    motor(-40,0);
    delay(2700);
    break;
}
while (1){
    motor(-32, -33);
    delay(3200);
    break;
}
while(1){
    motor(-40, 0);
    delay(2450);
    motor (-30, -34);
    delay(3300);
    motor(0, -40);
    delay(1750);
    motor(-33, -30);
    delay(2200);
    recognizer.say("Saya sudah tiba di tujuan");
    break;
}
}
}
motor(0, 0);
}

void modeVoice(){
    signed int res = recognizer.poll();
    recognizer.callSign("See");
    flag55=1;
    if (res == 1){
        if(flag55 == 1){
            recognizer.say("Saya bergerak maju");

```

```

    flag55 = 0;
}
    pembacaanSensor();
while (sensor[1] >= 40 && sensor[3] >= 40){
    pembacaanSensor();
    motor(30 - x, 30 + x);
    Serial.println("maju utama");}
if (sensor[1] < 40 || sensor[3] < 40) {
    recognizer.say("Saya akan melewati rintangan");
    Serial.println("baca depan");
    while (1) {
        pembacaanSensor();
        motor(30, -30);
        Serial.println("belok kanan");
        if (sensor[0] <= 25) {
            motor(0, 0);
            delay(1000);
            break;
        }
    }
    while (1) {
        pembacaanSensor();
        calpid();
        currentMillis5 = millis();
        if ((unsigned long)(currentMillis5 - previousMillis5) >= interval5) {
            b++; ///// pencacah waktu
            Serial.println("Nilai B = ");
            Serial.print(b);
            previousMillis5 = millis();
        }
        if(b >= a) {
            motor(30,-15);
            delay(3800);
            motor (0,0);
            delay(1000);
            break;
        }
    }

    while (1) {
        pembacaanSensor();
        motor(30, 38);
        delay(3500);
        recognizer.say("Saya sudah tiba di tujuan");
        break;
        res=0;
    }
}

```

```

    }
  }
}
if (res ==2){
  if(flag55 == 1){
    recognizer.say("Saya berjalan mundur");
    flag55 = 0;
  }
  pembacaanSensor();
  while (sensor[4] >= 80){
  pembacaanSensor();
  motor(-30 - x, -30 + x);
  Serial.println("mundur utama");
  }
  if (sensor[4] < 80) {
  recognizer.say("Saya akan melewati rintangan");
  Serial.println("baca belakang");
  while (1) {
  pembacaanSensor();
  motor(29, -29);
  Serial.println("belok kanan");
  if (sensor[2] <= 25) {
    motor(0, 0);
    delay(1000);
    break;
  }
  }
  while (1) {
  pembacaanSensor();
  motor (-30,-30);
  delay(2700);
  break;
  }
  while (1){
  pembacaanSensor();
  motor(-40,0);
  delay(2400);
  break;
  }
  while (1){
  motor(-31, -34);
  delay(3200);
  break;
  }
  while(1){
  motor(-40, 0);

```

```

    delay(2450);
    motor (-30, -34);
    delay(3300);
    motor(0, -40);
    delay(1750);
    motor(-33, -30);
    delay(2200);
    recognizer.say("Saya sudah tiba di tujuan");
    res=0;
    break;
  }
}
motor(0,0);
}

void pembacaanSensor() {
  currentMillis2 = millis();
  if ((unsigned long)(currentMillis2 - previousMillis2) >= interval2) {
    for (uint8_t i = 0; i < SONAR_NUM; i++) {
      sensor[i] = sonar[i].ping_cm();
      if (sensor[i] == 0) sensor[i] = 200;
      previousMillis2 = millis();
    }
  }
  currentMillis1 = millis();
  if ((unsigned long)(currentMillis1 - previousMillis1) >= interval1) {
    for (uint8_t i = 0; i < SONAR_NUM; i++) { // Loop through each sensor and
display results.
      Serial.print(sensor[i]);
      Serial.print(" ");
      previousMillis1 = millis();
    }
    Serial.println();
  }
}

void calpid() {
  currentMillis = millis();
  if ((unsigned long)(currentMillis - previousMillis) >= interval) {
    newpid = findoutPID(setpoint, 3, 0.5, 1);
    newpid = constrain(newpid, -50, 50);
    previousMillis = millis();

    kecKanan = kecS + newpid; //merubah pwm motor kanan
    kecKiri = kecS - newpid; //merubah pwm motor kiri

```

```

if (kecKanan > 0) { //pengkondisian sinyal pwm ke driver
  if (kecKanan > 70) kecKanan = 70;
  analogWrite(M1_RPWM, kecKanan);
  analogWrite(M1_LPWM, 0);
}
if (kecKanan <= 0) {
  analogWrite(M1_RPWM, 10);
  analogWrite(M1_LPWM, 0);
}

if (kecKiri > 0) { //pengkondisian sinyal pwm ke driver
  if (kecKiri > 70) kecKiri = 70;
  analogWrite(M2_RPWM, 0);
  analogWrite(M2_LPWM, kecKiri);
}
if (kecKiri <= 0) {
  analogWrite(M2_RPWM, 0);
  analogWrite(M2_LPWM, 10);
}
}
}

void calpid1() {
  currentMillis = millis();
  if ((unsigned long)(currentMillis - previousMillis) >= interval) {
    newpid = findoutPID1(setpoint1, 3, 0.5, 1);
    newpid = constrain(newpid, -50, 50);
    previousMillis = millis();

    kecKanan = kecS + newpid; //merubah pwm motor kanan
    kecKiri = kecS - newpid; //merubah pwm motor kiri

    if (kecKanan > 0) { //pengkondisian sinyal pwm ke driver
      if (kecKanan > 70) kecKanan = 70;
      analogWrite(M1_RPWM, 0); // ubah untuk ganti ban atau ubah keckanan & 0
      untuk ubah maju mundur
      analogWrite(M1_LPWM, kecKanan);
    }
    if (kecKanan <= 0) {
      analogWrite(M1_RPWM, 0);
      analogWrite(M1_LPWM, 10);
    }

    if (kecKiri > 0) { //pengkondisian sinyal pwm ke driver
      if (kecKiri > 70) kecKiri = 70;
      analogWrite(M2_RPWM, kecKiri);

```

```

    analogWrite(M2_LPWM, 0);
  }
  if (kecKiri <= 0) {
    analogWrite(M2_RPWM, 10);
    analogWrite(M2_LPWM, 0);
  }
}
}
}

```

```

float findoutPID(int sp, int kp, float ki, float kd) {
  pembacaanSensor();
  error1 = sensor[0] - sp;
  pidval = (kp * error1) + (ki * (error1 + errors1)) + (kd * (error1 - errors1));
  errors1 = error1;

```

```

  return pidval;
}

```

```

float findoutPID1(int sp, int kp, float ki, float kd) {
  pembacaanSensor();
  error1 = sensor[2] - sp;
  pidval = (kp * error1) + (ki * (error1 + errors1)) + (kd * (error1 - errors1));
  errors1 = error1;

```

```

  return pidval;
}

```