DAFTAR LAMPIRAN

Lampiran 1 Program Arduino

Penjualan Beras Otomatis Berbasis Mikrokontroler ESP32

```
#include <WiFi.h>
#include <HTTPClient.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <SPI.h>
#include <MFRC522.h>
#include <EEPROM.h>
#include <ESP32Servo.h>
#include <HX711.h>

// === WiFi & Google Sheet ===
const char* ssid = "Realme_10";
const char* password = "12345678";
const String scriptURL = "https://script.google.com/macros/s/AKfycbwQpr1tfY-
      zFzqI4LHEraMIgWceUT7B4Lj1jVjHdE7_krbKon0EhwJBm7ixPIsrfOY/
      exec";

// === LCD & RFID ===
LiquidCrystal_I2C lcd(0x27, 20, 4);
#define SS_PIN 17
#define RST_PIN 5
MFRC522 mfrc522(SS_PIN, RST_PIN);

// === Servo ===
Servo pintuBeras, servoBoxUang;
const int pinServo = 4;
const int pinServoBox = 12;

// === Load Cell ===
#define DT 33
#define SCK 32
HX711 scale;
float kalibrasi_default = -102503.0;
float beratTarget = 0, beratSekarang = 0;

// === EEPROM RFID ===
const int maxCards = 10, recordSize = 8;
bool rfidDetected = false;
String rfidUID = "";
```

```
// === Menu & Uang Tunai ===
int menuState = 0, kgTerpilih = 0;
String inputNominal = "";
int totalUangTunai = 0;

// === Keypad PCF8574 ===
#define PCF8574_ADDR 0x20
char customKeypad[4][4] = {
  {'D','#','0','*'}, {'C','9','8','7'},
  {'B','6','5','4'}, {'A','3','2','1'}
};

// === Sensor Warna ===
#define S0 27
#define S1 26
#define S2 25
#define S3 14
#define OUT 13

int r,g,b,lastR,lastG,lastB;
unsigned long lastDeteksi = 0;
const unsigned long jeda = 2500;
struct WarnaKal { int r,g,b,nominal; };
WarnaKal uangKal[] = {
  {259, 261, 229, 20000}, {260, 261, 229, 20000}, {259, 261, 229, 20000},
  {259, 260, 229, 20000}, {290, 294, 253, 20000}, {290, 294, 252, 20000},
  {291, 294, 253, 20000}, {266, 274, 236, 20000}, {266, 274, 236, 20000},
  {265, 274, 235, 20000}, {265, 274, 235, 20000}, {264, 274, 236, 20000},

  {260, 293, 255, 5000}, {259, 292, 256, 5000}, {259, 292, 255, 5000},
  {267, 298, 253, 5000}, {267, 298, 253, 5000}, {266, 298, 252, 5000},
  {226, 258, 221, 5000}, {226, 259, 222, 5000}, {226, 260, 222, 5000},
  {232, 270, 226, 5000},  {231, 270, 227, 5000},{231, 269, 227, 5000},

  {296, 319, 249, 10000}, {296, 319, 249, 10000}, {296, 319, 250, 10000},
  {290, 323, 259, 10000}, {290, 323, 260, 10000}, {289, 322, 259, 10000},
  {232, 251, 199, 10000}, {233, 251, 198, 10000}, {233, 249, 199, 10000},
  {229, 246, 195, 10000}, {229, 247, 196, 10000}, {229, 247, 196, 10000},

  {266, 291, 234, 100000}, {266, 291, 235, 100000}, {264, 291, 233, 100000},
  {263, 294, 237, 100000}, {264, 292, 237, 100000}, {263, 294, 236, 100000},
  {265, 290, 232, 100000}, {261, 293, 232, 100000}, {261, 295, 230, 100000},
  {262, 291, 238, 100000}, {269, 299, 234, 100000}, {266, 297, 231, 100000},

  {274, 260, 205, 50000}, {274, 260, 204, 50000}, {273, 258, 205, 50000},
```

```
  {273, 260, 205, 50000}, {294, 276, 219, 50000}, {293, 277, 220, 50000},
  {294, 277, 219, 50000}, {258, 260, 208, 50000}, {258, 260, 208, 50000},
  {257, 260, 206, 50000}, {264, 263, 210, 50000}, {265, 262, 211, 50000},
};

void sendDataToSheet(String metode, float berat, int nominal, String uid) {
  if (WiFi.status()==WL_CONNECTED) {
    HTTPClient http;
    String url = scriptURL +
      "?metode=" + metode +
      "&berat=" + String(berat,2) +
      "&nominal=" + String(nominal) +
      "&uid=" + uid;
    http.begin(url);
    int code = http.GET();
    http.end();
  }
}

void setupSensorWarna() {
  pinMode(S0,OUTPUT);pinMode(S1,OUTPUT);
  pinMode(S2,OUTPUT);pinMode(S3,OUTPUT);
  pinMode(OUT,INPUT);
  digitalWrite(S0,HIGH);digitalWrite(S1,LOW);
}

int bacaFrekuensi(bool s2, bool s3){
  digitalWrite(S2,s2);digitalWrite(S3,s3);
  delay(100);
  return pulseIn(OUT,LOW);
}

void bacaWarna(){
  r=bacaFrekuensi(LOW,LOW);
  g=bacaFrekuensi(HIGH,HIGH);
  b=bacaFrekuensi(LOW,HIGH);
}

int identifikasiUang(int rVal,int gVal,int bVal){
  for(int i=0;i<sizeof(uangKal)/sizeof(uangKal[0]);i++){
                int       sel=abs(rVal-uangKal[i].r)+abs(gVal-uangKal[i].g)+abs(bVal-
        uangKal[i].b);
    if(sel<150) return uangKal[i].nominal;
  }
  return 0;
```

```
}
void bukaBoxUang(){
  servoBoxUang.write(90);
  delay(3000);
  servoBoxUang.write(0);
}

int ambilSaldoEEPROM(String uid) {
  for(int i=0;i<maxCards;i++){
    int addr=i*recordSize; String stored="";
    for(int j=0;j<4;j++){
      byte b=EEPROM.read(addr+j);
      if(b<16) stored+="0";
      stored+=String(b,HEX);
    }
    stored.toUpperCase();
    if(uid==stored){
      int saldo=0;
      saldo|=EEPROM.read(addr+4)<<24;
      saldo|=EEPROM.read(addr+5)<<16;
      saldo|=EEPROM.read(addr+6)<<8;
      saldo|=EEPROM.read(addr+7);
      return saldo;
    }
  }
  return 0;
}

void simpanSaldoEEPROM(String uid, int saldo){
  int idx=-1;
  for(int i=0;i<maxCards;i++){
    int addr=i*recordSize; String stored="";
    for(int j=0;j<4;j++){
      byte b=EEPROM.read(addr+j);
      if(b<16) stored+="0";
      stored+=String(b,HEX);
    }
    stored.toUpperCase();
    if(uid==stored){ idx=i; break; }
  }
  if(idx==-1){
    for(int i=0;i<maxCards;i++){
      if(EEPROM.read(i*recordSize)==0xFF) { idx=i; break; }
    }
  }
```

```
  if(idx!=-1){
    int addr=idx*recordSize;
    for(int j=0;j<4;j++){
      String bs=uid.substring(j*2, j*2+2);
      EEPROM.write(addr+j, strtol(bs.c_str(),0,16));
    }
    EEPROM.write(addr+4, (saldo>>24)&0xFF);
    EEPROM.write(addr+5, (saldo>>16)&0xFF);
    EEPROM.write(addr+6, (saldo>>8)&0xFF);
    EEPROM.write(addr+7, saldo&0xFF);
    EEPROM.commit();
  }
}

// === Format angka ke ribuan (Rp 20.000) ===
String formatRupiah(int angka) {
  String hasil = "";
  String num = String(angka);
  int len = num.length();
  int counter = 0;
  for(int i=len-1; i>=0; i--){
    hasil = num[i] + hasil;
    counter++;
    if(counter%3==0 && i!=0){
      hasil = '.' + hasil;
    }
  }
  return "Rp " + hasil;
}

void tampilkanMenuAwal(){
  lcd.clear();
  lcd.setCursor(0,0);lcd.print("A: Non Tunai");
  lcd.setCursor(0,1);lcd.print("B: Tunai");
  lcd.setCursor(0,2);lcd.print("C: Cek Saldo");
  lcd.setCursor(0,3);lcd.print("D: Isi Saldo");
  menuState=0;rfidDetected=false;
  inputNominal="";totalUangTunai=0;
}

void prosesTimbang(){
  beratTarget=kgTerpilih*1.0;
  lcd.clear();lcd.setCursor(0,0);lcd.print("Menimbang...");
  scale.tare(); pintuBeras.write(180);
  while(true){
```

```
    beratSekarang=scale.get_units(5);
    lcd.setCursor(0,1);
    lcd.printf("Berat: %.2f kg  ", beratSekarang);
    if(beratSekarang>=beratTarget){
      pintuBeras.write(0);
      lcd.setCursor(0,2);lcd.print("Tercapai");
      lcd.setCursor(0,3);
      lcd.printf("Final: %.2f kg", beratSekarang);
      break;
    }
  }
  delay(3000);
  tampilkanMenuAwal();
}
void bacaRFID(){
   if(!mfrc522.PICC_IsNewCardPresent()  ||  !mfrc522.PICC_ReadCardSerial())
        return;
  rfidUID="";
  for(byte i=0;i<mfrc522.uid.size;i++){
    if(mfrc522.uid.uidByte[i]<0x10) rfidUID+="0";
    rfidUID+=String(mfrc522.uid.uidByte[i],HEX);
  }
  rfidUID.toUpperCase(); rfidDetected=true;
  mfrc522.PICC_HaltA();

  if(menuState==5){
    int harga=kgTerpilih*20000;
    int saldo=ambilSaldoEEPROM(rfidUID);
    if(saldo>=harga){
      simpanSaldoEEPROM(rfidUID, saldo-harga);
      sendDataToSheet("non-tunai", kgTerpilih, harga, rfidUID);
      prosesTimbang();
    } else {
      lcd.clear();
      lcd.setCursor(0,0); lcd.print("Saldo Tidak Cukup");
      lcd.setCursor(0,1); lcd.printf("Perlu: %s", formatRupiah(harga).c_str());
      delay(3000); tampilkanMenuAwal();
    }
  } else if(menuState==3){
    int saldo=ambilSaldoEEPROM(rfidUID);
    lcd.clear();
    lcd.setCursor(0,0); lcd.print("Saldo Anda:");
    lcd.setCursor(0,1); lcd.printf("%s", formatRupiah(saldo).c_str());
    delay(3000); tampilkanMenuAwal();
```

```
  }
}
char bacaKeypad() {
  for(int row=0; row<4; row++){
    byte data = 0xF0 | ~(1<<row);
    Wire.beginTransmission(PCF8574_ADDR);
    Wire.write(data);
    Wire.endTransmission();
    delayMicroseconds(50);
    Wire.requestFrom(PCF8574_ADDR,1);
    if(Wire.available()){
      byte kol=Wire.read();
      for(int col=0; col<4; col++){
        if(!(kol&(1<<(4+col)))) return customKeypad[row][col];
      }
    }
  }
  return 0;
}
void setup(){
  Serial.begin(115200);
  WiFi.begin(ssid,password);
  while(WiFi.status()!=WL_CONNECTED){ delay(500); }
  Wire.begin(21,22);
  lcd.init(); lcd.backlight();
  pintuBeras.attach(pinServo);
  servoBoxUang.attach(pinServoBox);
  pintuBeras.write(0); servoBoxUang.write(0);
  SPI.begin(18,19,23,SS_PIN);
  mfrc522.PCD_Init();
  EEPROM.begin(512);
  scale.begin(DT,SCK);
  scale.set_scale(kalibrasi_default);
  scale.tare();
  setupSensorWarna();
  tampilkanMenuAwal();
}

void loop(){
   if((menuState==3 || menuState==4 || menuState==5) && !rfidDetected)
       bacaRFID();

  if(menuState==7){

   if(millis()-lastDeteksi > jeda){
     bacaWarna();
```

```
    if(abs(r-lastR)>10||abs(g-lastG)>10||abs(b-lastB)>10){
      int nom = identifikasiUang(r,g,b);
      if(nom>0){
        totalUangTunai+=nom;
        lcd.setCursor(0,1);
        lcd.printf("Diterima: %s", formatRupiah(nom).c_str());
        lcd.setCursor(0,2);
        lcd.printf("Total: %s  ", formatRupiah(totalUangTunai).c_str());
        bukaBoxUang();
        if(totalUangTunai >= kgTerpilih*20000) {
          sendDataToSheet("tunai", kgTerpilih, totalUangTunai, "-");
          prosesTimbang();
        }
      } else {
        lcd.setCursor(0,1); lcd.print("Uang tidak valid");
        lcd.setCursor(0,2); lcd.print("Silakan ulangi");
        delay(2000);
      }
      lastDeteksi = millis();
    }
    lastR=r; lastG=g; lastB=b;
  }
}
char key = bacaKeypad();
if(key){
  delay(200);
  switch(key){
    case 'A':
      menuState=1;
      lcd.clear(); lcd.print("Non Tunai - Pilih");
      lcd.setCursor(0,1); lcd.print("1:1kg ... 5:5kg");
      break;
    case 'B':
      menuState=2;
      lcd.clear(); lcd.print("Tunai - Pilih Kg");
      lcd.setCursor(0,1); lcd.print("1:1kg ... 5:5kg");
      break;
    case 'C':
      menuState=3; rfidDetected=false;
      lcd.clear(); lcd.print("Cek Saldo"); lcd.setCursor(0,1); lcd.print("Tempelkan
       Kartu");
      break;

    case 'D':
      menuState=4; rfidDetected=false; inputNominal="";
       lcd.clear(); lcd.print("Isi Saldo"); lcd.setCursor(0,1); lcd.print("Tempelkan
```

```
        Kartu");
       break;
      case '*':
       if(menuState==2 && kgTerpilih){
        lcd.clear();lcd.print("Masukkan uang...");
        totalUangTunai=0;
        lastDeteksi=0;
        menuState=7;
       }
       else if(menuState==4 && rfidDetected && inputNominal!=""){
        int nom = inputNominal.toInt();
        int saldo = ambilSaldoEEPROM(rfidUID);
        simpanSaldoEEPROM(rfidUID, saldo + nom);
        lcd.clear(); lcd.setCursor(0,0); lcd.print("Topup Berhasil");
              lcd.setCursor(0,1);  lcd.printf("Saldo:  %s",  formatRupiah(saldo  +
       nom).c_str());
        delay(3000); tampilkanMenuAwal();
       }
       break;
      case '#':
       tampilkanMenuAwal();
       break;
      default:
       if(menuState==1||menuState==2){
        if(key>='1'&&key<='5'){
         kgTerpilih=key-'0';
         lcd.clear(); lcd.printf("Dipilih: %d kg", kgTerpilih);
         if(menuState==1){
          lcd.setCursor(0,1); lcd.print("Tempelkan Kartu");
          menuState=5; rfidDetected=false;
         }
        }
       } else if(menuState==4 && rfidDetected && key >= '0' && key <= '9'){
        if(inputNominal.length() < 7){
         inputNominal += key;
         lcd.setCursor(0,1);
         lcd.print("                ");
         lcd.setCursor(0,1);
         lcd.printf("Isi: Rp%s     ", inputNominal.c_str());
        }
       }
       break;
    }
   }
}
```

Lampiran 2 Dokumentasi Pembuatan Kerangka Alat

Lampiran 3 Foto keseluruhan alat

Lampiran 4 form pembimbing 1

FORM BIMBINGAN
TUGAS AKHIR

NAMA : ALFIAN BAIHAQI
NIM : 22010012
JUDUL TUGAS AKHIR : IMPLEMENTASI SISTEM PENJUALAN BERAS OTOMATIS BERBASIS MIKROKONTROLER ESP 3

Pembimbing 1

No	Hari / tanggal	Uraian	Tanda tangan
	20/3 2025	tambahkan nisn/ pemabuluan untuk menunjukan novelty	
	22/3 2025	acc bab 1	
	30/4 2025	perbaiki tujuan penelitian, tambahkan metode data logger	
	19/5 2025	-sesuaikan teori dengan komponen yg akan digunakan	
	12/6 2025	- lanjutkan bab 3	
		perbanyak flowchart dan tambah yang lengkap	
	14/7 2025	perbaiki flowchart	
	17/7 2025	lanjutkan pengujian & pembahasan	
	18/7 2025	tambah analisa uji	
	25/7 2025	acc sidang	

Lampiran 5 form pembimbing 2

FORM BIMBINGAN
TUGAS AKHIR

NAMA : ALFIAN BAIHAQI
NIM : 22010012
JUDUL TUGAS AKHIR : IMPLEMENTASI SISTEM PENJUALAN BERAS OTOMATIS BERBASIS MIKROKONTROLER ESP 3

Pembimbing 2

No	Hari / tanggal	Uraian	Tanda tangan
	24/3-2025	Perubahan kata di sub-bab Tujuan.	
	30/4-2025	Desain	
	09/05-2025	Acc, Lanjut bab III	
	14/07-2025	Acc, Lanjut bab IV	
	28/07-2025	Revisi Bab IV dan Bab V Tambahkan nilai error alat, Hitung nilai Range RGB, Tambahkan tabel	
	29/07-2025	Revisi Bab V Kesimpulan	

Lampiran 6 penilaian bimbingan

PENILAIAN BIMBINGAN TUGAS AKHIR INDIVIDU

Judul : IMPLEMENTASI SISTEM PENJUALAN BERAS OTOMATIS BERBASIS MIKROKONTROLER ESP32

Nama : Alfian Baihaqi

NIM : 22010012

Kelas : 6A / D3 Teknik Elektronika

I. Nilai Bimbingan Tugas Akhir (Pembimbing I)

No	Unsur Yang Dinilai	Nilai
1	Kedisiplinan dalam bimbingan	80
2	Kreativitas pemecahan dalam bimbingan	80
3	Penguasaan materi tugas akhir	80
4	Kelengkapan dan referensi tugas akhir	80
Total Nilai = (Jumlah Nilai / 4)		80

II. Nilai Bimbingan Tugas Akhir (Pembimbing II)

No	Unsur Yang Dinilai	Nilai
1	Kedisiplinan dalam bimbingan	80
2	Kreativitas pemecahan dalam bimbingan	80
3	Penguasaan materi tugas akhir	80
4	Kelengkapan dan referensi tugas akhir	80
Total Nilai = (Jumlah Nilai / 4)		80

Nilai Bimbingan $= \frac{TotalNilaiPembimbing1 + TotalNilaiPembimbing2}{2}$

$= 80$

Tegal, 30 Juli 2025

Mengetahui,

Pembimbing 1

Qirom, S.Pd, M.T
NIPY. 09.015.281

Pembimbing 2

Rony Darmono, M.T
NIPY. 09.015.282

Lampiran 7 *datasheet* komponen

1.) *Datasheet* ESP32

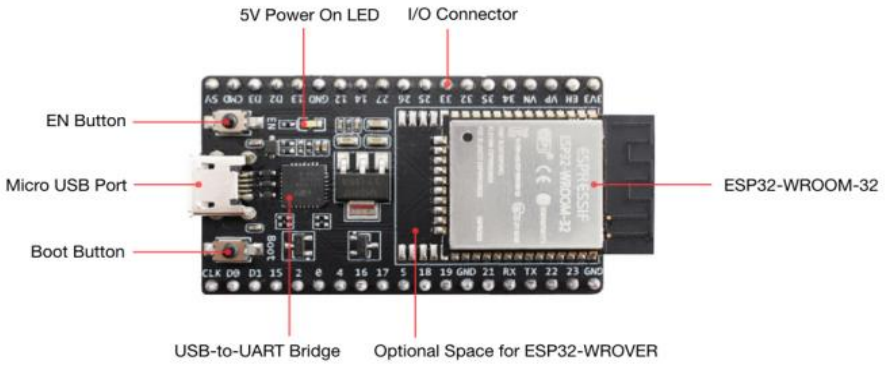
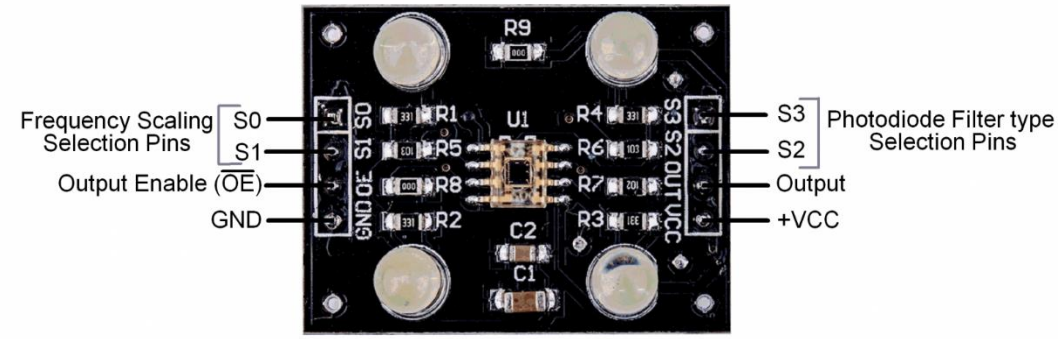


Fig. 1: ESP32-DevKitC V4 with ESP32-WROOM-32 module soldered

Key Component	Description
ESP32-WROOM-32	A module with ESP32 at its core. For more information, see ESP32-WROOM-32 Datasheet.
EN	Reset button.
Boot	Download button. Holding down **Boot** and then pressing **EN** initiates Firmware Download mode for downloading firmware through the serial port.
USB-to-UART Bridge	Single USB-UART bridge chip provides transfer rates of up to 3 Mbps.
Micro USB Port	USB interface. Power supply for the board as well as the communication interface between a computer and the ESP32-WROOM-32 module.
5V Power On LED	Turns on when the USB or an external 5V power supply is connected to the board. For details see the schematics in *Related Documents*.
I/O	Most of the pins on the ESP module are broken out to the pin headers on the board. You can program ESP32 to enable multiple functions such as PWM, ADC, DAC, I2C, I2S, SPI, etc.

No.	Name	Type[1]	Function
1	3V3	P	3.3 V power supply
2	EN	I	CHIP_PU, Reset
3	VP	I	GPIO36, ADC1_CH0, S_VP
4	VN	I	GPIO39, ADC1_CH3, S_VN
5	IO34	I	GPIO34, ADC1_CH6, VDET_1
6	IO35	I	GPIO35, ADC1_CH7, VDET_2
7	IO32	I/O	GPIO32, ADC1_CH4, TOUCH_CH9, XTAL_32K_P
8	IO33	I/O	GPIO33, ADC1_CH5, TOUCH_CH8, XTAL_32K_N
9	IO25	I/O	GPIO25, ADC2_CH8, DAC_1
10	IO26	I/O	GPIO26, ADC2_CH9, DAC_2
11	IO27	I/O	GPIO27, ADC2_CH7, TOUCH_CH7
12	IO14	I/O	GPIO14, ADC2_CH6, TOUCH_CH6, MTMS
13	IO12	I/O	GPIO12, ADC2_CH5, TOUCH_CH5, MTDI
14	GND	G	Ground
15	IO13	I/O	GPIO13, ADC2_CH4, TOUCH_CH4, MTCK
16	D2	I/O	GPIO9, D2[2]
17	D3	I/O	GPIO10, D3[2]
18	CMD	I/O	GPIO11, CMD[2]
19	5V	P	5 V power supply

2.) *Datasheet* Sensor Warna TCS3200



Spesifikasi dan Fitur :

==========

1 , using imported chip TCS3200 PCB board with gold plating

2, TCS3200 TCS230 is an upgraded version , the better

3 , power supply 3-5v

4, anti- light interference

5, white LED, can control lights , off.

6 , can detect non-luminous object color

7, PCB size : (L) 33mm * (W) 25mm

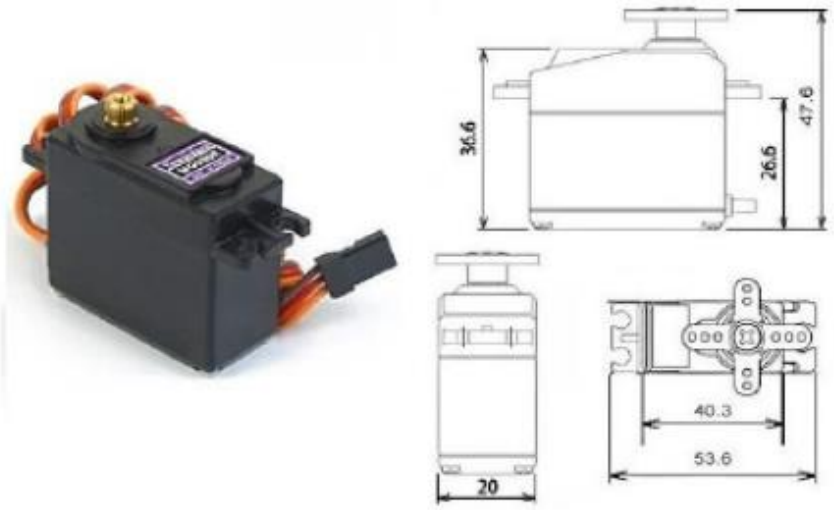
3.) *Datasheet* RFID MFRC522

Pin 1 : VCC
Pin 2 : RST
Pin 3 : GND
Pin 4 : IRQ
Pin 5 : MISO/SCL/TX
Pin 6 : MOSI
Pin 7 : SCK
Pin 8 : SS/SDA/RX

Spesifikasi:
==========
- Arus dan tegangan operasional : 13-26mA/DC 3.3V
- Tipe kartu Tag yang didukung : mifare1 S50, MIFARE DESFire, mifare Pro, mifare1 S70 MIFARE Ultralight,
- Idle current :10-13mA/DC 3.3V
- Peak current: 30mA
- Sleep current: 80uA
- Menggunakan Antarmuka SPI
- Kecepatan transfer rate data : maximum 10Mbit/s
- Frekuensi kerja : 13.56MHz
- Ukuran dari RFID Reader : 40 x 60mm
- Suhu tempat penyimpanan : -40 – 85 degrees Celsius
- Suhu kerja : -20 – 80 degrees Celsius
- Relative humidity: relative humidity 5% -95%

4.) *Datasheet* Motor Servo MG996R

MG996R High Torque
Metal Gear Dual Ball Bearing Servo



This High-Torque MG996R Digital Servo features metal gearing resulting in extra high 10kg stalling torque in a tiny package. The MG996R is essentially an upgraded version of the famous MG995 servo, and features upgraded shock-proofing and a redesigned PCB and IC control system that make it much more accurate than its predecessor. The gearing and motor have also been upgraded to improve dead bandwith and centering. The unit comes complete with 30cm wire and 3 pin 'S' type female header connector that fits most receivers, including Futaba, JR, GWS, Cirrus, Blue Bird, Blue Arrow, Corona, Berg, Spektrum and Hitec.

This high-torque standard servo can rotate approximately 120 degrees (60 in each direction). You can use any servo code, hardware or library to control these servos, so it's great for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. The MG996R Metal Gear Servo also comes with a selection of arms and hardware to get you set up nice and fast!

Specifications

- Weight: 55 g
- Dimension: 40.7 x 19.7 x 42.9 mm approx.
- Stall torque: 9.4 kgf-cm (4.8 V), 11 kgf-cm (6 V)
- Operating speed: 0.17 s/60º (4.8 V), 0.14 s/60º (6 V)

5.) *Datasheet* Motor Servo SG90

SPESIFIKASI :

Product Model : SG90

Weight: 13g

Dimension: 22.6mm x 12.1mm x 22.3mm

Stall torque: 1.8kg/cm(4.8v)

Stall Current: 1.5A

Gear type: POM gear set

Operating speed: 0.1sec/60degree(4.8v)

Operating voltage: 4.8v

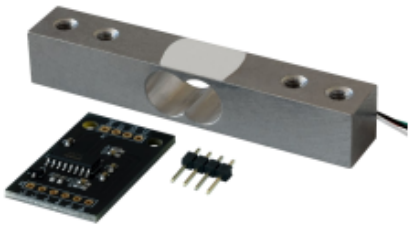
Temperature range: 0_ 55

Dead band width: 1us

Power Supply: Through External Adapter

Servo wire length: 25 cm

6.) *Datasheet Load Cell* HX711



MAIN FEATURES	
Model	HX711-20
Special feature	Integrated 24 bit A/D-converter
Measuring range	Up to 20 kg
Load cell accuracy	±0,02% F.S
Items delivered	Load cell, amplifier board, pin header (4 pins)

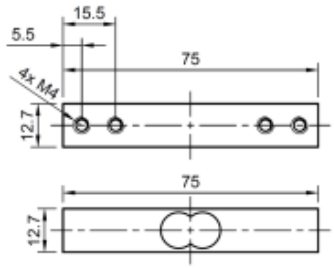
With this load cell and amplifier board, you can build your own scale in conjunction with a microcontroller or single-board computer.

The amplifier board contains an HX711 24 bit A/D converter to convert the analogue signal of the load cell into a weight with high accuracy.

Due to its high popularity, there are many application examples online for this converter.

FURTHER SPECIFICATIONS	
Supply voltage	2.6 ~ 5.25 V
Current consumption	< 1.5 mA
Interface	Serial; 2-wire
Dimensions PCB	34.2 x 20 x 3 mm
Dimensions load cell	75 x 15 x 14.2 mm
Cable length	25 cm
Weight	33.5 g

FURTHER DETAILS	
Article No.	SEN-HX711-20
EAN	4250236822297
Customs Tariff No.	84239010



7.) *Datasheet Step Down* LM2596

Fitur & Spesifikasi:
==========
- Efisiensi : Up to 92% (makin besar tegangan output, efisiensinya makin besar juga)
- Frekuensi switching: 150KHz
- Rectifier: Non-Synchronous Rectification
- Module Properties: Non-isolated step-down module (buck)
- Short circuit protection: current limiting, since the recovery
- Operating temperature: Industrial grade (-40 to +85) (output power 24W or less)
- Full load temperature rise: 40
- Load regulation: 0.5%
- Voltage regulation: 2.5%
- Tegangan Input : 4-35V
- Tegangan Output: 1.23-30V(Adjustable)
- Arus Output : Rated current is 2A,maximum 3A(Additional heatsink is required)
- Dimensi : 43x21x14MM

Lampiran 8 kesediaan pembimbing 1

SURAT KESEDIAAN MEMBIMBING TUGAS AKHIR

Yang bertanda tangan di bawah ini :

Nama	: Qirom, S.Pd, M.T
NIPY	: 09.015.281
Jabatan Struktural	: -
Jabatan Fungsional	: Lektor

Dengan ini menyatakan bersedia menjadi Pembimbing 1 pada Tugas Akhir Mahasiswa berikut :

Nama	: Alfian Baihaqi
NIM	: 22010012
Program Studi	: DIII Teknik Elektronika
Judul Laporan Tugas	: **IMPLEMENTASI SISTEM PENJUALAN BERAS OTOMATIS BERBASIS MIKROKONTROLER ESP32**

Demikian Pernyataan ini dibuat agar dilaksanakan sebagaimana mestinya.

Tegal, 20 Maret 2025

Mengetahui,	
Ka. Prodi DIII Teknik Elektronika	Calon Dosen Pembimbing 1,
Rony Darpono, M.T	**Qirom, S.Pd, M.T**
NIPY. 09.015.282	NIPY. 09.015.281

Lampiran 9 kesediaan pembimbing 2

SURAT KESEDIAAN MEMBIMBING TUGAS AKHIR

Yang bertanda tangan di bawah ini :

Nama	: Rony Darpono, M.T
NIPY	: 09.015.282
Jabatan Struktural	: Ka. Prodi DIII Teknik Elektronika
Jabatan Fungsional	: Lektor

Dengan ini menyatakan bersedia menjadi Pembimbing 2 pada Tugas Akhir Mahasiswa berikut :

Nama	: Alfian Baihaqi
NIM	: 22010012
Program Studi	: DIII Teknik Elektronika
Judul Laporan Tugas	: **IMPLEMENTASI SISTEM PENJUALAN BERAS OTOMATIS BERBASIS MIKROKONTROLER ESP32**

Demikian Pernyataan ini dibuat agar dilaksanakan sebagaimana mestinya.

Tegal, 24 Maret 2025

Mengetahui,
Ka. Prodi DIII Teknik Elektronika

Rony Darpono, M.T
NIPY. 09.015.282

Calon Dosen Pembimbing 2,

Rony Darpono, M.T
NIPY. 09.015.282

Lampiran 10 form revisi tugas akhir ketua penguji

FORMULIR REVISI

UJIAN TUGAS AKHIR

NAMA : ALFIAN BAIHAQI

NIM : 22010012

JUDUL : IMPLEMENTASI SISTEM PENJUALAN BERAS OTOMATIS BERBASIS MIKROKONTROLER ESP 32

KETUA PENGUJI

No	Hari/Tanggal	Uraian	Tanda Tangan
1.	01/2025 09	Revisi: alat Penambahan sistem admin ACC	

Ketua Penguji

Much. Sobri Sungkar, M.Kom

Lampiran 11 form revisi tugas akhir penguji 1

FORMULIR REVISI

UJIAN TUGAS AKHIR

NAMA : ALFIAN BAIHAQI

NIM : 22010012

JUDUL : IMPLEMENTASI SISTEM PENJUALAN BERAS OTOMATIS BERBASIS MIKROKONTROLER ESP 32

PENGUJI I

No	Hari/Tanggal	Uraian	Tanda Tangan
1.	25/08/2025	Bab I Latar belakang kata awal tolong di tebalkan	
2.	26/08/2025	Daftar lampiran Tabel, gambar tata tulis	
3.	27/08/2025	Acc Revisi Laporan	
4.	28/08/2025	Acc Revisi proyek	

Penguji 1

Martselani Adias Sabara, M. Kom

Lampiran 12 form revisi tugas akhir penguji 2

FORMULIR REVISI

UJIAN TUGAS AKHIR

NAMA : **ALFIAN BAIHAQI**

NIM : **22010012**

JUDUL : **IMPLEMENTASI SISTEM PENJUALAN BERAS OTOMATIS BERBASIS MIKROKONTROLER ESP 32**

PENGUJI 2

No	Hari/Tanggal	Uraian	Tanda Tangan
1.	21/08/2025	Revisi minor	
2.	22/08/2025	Revisi minor	
3.	25/08/2025	ACC	

Penguji 2

Ratri Wikaningtyas, M.Pd