

# LAMPIRAN

## PERALATAN YANG DIGUNAKAN

1. ARDUINO UNO / ATMEGA 328
2. SENSOR WARNA TCS 3200-DB
3. LIQUID CRYSTAL DISPLAY (LCD)
4. MODUL SUARA IC ISD 1760
5. SENSOR ULTRAVIOLET GY ML 8511
6. SPEAKER
7. KOTAK HITAM
8. KABEL
9. SAKLAR
10. ADAPTOR

## SKETCH KODE PROGRAM ARDUINO

```
#include <I2Cdev.h>
#include <Wire.h> // For I2C
#include <LiquidCrystal.h>
LiquidCrystal lcd(13, 12, 11, 10, 9, 8);
#define FWD A1
#define PLAY A2
#define RECLEED 8
#define S0 6
#define S1 7
#define S2 3
#define S3 4
#define sensorOut 2
#define sensorstart A0
int frequency = 0;
int sred=0;
int sgreen=0;
int sblue=0;
int uang=0;
int pointersuara=8;
int pointeruang=0;
int tombolstart=0;
int ketemu=0;
int adauang=1;
int hitcek=0;
int benar100=0;
int benar50=0;
int benar20=0;
int benar10=0;
int benar5=0;

int UVOUT = A3; //Output from the sensor
int REF_3V3 = A5; //3.3V power on the Arduino board
void setup() {
  pinMode(S0, OUTPUT);
  pinMode(S1, OUTPUT);
  pinMode(S2, OUTPUT);
  pinMode(S3, OUTPUT);
  pinMode(sensorOut, INPUT);
  pinMode(sensorstart, INPUT);
  pinMode(UVOUT, INPUT);
  pinMode(REF_3V3, INPUT);
  // Setting frequency-scaling to 20%
  digitalWrite(S0,HIGH);
  digitalWrite(S1,LOW);
  lcd.begin(16, 2);
  lcd.setCursor(0, 0);
  lcd.print(" Pengetes Uang ");
  Serial.begin(9600);
  pinMode(FWD, OUTPUT);
  pinMode(PLAY, OUTPUT);
```

```

pinMode(RECLED, OUTPUT);
digitalWrite(FWD, HIGH);
digitalWrite(PLAY, HIGH);
// record(3000);
// delay(2000);
// action(FWD);
pointersuara=1;
// lcd.clear();
uang=0;
}
void loop() {

int stringLength = 0;
int uvLevel = averageAnalogRead(UVOUT);
int refLevel = averageAnalogRead(REF_3V3);
//Use the 3.3V power pin as a reference to get a very accurate output value from sensor
float outputVoltage = 3.3 / refLevel * uvLevel;
float uvIntensity = mapfloat(outputVoltage, 0.99, 2.8, 0.0, 15.0);
//Serial.print("UV L: ");
//Serial.print(uvLevel);
//Serial.print(" UV v: ");
//Serial.print(outputVoltage);
//Serial.print(" UV I: ");
//Serial.print(uvIntensity);
//Serial.print("->");
tombolstart=digitalRead(sensorstart);
// Setting red filtered photodiodes to be read
digitalWrite(S2,LOW);
digitalWrite(S3,LOW);
// Reading the output frequency
frequency = pulseIn(sensorOut, LOW);
sred=frequency;
delay(100);
// Setting Green filtered photodiodes to be read
digitalWrite(S2,HIGH);
digitalWrite(S3,HIGH);
// Reading the output frequency
frequency = pulseIn(sensorOut, LOW);
sgreen=frequency;
delay(100);
// Setting Blue filtered photodiodes to be read
digitalWrite(S2,LOW);
digitalWrite(S3,HIGH);
// Reading the output frequency
frequency = pulseIn(sensorOut, LOW);
sblue=frequency;
// Printing the value on the serial monitor
Serial.print("Sensor R= ");
Serial.print(sred);
Serial.print(" G= ");
Serial.print(sgreen);
Serial.print(" B= ");
Serial.print(sblue);
Serial.print(" T= ");

```

```

Serial.print(tombolstart);
hitcek=hitcek+1;
// cekadauangtidak();
// if (adauang==1)
// {
    cekuang_100();
    cekuang_50();
    cekuang_20();
    cekuang_10();
    cekuang_5();
    cekpalsu();
// }
Serial.print(" Uang= ");
Serial.println(uang);
// delay(100);
if ((tombolstart==1) && (hitcek>=9))
{
    lcd.setCursor(0, 1);
    lcd.print(" ");
    if (uang==0)
    {
        lcd.setCursor(0, 1);
        lcd.print(" Uang Palsu ");
        action(FWD);
        action(FWD);
        action(FWD);
        action(FWD);
        action(FWD);
        action(FWD);
        action(PLAY);
        delay(3000);
        while (tombolstart==1)
        {
            tombolstart=digitalRead(sensorstart);
        }
        lcd.clear();
        lcd.setCursor(0, 0);
        lcd.print(" Pengetes Uang ");
        uang=0;
        ketemu=0;
    }
    if ((uang==5) && (benar5>=5))
    {
// resetpointersuara();
        lcd.setCursor(0, 1);
        lcd.print(" Rp. 5.000 ");
        action(FWD);
// action(FWD);
// action(FWD);
        action(PLAY);
        delay(3000);
        while (tombolstart==1)
        {
            tombolstart=digitalRead(sensorstart);

```

```

}
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(" Pengetes Uang ");
uang=0;
ketemu=0;
adauang=1;
}
if ((uang==10) && (benar10>=5))
{
// resetpointersuara();
lcd.setCursor(0, 1);
lcd.print(" Rp. 10.000  ");
action(FWD);
action(FWD);
// action(FWD);
// action(FWD);
action(PLAY);
delay(3000);
while (tombolstart==1)
{
tombolstart=digitalRead(sensorstart);
}
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(" Pengetes Uang ");
uang=0;
ketemu=0;
adauang=1;
}
if ((uang==20) && (benar20>=5))
{
// resetpointersuara();
lcd.setCursor(0, 1);
lcd.print(" Rp. 20.000  ");
action(FWD);
action(FWD);
action(FWD);
// action(FWD);
// action(FWD);
action(PLAY);
delay(3000);
while (tombolstart==1)
{
tombolstart=digitalRead(sensorstart);
}
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(" Pengetes Uang ");
uang=0;
ketemu=0;
adauang=1;
}
if ((uang==50) && (benar50>=5))

```

```

{
// resetpointersuara();
lcd.setCursor(0, 1);
lcd.print(" Rp. 50.000  ");
action(FWD);
action(FWD);
action(FWD);
action(FWD);
// action(FWD);
// action(FWD);

action(PLAY);
delay(3000);
while (tombolstart==1)
{
tombolstart=digitalRead(sensorstart);
}
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(" Pengetes Uang ");
uang=0;
ketemu=0;
adauang=1;
}
if ((uang==100) && (benar100>=5))
{
// resetpointersuara();
lcd.setCursor(0, 1);
lcd.print(" Rp. 100.000  ");
action(FWD);
action(FWD);
action(FWD);
action(FWD);
action(FWD);
// action(FWD);
// action(FWD);
action(PLAY);
delay(3000);
while (tombolstart==1)
{
tombolstart=digitalRead(sensorstart);
}
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(" Pengetes Uang ");
uang=0;
ketemu=0;
adauang=1;
}
if ((benar100==0) &&
(benar50==0) &&
(benar20==0) &&
(benar10==0) &&
(benar5==0))

```

```

{
  lcd.setCursor(0, 1);
  lcd.print(" Uang Palsu ");
  action(FWD);
  action(FWD);
  action(FWD);
  action(FWD);
  action(FWD);
  action(FWD);
  action(PLAY);
  delay(3000);
  while (tombolstart==1)
  {
    tombolstart=digitalRead(sensorstart);
  }
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(" Pengetes Uang ");
  uang=0;
  ketemu=0;
}
}
if (hitcek>=10)
{
  Serial.println("*****");
  Serial.print("B100=");
  Serial.print(benar100);
  Serial.print(" B50=");
  Serial.print(benar50);
  Serial.print(" B20=");
  Serial.print(benar20);
  Serial.print(" B10=");
  Serial.print(benar10);
  Serial.print(" B5=");
  Serial.println(benar5);
  Serial.println("*****");
  hitcek=0;
  benar100=0;
  benar50=0;
  benar20=0;
  benar10=0;
  benar5=0;
}
}
void resetpointersuara()
{
  if (pointersuara==1)
  {
    pointersuara=1;
  }
  if (pointersuara==2)
  {
    action(FWD);
    action(FWD);
  }
}

```



```

    action(FWD);
    action(FWD);
    action(FWD);
    action(FWD);
    action(FWD);
}
if (pointersuara==3)
{
    action(FWD);
    action(FWD);
    action(FWD);
    action(FWD);
    action(FWD);
    action(FWD);
}
if (pointersuara==4)
{
    action(FWD);
    action(FWD);
    action(FWD);
    action(FWD);
    action(FWD);
}
if (pointersuara==5)
{
    action(FWD);
    action(FWD);
    action(FWD);
    action(FWD);
}
if (pointersuara==6)
{
    action(FWD);
    action(FWD);
    action(FWD);
}
if (pointersuara==7)
{
    action(FWD);
    action(FWD);
}
if (pointersuara==8)
{
    action(FWD);
}
}

void cekuang_100()
{
    //100 normal atas
    if ((sred>=40) && (sred<=47))
    {
        if ((sgreen>=53) && (sgreen<=59))

```

```

    {
        if ((sblue>=40) && (sblue<=48))
        {
            Serial.println(" Asli 100 Ribu A");
            uang=100;
            pointeruang=7;
            ketemu=1;
            adauang=1;
            benar100=benar100+1;
        }
    }
}
//100 atas flip
if ((sred>=42) && (sred<=48))
{
    if ((sgreen>=59) && (sgreen<=65))
    {
        if ((sblue>43) && (sblue<=49))
        {
            Serial.println(" Asli 100 Ribu AF");
            uang=100;
            pointeruang=7;
            ketemu=1;
            adauang=1;
            benar100=benar100+1;
        }
    }
}
//100 bawah normal
if ((sred>=40) && (sred<=46))
{
    if ((sgreen>=47) && (sgreen<=53))
    {
        if ((sblue>36) && (sblue<=42))
        {
            Serial.println(" Asli 100 Ribu B");
            uang=100;
            pointeruang=7;
            ketemu=1;
            adauang=1;
            benar100=benar100+1;
        }
    }
}
//100 bawah flip
if ((sred>=49) && (sred<=55))
{
    if ((sgreen>=54) && (sgreen<=60))
    {
        if ((sblue>41) && (sblue<=47))
        {
            Serial.println(" Asli 100 Ribu BF");
            uang=100;
            pointeruang=7;

```

```

        ketemu=1;
        adauang=1;
        benar100=benar100+1;
    }
}
}
void cekuang_50()
{
    //50 normal atas
    if ((sred>=59) && (sred<=65))
    {
        if ((sgreen>=47) && (sgreen<=53))
        {
            if ((sblue>=33) && (sblue<=40))
            {
                Serial.println(" Asli 50 Ribu");
                uang=50;
                pointeruang=6;
                ketemu=1;
                adauang=1;
                benar50=benar50+1;
            }
        }
    }
    //50 atas flip
    if ((sred>=75) && (sred<=81))
    {
        if ((sgreen>=57) && (sgreen<=64))
        {
            if ((sblue>38) && (sblue<=44))
            {
                Serial.println(" Asli 50 Ribu");
                uang=50;
                pointeruang=6;
                ketemu=1;
                adauang=1;
                benar50=benar50+1;
            }
        }
    }
    //50 bawah normal
    if ((sred>=80) && (sred<=88))
    {
        if ((sgreen>=58) && (sgreen<=65))
        {
            if ((sblue>37) && (sblue<=44))
            {
                Serial.println(" Asli 50 Ribu");
                uang=50;
                pointeruang=6;
                ketemu=1;
                adauang=1;
                benar50=benar50+1;
            }
        }
    }
}

```

```

    }
  }
}
//50 bawah flip
if ((sred>=62) && (sred<=68))
{
  if ((sgreen>=47) && (sgreen<=55))
  {
    if ((sblue>33) && (sblue<=39))
    {
      Serial.println(" Asli 50 Ribu");
      uang=50;
      pointeruang=6;
      ketemu=1;
      adauang=1;
      benar50=benar50+1;
    }
  }
}
}
void cekuang_20()
{
  //20 normal atas
  if ((sred>=53) && (sred<=60))
  {
    if ((sgreen>=45) && (sgreen<=51))
    {
      if ((sblue>=40) && (sblue<=47))
      {
        Serial.println(" Asli 20 Ribu");
        uang=20;
        pointeruang=5;
        ketemu=1;
        adauang=1;
        benar20=benar20+1;
      }
    }
  }
}

//20 atas flip
if ((sred>=67) && (sred<=73))
{
  if ((sgreen>=53) && (sgreen<=60))
  {
    if ((sblue>45) && (sblue<=52))
    {
      Serial.println(" Asli 20 Ribu");
      uang=20;
      pointeruang=5;
      ketemu=1;
      adauang=1;
      benar20=benar20+1;
    }
  }
}
}

```

```

}

//20 bawah normal
if ((sred>=67) && (sred<=73))
{
    if ((sgreen>=50) && (sgreen<=57))
    {
        if ((sblue>43) && (sblue<=49))
        {
            Serial.println(" Asli 20 Ribu");
            uang=20;
            pointeruang=5;
            ketemu=1;
            adauang=1;
            benar20=benar20+1;
        }
    }
}

//20 bawah flip
if ((sred>=57) && (sred<=64))
{
    if ((sgreen>=47) && (sgreen<=53))
    {
        if ((sblue>41) && (sblue<=48))
        {
            Serial.println(" Asli 20 Ribu");
            uang=20;
            pointeruang=5;
            ketemu=1;
            adauang=1;
            benar20=benar20+1;
        }
    }
}

}

void cekuang_10()
{
    //10 normal atas
    if ((sred>=55) && (sred<=61))
    {
        if ((sgreen>=58) && (sgreen<=65))
        {
            if ((sblue>=38) && (sblue<=44))
            {
                Serial.println(" Asli 10 Ribu");
                uang=10;
                pointeruang=4;
                ketemu=1;
                adauang=1;
                benar10=benar10+1;
            }
        }
    }
}

//10 atas flip

```

```

if ((sred>=66) && (sred<=72))
{
    if ((sgreen>=70) && (sgreen<=77))
    {
        if ((sblue>45) && (sblue<=52))
        {
            Serial.println(" Asli 10 Ribu");
            uang=10;
            pointeruang=4;
            ketemu=1;
            adauang=1;
            benar10=benar10+1;
        }
    }
}
//10 bawah normal
if ((sred>=58) && (sred<=64))
{
    if ((sgreen>=59) && (sgreen<=65))
    {
        if ((sblue>38) && (sblue<=44))
        {
            Serial.println(" Asli 10 Ribu");
            uang=10;
            pointeruang=4;
            ketemu=1;
            adauang=1;
            benar10=benar10+1;
        }
    }
}
//10 bawah flip
if ((sred>=51) && (sred<=59))
{
    if ((sgreen>=51) && (sgreen<=57))
    {
        if ((sblue>33) && (sblue<=39))
        {
            Serial.println(" Asli 10 Ribu");
            uang=10;
            pointeruang=4;
            ketemu=1;
            adauang=1;
            benar10=benar10+1;
        }
    }
}
}
void cekuang_5()
{
    //5 normal atas
    if ((sred>=46) && (sred<=53))
    {
        if ((sgreen>=50) && (sgreen<=55))

```

```

    {
      if ((sblue>=41) && (sblue<=47))
      {
        Serial.println(" Asli 5 Ribu A");
        uang=5;
        pointeruang=3;
        ketemu=1;
        adauang=1;
        benar5=benar5+1;
      }
    }
  }
//5 atas flip
if ((sred>=50) && (sred<=56))
{
  if ((sgreen>=57) && (sgreen<=63))
  {
    if ((sblue>43) && (sblue<=51))
    {
      Serial.println(" Asli 5 Ribu AF");
      uang=5;
      pointeruang=3;
      ketemu=1;
      adauang=1;
      benar5=benar5+1;
    }
  }
}
//5 bawah normal
if ((sred>=47) && (sred<=53))
{
  if ((sgreen>=53) && (sgreen<=59))
  {
    if ((sblue>46) && (sblue<=51))
    {
      Serial.println(" Asli 5 Ribu B");
      uang=5;
      pointeruang=3;
      ketemu=1;
      adauang=1;
      benar5=benar5+1;
    }
  }
}
//5 bawah flip
if ((sred>=43) && (sred<=49))
{
  if ((sgreen>=49) && (sgreen<=55))
  {
    if ((sblue>45) && (sblue<=51))
    {
      Serial.println(" Asli 5 Ribu BF");
      uang=5;
      pointeruang=3;

```

```

        ketemu=1;
        adauang=1;
        benar5=benar5+1;
    }
}
}
}
void cekpalsu()
{
    //cek palsu
    if ((sred>=20) && (sred<=33))
    {
        if ((sgreen>=24) && (sgreen<=32))
        {
            if ((sblue>15) && (sblue<=25))
            {
                Serial.println(" Uang Palsu");
                uang=0;
                pointeruang=0;
            }
        }
    }
}
void cekaduangtidak()
{
    //cek keberadaan uang
    if ((sred>=155) && (sred<=164))
    {
        if ((sgreen>=145) && (sgreen<=153))
        {
            if ((sblue>103) && (sblue<=111))
            {
                Serial.println(" Tidak Ada Uang");
                adauang=0;
                pointeruang=0;
            }
        } else { adauang=1;}
    }
}
void action(int pin){
    digitalWrite(pin,LOW);
    // Serial.print("Pin: ");
    // Serial.print(pin);
    // Serial.println(" Active");
    delay(400);
    digitalWrite(pin,HIGH);
    // Serial.print("Pin: ");
    // Serial.print(pin);
    // Serial.println(" OFF");
    delay(600);
}
int averageAnalogRead(int pinToRead)
{
    byte numberOfReadings = 8;

```



```
unsigned int runningValue = 0;
for(int x = 0 ; x < numberOfReadings ; x++)
  runningValue += analogRead(pinToRead);
runningValue /= numberOfReadings;
return(runningValue);
}
//The Arduino Map function but for floats
//From: http://forum.arduino.cc/index.php?topic=3922.0
float mapfloat(float x, float in_min, float in_max, float out_min, float out_max)
{
  return (x - in_min) * (out_max - out_min) / (in_max - in_min) + out_min;
}
```

## PENGUJIAN SENSOR WARNA UANG KERTAS

### 100000

Sensor R= 48 G= 60 B= 45 T= 1 Asli 100 Ribu AF

Sensor R= 46 G= 64 B= 40 T= 1 Uang= 100

Sensor R= 45 G= 57 B= 44 T= 1 Asli 100 Ribu A

Sensor R= 49 G= 58 B= 46 T= 1 Asli 100 Ribu BF

Sensor R= 48 G= 57 B= 45 T= 1 Uang= 100

Sensor R= 46 G= 60 B= 45 T= 1 Asli 100 Ribu AF

Sensor R= 45 G= 61 B= 46 T= 1 Asli 100 Ribu AF

Sensor R= 45 G= 53 B= 43 T= 1 Asli 100 Ribu A

Sensor R= 49 G= 58 B= 45 T= 1 Asli 100 Ribu BF

Sensor R= 44 G= 58 B= 46 T= 1 Asli 100 Ribu A

### 50000

Sensor R= 81 G= 60 B= 39 T= 1 Asli 50 Ribu

Sensor R= 69 G= 53 B= 36 T= 1 Uang= 50

Sensor R= 77 G= 60 B= 39 T= 0 Asli 50 Ribu

Sensor R= 83 G= 61 B= 40 T= 0 Asli 50 Ribu

Sensor R= 62 G= 52 B= 36 T= 1 Asli 50 Ribu

Sensor R= 60 G= 46 B= 27 T= 1 Uang= 50

Sensor R= 53 G= 46 B= 33 T= 1 Uang= 50

Sensor R= 83 G= 54 B= 39 T= 1 Uang= 50

Sensor R= 90 G= 66 B= 40 T= 0 Uang= 50

Sensor R= 86 G= 61 B= 40 T= 0 Asli 50 Ribu

### 20000

Sensor R= 57 G= 49 B= 43 T= 1 Asli 20 Ribu

Sensor R= 62 G= 53 B= 45 T= 1 Asli 20 Ribu

Sensor R= 66 G= 57 B= 48 T= 0 Uang= 20

Sensor R= 57 G= 48 B= 50 T= 0 Uang= 20  
Sensor R= 64 G= 53 B= 45 T= 0 Asli 20 Ribu  
Sensor R= 64 G= 54 B= 46 T= 1 Uang= 20  
Sensor R= 58 G= 54 B= 45 T= 1 Uang= 20  
Sensor R= 60 G= 57 B= 48 T= 0 Uang= 20  
Sensor R= 66 G= 57 B= 48 T= 0 Uang= 20  
Sensor R= 64 G= 53 B= 40 T= 0 Asli 50 Ribu

### **10000**

Sensor R= 57 G= 60 B= 40 T= 1 Asli 10 Ribu  
Sensor R= 71 G= 73 B= 46 T= 1 Asli 10 Ribu  
Sensor R= 67 G= 70 B= 46 T= 1 Asli 10 Ribu  
Sensor R= 61 G= 61 B= 40 T= 1 Asli 10 Ribu  
Sensor R= 64 G= 65 B= 41 T= 1 Asli 10 Ribu  
Sensor R= 57 G= 58 B= 33 T= 1 Uang= 10  
Sensor R= 50 G= 60 B= 40 T= 0 Uang= 10  
Sensor R= 57 G= 58 B= 40 T= 0 Asli 10 Ribu  
Sensor R= 57 G= 58 B= 39 T= 0 Asli 10 Ribu  
Sensor R= 60 G= 60 B= 39 T= 1 Asli 10 Ribu

### **5000**

Sensor R= 49 G= 44 B= 45 T= 1 Uang= 5  
Sensor R= 50 G= 54 B= 48 T= 1 Asli 5 Ribu B  
Sensor R= 45 G= 54 B= 49 T= 1 Asli 5 Ribu BF  
Sensor R= 49 G= 53 B= 46 T= 1 Asli 5 Ribu  
Sensor R= 50 G= 53 B= 48 T= 1 Asli 5  
Sensor R= 43 G= 49 B= 48 T= 1 Asli 5 Ribu  
sensor R= 50 G= 53 B= 46 T= 1 Asli 5  
sensor R= 44 G= 49 B= 48 T= 1 Asli 5  
Sensor R= 48 G= 53 B= 50 T= 1 Asli 5 Ribu B

## TAMPILAN PENGUJIAN DAN HASIL PENGUJIAN UANG KERTAS



Pengujian Uang Rp. 5000



Hasil Pengujian Uang Rp. 5000



Pengujian Uang Rp. 10000



Hasil Pengujian Uang Rp. 10000



Pengujian Uang Rp. 20000



Hasil Pengujian Uang Rp. 20000



Pengujian Uang Rp. 50000



Pengujian Uang Rp. 50000



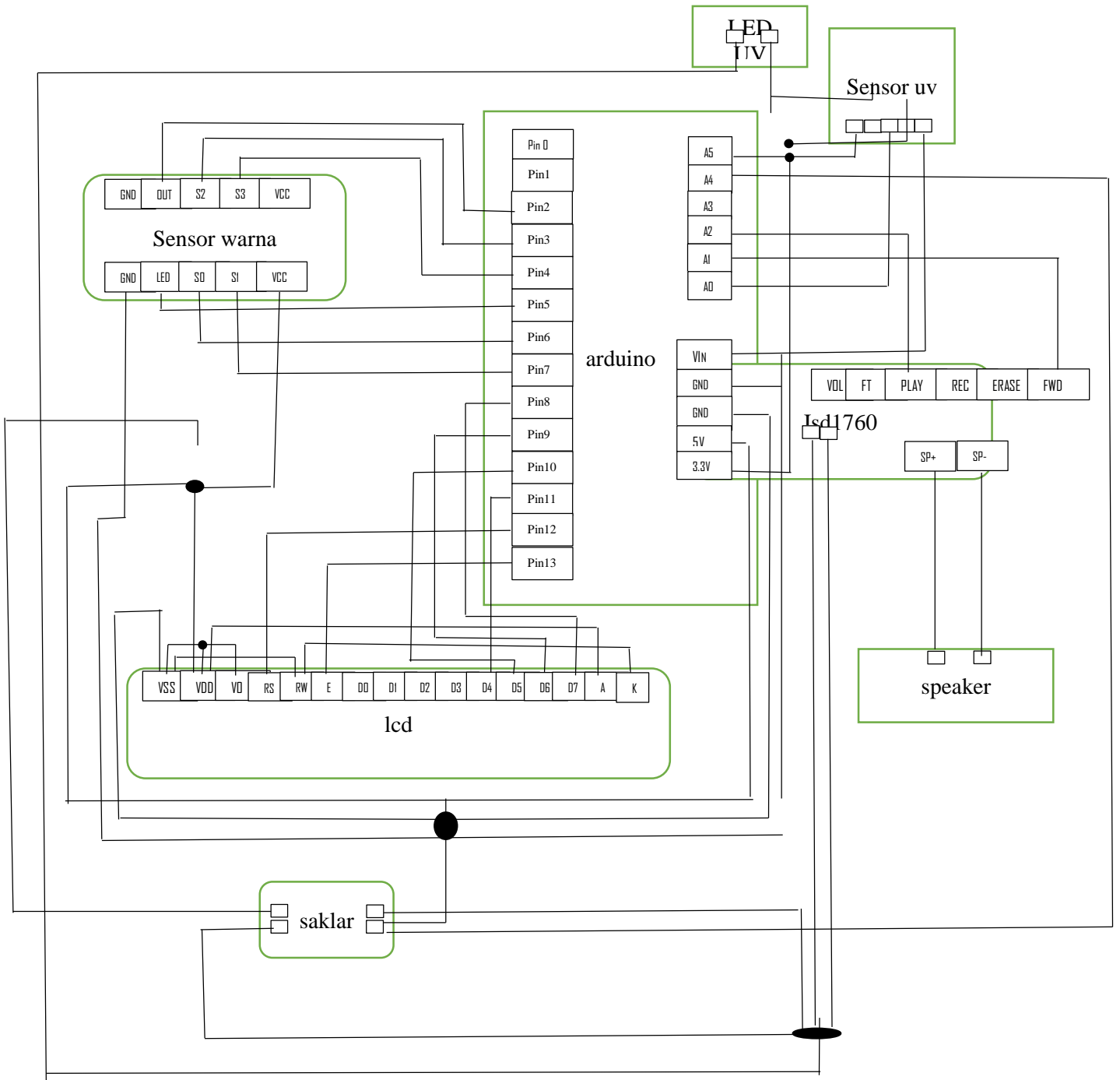
Pengujian Uang Rp. 10000



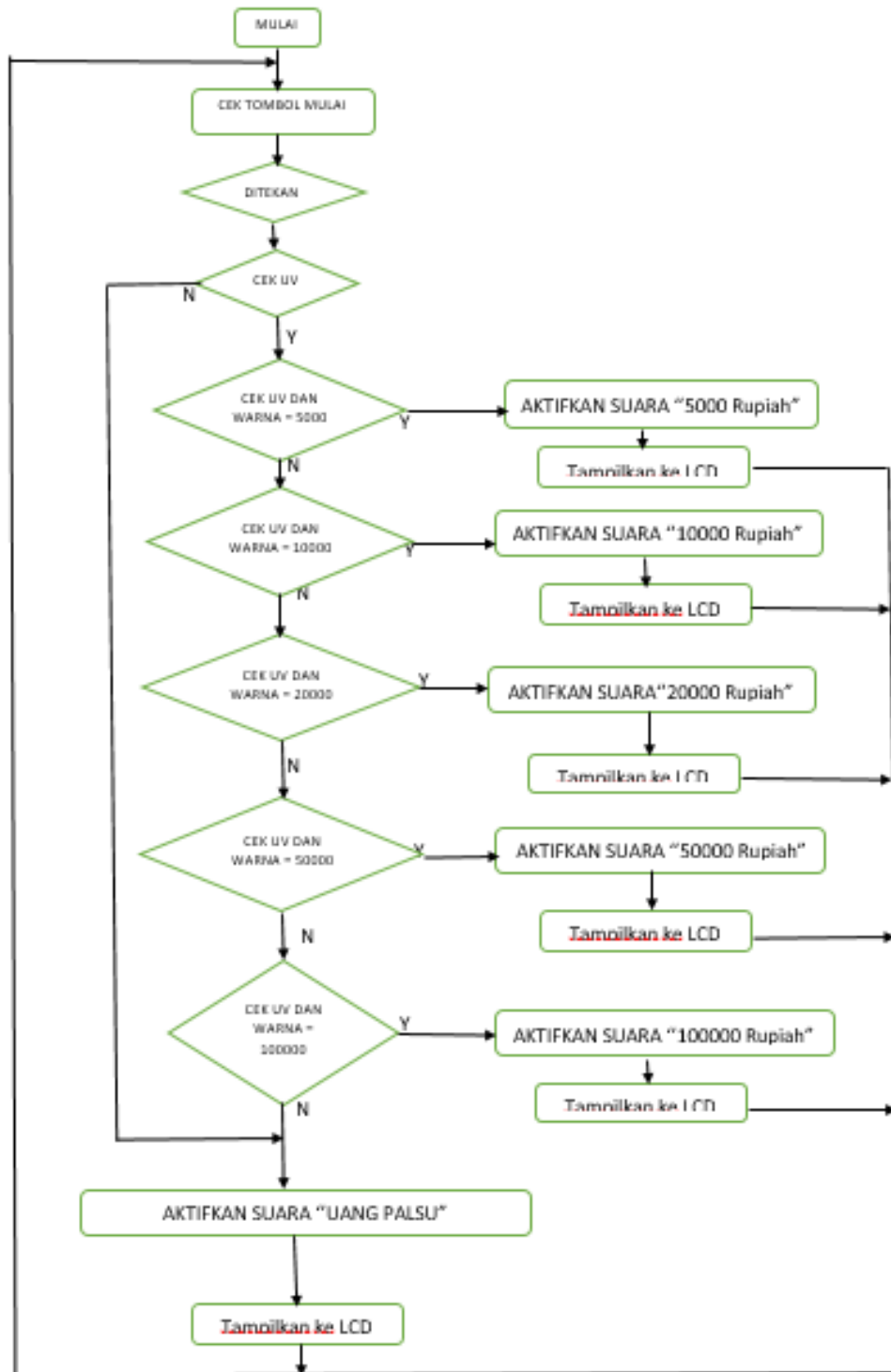
Hasil Pengujian Uang Rp. 10000



# DIAGRAM SKEMATIK RANGKAIAN



# DIAGRAM ALUR KERJA



## **Kartu Bimbingan**



