LAMPIRAN

Lampiran -1 Listing Program

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <Servo.h>

// Definisi pin sensor, button, dan servo
#define BUTTON_PIN 8
#define PROXIMITY_PIN 7
#define SERVO_PIN 6

// Definisi pin sensor ultrasonik
#define TRIG_PIN_METAL 9
#define ECHO_PIN_METAL 11
#define TRIG_PIN_NON_METAL 10
#define ECHO_PIN_NON_METAL 12

// Objek servo
Servo servoMotor;

// Objek LCD
LiquidCrystal_I2C lcd(0x27, 16, 2);

// Variabel status
bool statusSampah = false;
bool lastButtonState = LOW;
```

```
int minDistance = 15;
bool tempatSampahPenuh = false;

void setup() {
    pinMode(BUTTON_PIN, INPUT_PULLUP);
    pinMode(PROXIMITY_PIN, INPUT);
    pinMode(TRIG_PIN_METAL, OUTPUT);
    pinMode(ECHO_PIN_METAL, INPUT);
    pinMode(TRIG_PIN_NON_METAL, OUTPUT);
    pinMode(ECHO_PIN_NON_METAL, INPUT);

    servoMotor.attach(SERVO_PIN);
    servoMotor.write(90);

    lcd.init(16, 2);
    lcd.backlight();
    lcd.setCursor(0, 0);
    lcd.print("Menunggu sampah...");

    Serial.begin(9600);
    }

void loop() {
    cekTempatSampah();

    if (tempatSampahPenuh) {
```

```
    return; // Jika penuh, hentikan loop sementara
    }

    // Baca status button dengan debouncing
    bool buttonState = digitalRead(BUTTON_PIN);

    if (buttonState == LOW && lastButtonState == HIGH &&
!statusSampah) {
    Serial.println("Sampah terdeteksi!");
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Sampah terdeteksi!");

    statusSampah = true;
    delay(100);
    int isMetal = digitalRead(PROXIMITY_PIN);
    delay(50);
    int isMetalConfirmed = digitalRead(PROXIMITY_PIN);

    if (isMetal == HIGH && isMetalConfirmed == HIGH) {
    Serial.println("Sampah Logam Terdeteksi!");
    lcd.setCursor(0, 1);
    lcd.print("Sampah Logam!");
    servoMotor.write(180);
    } else {
    Serial.println("Sampah Non-Logam!");
```

```
    lcd.setCursor(0, 1);
    lcd.print("Sampah Non-Logam!");
    servoMotor.write(0);
    }

    delay(1500);
    servoMotor.write(90);
    while (digitalRead(BUTTON_PIN) == LOW) {
    delay(10);
    }
    delay(500);
    statusSampah = false;
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Menunggu sampah...");
    Serial.println("Menunggu sampah baru...");
    }

    lastButtonState = buttonState;
    delay(50);
    }

void cekTempatSampah() {
    long durationMetal, durationNonMetal;
    int distanceMetal, distanceNonMetal;
```

```
    digitalWrite(TRIG_PIN_METAL, LOW);
    delayMicroseconds(2);
    digitalWrite(TRIG_PIN_METAL, HIGH);
    delayMicroseconds(10);
    digitalWrite(TRIG_PIN_METAL, LOW);
    durationMetal = pulseIn(ECHO_PIN_METAL, HIGH);
    distanceMetal = durationMetal * 0.034 / 2;

    digitalWrite(TRIG_PIN_NON_METAL, LOW);
    delayMicroseconds(2);
    digitalWrite(TRIG_PIN_NON_METAL, HIGH);
    delayMicroseconds(10);
    digitalWrite(TRIG_PIN_NON_METAL, LOW);
    durationNonMetal = pulseIn(ECHO_PIN_NON_METAL, HIGH);
    distanceNonMetal = durationNonMetal * 0.034 / 2;

    if (distanceMetal <= minDistance || distanceNonMetal
<= minDistance) {
    if (!tempatSampahPenuh) {
    lcd.clear();
    lcd.setCursor(0, 0);
    if (distanceMetal <= minDistance) {
    lcd.print("Logam: Penuh");
    lcd.setCursor(0, 1);
    lcd.print("Jarak: ");
    lcd.print(distanceMetal);
```

```
    lcd.print(" cm");
     } else {
    lcd.print("Non-Logam: Penuh");
    lcd.setCursor(0, 1);
    lcd.print("Jarak: ");
    lcd.print(distanceNonMetal);
    lcd.print(" cm");
     }
    tempatSampahPenuh = true;
    delay(5000); // Tunda supaya tidak terus-terusan
refresh
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Menunggu sampah...");
    }
    } else {
    if (tempatSampahPenuh) {
    tempatSampahPenuh = false;
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Menunggu sampah...");
       }
    }
}
```

Lampiran -2 Data Sheet Sensor Proximity Induktif

Inductive Proximity Sensor Detection Switch PNP

Model: LJ12A3-4-Z/BY



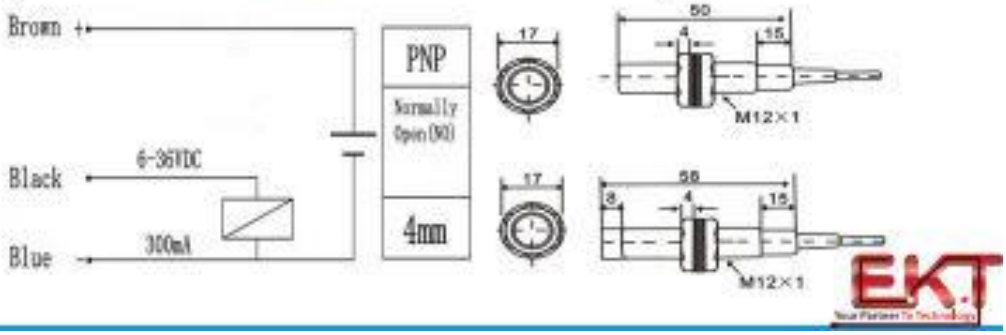
Description:

- It is a component widely used in automatic control industry for detecting, controlling, and noncontact switching. When proximity switch is close to some target object, it will send out control signal.
- It's widely used in machine, paper making, light industry for limiting station, orientation taking count, speeding trial ect...

Features:

Wire Type	Cylindrical DC 3 Wire Type (Black, Brown, Blue)
Switch Appearance Type	Cylinder Type
Theory	Inductive Sensor
Output Type	PNP NO(Normal Open)
Diameter of Head	12mm
Detecting Distance	4mm
Supply Voltage	DC 6-36V
Current Output	300mA
Response Frequency	0.5KHz
Detect Object	Iron
Operating Temperature	-25C to +55C (Non-freezing Condition)
Size	6.2 x 50px/2.4'' x 0.8" (L*Max. Dia)
Cable Length	2750px/43.3"
External Material	Plastic, Alloy
Net Weight	46g
Color	Silver Tone, Yellow, Gray





Lampiran -3 Data Sheet Motor Servo

PARALLAX

Web Site: www.parallax.com
Forums: forums.parallax.com
Sales: sales@parallax.com
Technical: support@parallax.com

Office: (916) 624-8333
Fax: (916) 624-8003
Sales: (888) 512-1024
Tech Support: (888) 997-8267

Parallax Standard Servo (#900-00005)

The Parallax Standard Servo is ideal for robotics and basic movement projects.

Features



- Holds any position between 0 and 180 degrees
- 43.1 oz-in torque at 6 V
- Accepts four mounting screws
- Easy to interface with any Parallax microcontroller
- High precision gear made of the POM (polyacetal) resin makes the operation smooth causing no backlash.
- Manufactured for Parallax exclusively by Futaba

Technical Specifications

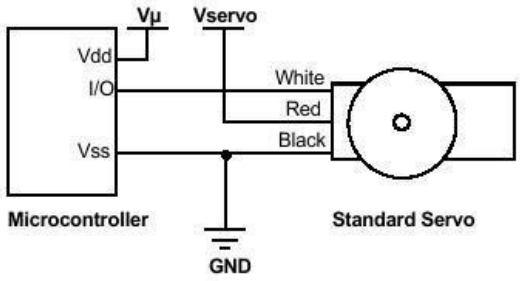
- Power requirements: 4 to 6 VDC* (see Power Requirement Notes below)
- Maximum current draw: 140 +/- 50 mA at 6 VDC when operating in no load conditions
  15 mA when in static state
- Communication: Pulse-width modulation
- Dimensions approx 2.2 x 0.8 x 1.6 in (5.58x 1.9 x 40.6 cm) excluding servo horn
- Operating temperature range: 14 to 122°F (-10 to 50°C)
- Weight: 1.55 oz (44 g)

*Power Requirement Notes

Futaba specifies 4-6 VDC for this servo. However, we find that this servo is tolerant of a 9 V battery for short periods of time when there is no load, as used in some activities in the Stamps in Class series of tutorials. (Slight jittering may be observed when batteries are fresh; this does not cause damage). Do not use this servo with an unregulated wall-mount supply, or a regulated wall mount supply exceeding 6 VDC.

Servo current draw can spike while under load. Be sure that your application's power supply and voltage regulator is prepared to supply adequate current for all servos used. Do not try to power this servo directly from a BASIC Stamp module's Vdd or Vin pins; do not connect the servo's Vss line directly to the BASIC Stamp module's Vss pin.

Quick-Start Circuit



Vμ = microcontroller voltage supply

Vservo = 4 to 6 VDC, regulated or battery (See **Error! Reference source not found.**, page **Error! Bookmark not defined.**)

I/O = PWM TTL or CMOS output signal, 3.3 to 5 V, not to exceed Vservo + 0.2 V

Specifications

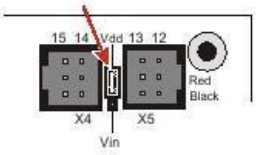
Pin	Name	Description	Minimum	Typical	Maximum	Units
1 (White)	Signal	Input; TTL or CMOS	3.3	5.0	Vservo + 0.2	V
2 (Red)	Vservo	Power Supply	4.0	5.0	6.0	V
3 (Black)	Vss	Ground		0		V

Power Precautions

- Do not use this servo with an unregulated wall-mount supply. Such power supplies may deliver variable voltage far above the stated voltage.
- Do not power this servo through the BASIC Stamp Module's Vdd pin.
- Servo current draw can spike while under peak load; be sure your application's regulator is prepared to supply adequate current for all servos used in combination.
- Some Stamps in Class tutorials, such as "What's a Microcontroller?" instruct the user to power these servos with a 9V battery when using a HomeWork Board; this does not cause damage.

Board of Education Jumper Connection

When connecting the servo to the Board of Education Rev C's servo header, be sure the jumper is set to Vdd as shown in the figure below. Failure to place the jumper at this setting can cause damage your servo.



Lampiran -4 Data Sheet Sensor Ultrasonik

ELEC Freaks Tech Support: services@elecfreaks.com

Ultrasonic Ranging Module HC - SR04

Product features:

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:
(1) Using IO trigger for at least 10us high level signal,
(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.
Test distance = (high level time×velocity of sound (340M/S) / 2,

Wire connecting direct as following:

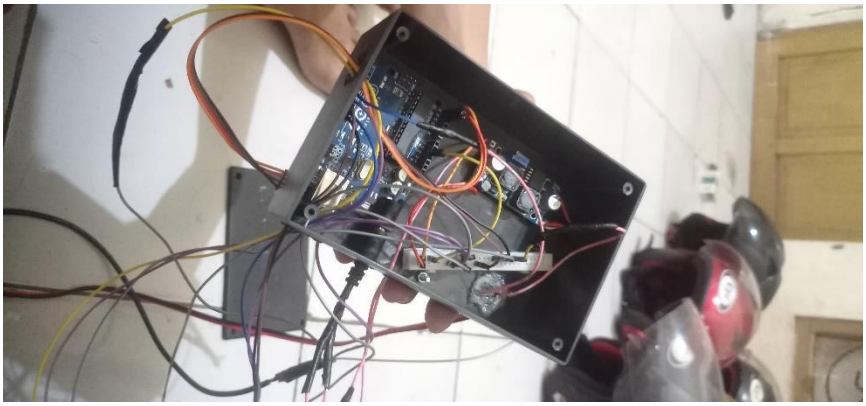
- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

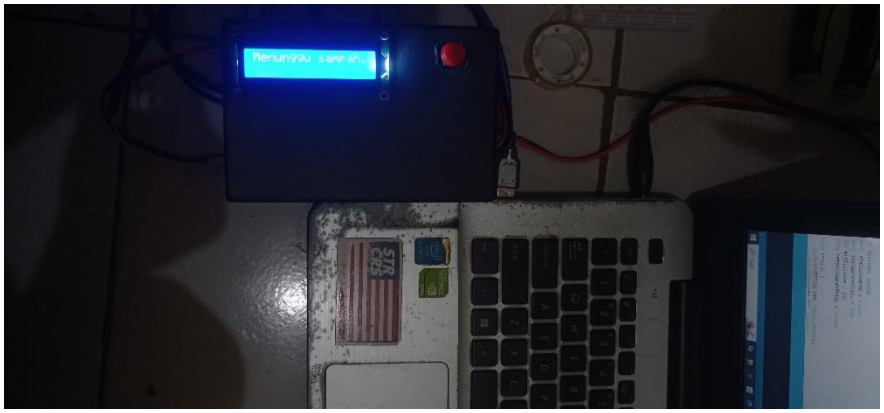
Electric Parameter

Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m
Min Range	2cm
MeasuringAngle	15 degree
Trigger Input Signal	10uS TTL pulse
Echo Output Signal	Input TTL lever signal and the range in proportion
Dimension	45*20*15mm

Lampiran -5 Dokumentasi Pekerjaan Alat







Lampiran -6 Dokumentasi Pengambilan Data

