LAMPIRAN

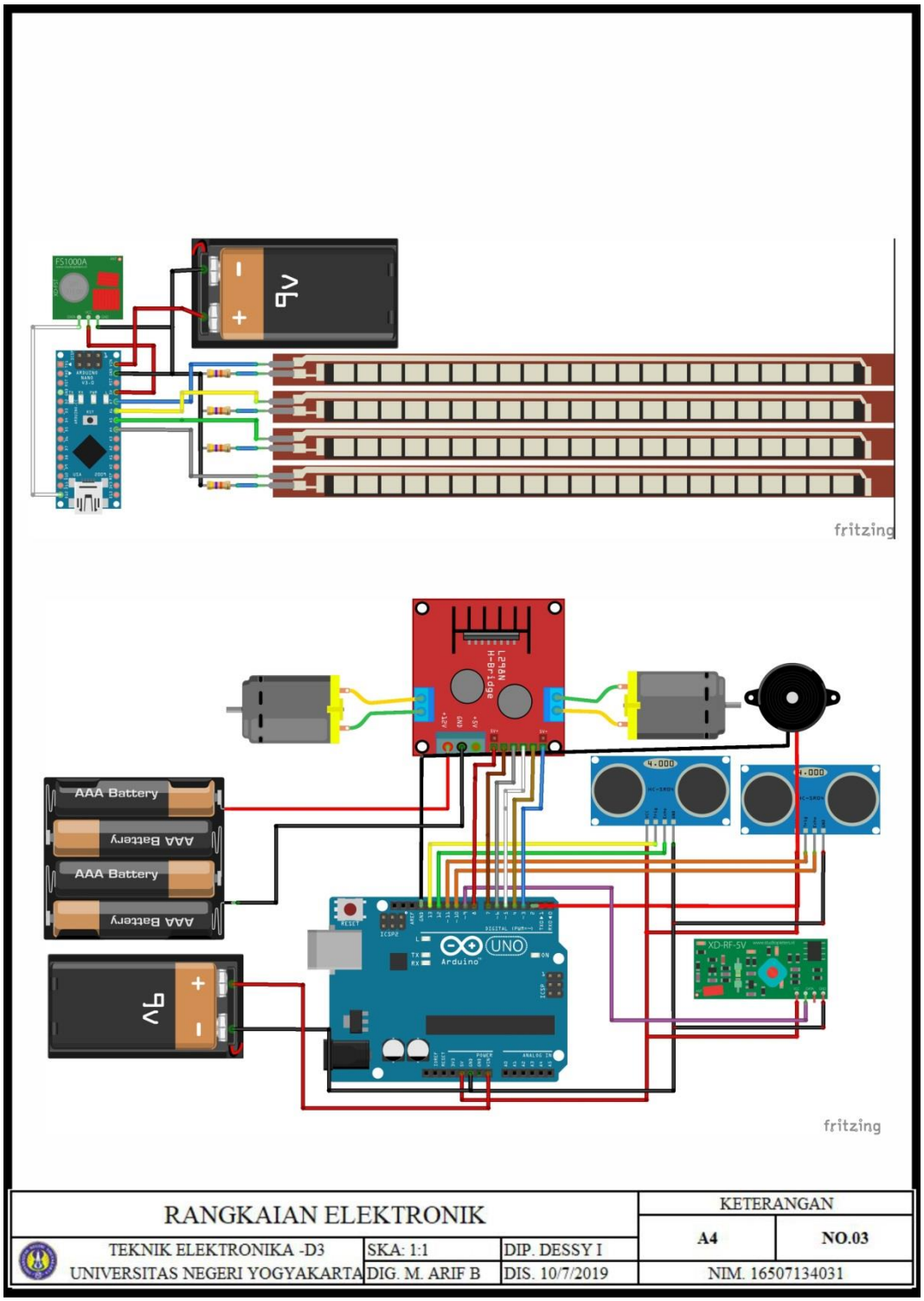
Lampiran 1. Desain Kursi Roda

DESAIN KURSI RODA			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.1
UNIVERSITAS NEGERI YOGYAKARTA	DIG. M. ARIF B	DIS. 10/7/2019	NIM. 16507134031	

Lampiran 2. Foto Kursi Roda

FOTO KURSI RODA			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.2
UNIVERSITAS NEGERI YOGYAKARTA	DIG. M. ARIF B	DIS. 10/7/2019	NIM. 16507134031	

Lampiran 3. Rangkaian Elektronik



Lampiran 4. *Listing Program*

```
#include <VirtualWire.h>

const int transmit_pin = 12;

//Analog read pins
int flex1 = A7;
int flex2 = A6;
int flex3 = A5;
int flex4 = A4;

//to hold the caculated values
double x;
double y;
double z;
double v;
//buffer
int flex1data;
int flex2data ;
int flex3data ;
int flex4data ;

void setup() {

  vw_set_tx_pin(transmit_pin);

  // VirtualWire setup
  vw_setup(2000);     // Bits per sec
pinMode(flex1, INPUT);
  pinMode(flex2, INPUT);
  pinMode(flex3, INPUT);
  pinMode(flex4, INPUT);

  Serial.begin(9600);
}

void loop() {

  flex1data = analogRead(flex1);
  flex2data = analogRead(flex2);
  flex3data = analogRead(flex3);
  flex4data = analogRead(flex4);
  Serial.println(flex1data);
  Serial.println(flex2data);
  Serial.println(flex3data);
  Serial.println(flex4data);

  x = flex1data;
  y = flex2data;
  z = flex3data;
  v = flex4data;

//printing values

//char sensorArray[] = {x, y, z};
double sensorArray[] = {x, y, z,v};
  digitalWrite(13, true); // Turn on a light to
show transmitting
  //vw_send((uint8_t *)&sensorArray,
strlen(sensorArray));
  vw_send((uint8_t *)sensorArray,
sizeof(sensorArray));
  vw_wait_tx(); // Wait until the whole
message is gon
  delay(50);

}
```

LISTING PROGRAM			KETERANGAN	
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```
#include <VirtualWire.h>
#define in1  3
#define in2  5
#define in3  6
#define in4  9
#define trigPin1 4
#define echoPin1 2
#define trigPin2 7
#define echoPin2 8
#define buzzer 13

long duration1, distance1, duration2,
distance2;

double x,y,z,v;
double sensorArray[4] = {};

int flex1data ;
int flex2data ;
int flex3data ;
int flex4data ;

const int receive_pin = 12;

long periodGerak = 50;
long periodUS = 50;
long periodUS1 = 50;
long time_gerak = 0;
long time_US = 0;
long time_US1 = 0;

void maju(){
  analogWrite(in1, 243);
  analogWrite(in3, 255);

}
void mundur(){
  analogWrite(in2, 243);
  analogWrite(in4, 255);
}
void kanan(){
  analogWrite(in2, 243);
  analogWrite(in3, 255);

}
void kiri(){
  analogWrite(in1, 243);
  analogWrite(in4, 255);
}
void diam(){
  analogWrite(in1, 0);
  analogWrite(in3, 0);
  analogWrite(in2, 0);
  analogWrite(in4, 0);
}
void gerak(){
  if (x>650){
    maju();
  }

  else if (y>650){
    mundur();
  }

  else if (z > 920){
    kanan();
  }
  else if (v>550){
    kiri();
  }

  else if( ((x>400)&&(x<600)) &&
((y>300)&&(y<500)) &&
((z>800)&&(z<910)) &&
((v>400)&&(v<500))) {
    diam();
  }

}
void US(){
  digitalWrite(trigPin1,LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin1,HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin1,LOW);
  delayMicroseconds(10);

  duration1=pulseIn(echoPin1, HIGH);
  distance1= (duration1/2)/29.1;
  if ((distance1<10)&&(distance1>0))
  {digitalWrite(buzzer,HIGH);
  diam();
  }
  else {
    digitalWrite(buzzer,LOW);
  }
}
void US1(){
  digitalWrite(trigPin2,LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin2,HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin2,LOW);
  delayMicroseconds(10);

  duration2=pulseIn(echoPin2, HIGH);
  distance2= (duration2/2)/29.1;
  if
((distance2<10)&&(distance2>0)){digitalWrit
e(buzzer,HIGH);
```

LISTING PROGRAM			KETERANGAN	
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```
 diam();
  }
  else {
   digitalWrite(buzzer,LOW);
  }
}

void setup() {

  vw_set_rx_pin(receive_pin);

  Serial.begin(9600);

  // sets the digital pin as output
  pinMode(buzzer, OUTPUT);
  pinMode(in1, OUTPUT);
  pinMode(in2, OUTPUT);
  pinMode(in3, OUTPUT);
  pinMode(in4, OUTPUT);
  pinMode(trigPin1, OUTPUT);
  pinMode(echoPin1, INPUT);
  pinMode(trigPin2, OUTPUT);
  pinMode(echoPin2, INPUT);
  pinMode(buzzer, OUTPUT);
  // VirtualWire
  // Initialise the IO and ISR
  // Required for DR3100
  vw_set_ptt_inverted(true);
  // Bits per sec
  vw_setup(2000);

  // Start the receiver PLL running
  vw_rx_start();

} // END void setup

void loop() {
  uint8_t buf[VW_MAX_MESSAGE_LEN];
  uint8_t buflen =
VW_MAX_MESSAGE_LEN;

  // Non-blocking
  if (vw_get_message(buf, &buflen))
  {
    memcpy(sensorArray, buf, buflen);
    //int i;
    // Turn on a light to show received good
message
    //digitalWrite(13, true);

    // Message with a good checksum received,
dump it.
    //for (i = 0; i < buflen; i++)
    //{
      // Fill Sensor1CharMsg Char array with
corresponding
      // chars from buffer.
      //sensorArray[i] = char(buf[i]);

    //}
   x= sensorArray[0];// == x;
   y= sensorArray[1]; //== y;
   z= sensorArray[2]; //== z;
   v= sensorArray[3];

    if(millis() - time_gerak > periodGerak){
     gerak();
     time_gerak = millis();
    }


    // DEBUG
    Serial.print("X: ");
    Serial.println(x);

    Serial.print("Y: ");
    Serial.println(y);

    Serial.print("z: ");
    Serial.println(z);
Serial.print("v: ");
    Serial.println(v);


    // END DEBUG

    // Turn off light to and await next message
    digitalWrite(13, false);
  }
  Serial.print("Jarak depan: ");
   Serial.println(distance1);
   Serial.print("Jarak belakang: ");
   Serial.println(distance2);
  if(millis() - time_US > periodUS){
    US();
    time_US = millis();
   }
   if(millis() - time_US1 > periodUS1){
    US1();
    time_US1 = millis();
   }
}
```

LISTING PROGRAM			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.4
UNIVERSITAS NEGERI YOGYAKARTA	DIG. M. ARIF B	DIS. 10/7/2019	NIM. 16507134031	

Lampiran 5. Daftar Komponen

1. Arduino Nano
2. Arduino Uno
3. *Flex* sensor
4. Modul RF 433 Mhz
5. *Driver* Motor L298N
6. HC-SR04
7. *Buzzer*
8. Motor DC
9. Baterai

DAFTAR KOMPONEN			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.5
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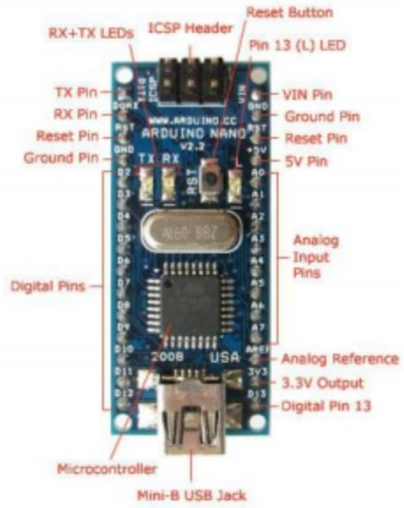
Lampiran 6. Datasheet Arduino Nano



Schematic and Design

Arduino Nano 3.0 (ATmega328): schematic, Eagle files.
Arduino Nano 2.3 (ATmega168): manual (pdf), Eagle files. *Note:* since the free version of Eagle does not handle more than 2 layers, and this version of the Nano is 4 layers, it is published here unrouted, so users can open and use it in the free version of Eagle.

Specifications:

Microcontroller	Atmel ATmega168 or ATmega328
Operating Voltage (logic level)	5 V
Input Voltage (recommended)	7-12 V
Input Voltage (limits)	6-20 V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	8
DC Current per I/O Pin	40 mA
Flash Memory	16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB used by bootloader
SRAM	1 KB (ATmega168) or 2 KB (ATmega328)
EEPROM	512 bytes (ATmega168) or 1 KB (ATmega328)
Clock Speed	16 MHz
Dimensions	0.73" x 1.70"

Power:

The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source.

DATASHEET ARDUINO NANO			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.6
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Lampiran 7. Datasheet Arduino Uno

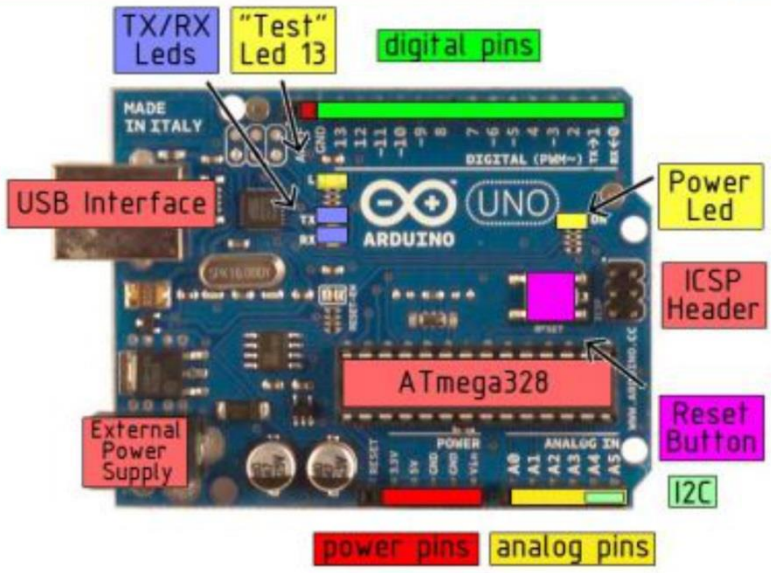
Technical Specification

EAGLE files: arduino-duemilanove-uno-design.zip Schematic: arduino-uno-schematic.pdf

Summary

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz

the board



DATASHEET ARDUINO UNO			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.7
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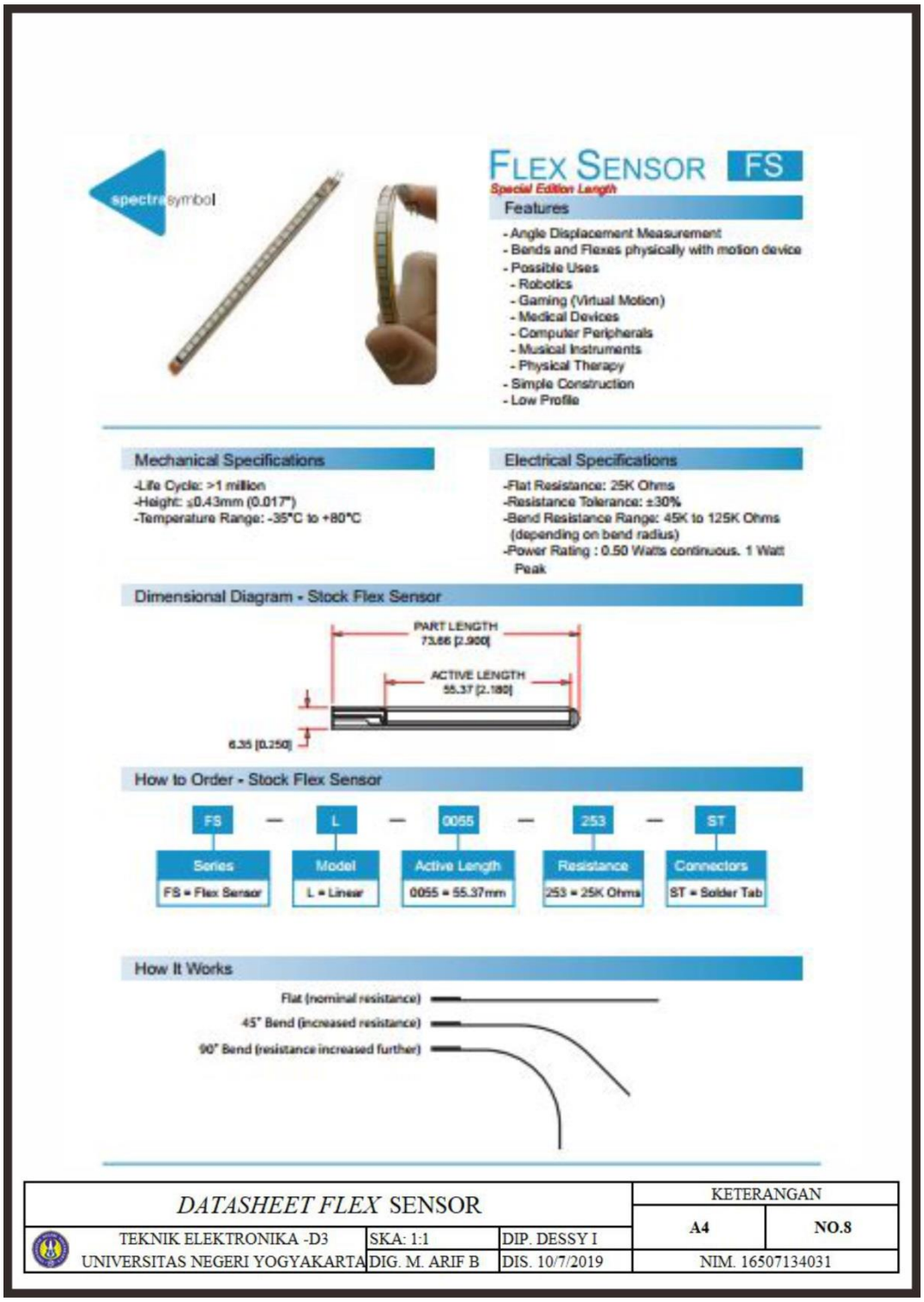
Lampiran 8. *Datasheet flex* sensor



DATASHEET FLEX SENSOR			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.8
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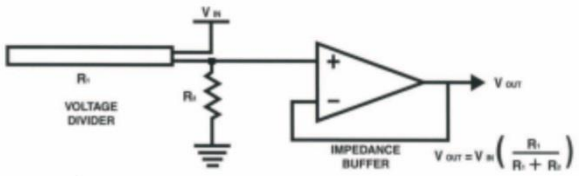
Schematics

BASIC FLEX SENSOR CIRCUIT:

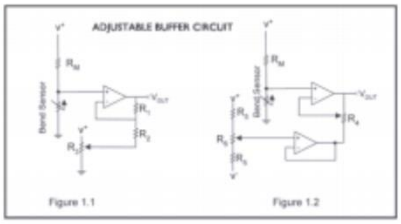


Following are notes from the ITP Flex Sensor Workshop

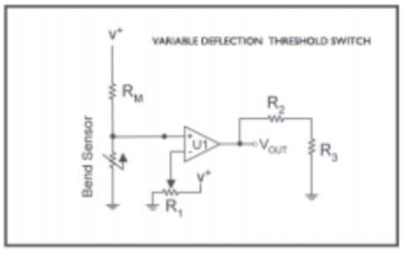
"The impedance buffer in the [Basic Flex Sensor Circuit] (above) is a single sided operational amplifier, used with these sensors because the low bias current of the op amp reduces errer due to source impedance of the flex sensor as voltage divider. Suggested op amps are the LM358 or LM324."

"You can also test your flex sensor using the simplest circut, and skip the op amp."

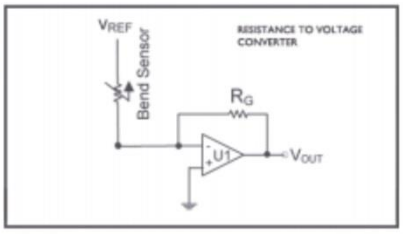
"Adjustable Buffer - a potentiometer can be added to the circuit to adjust the sensitivity range."



"Variable Deflection Threshold Switch - an op amp is used and outputs either high or low depending on the voltage of the inverting input. In this way you can use the flex sensor as a switch without going through a microcontroller."



"Resistance to Voltage Converter - use the sensor as the input of a resistance to voltage converter using a dual sided supply op-amp. A negative reference voltage will give a positive output. Should be used in situations when you want output at a low degree of bending."



DATASHEET FLEX SENSOR			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	**A4**	**NO.8**
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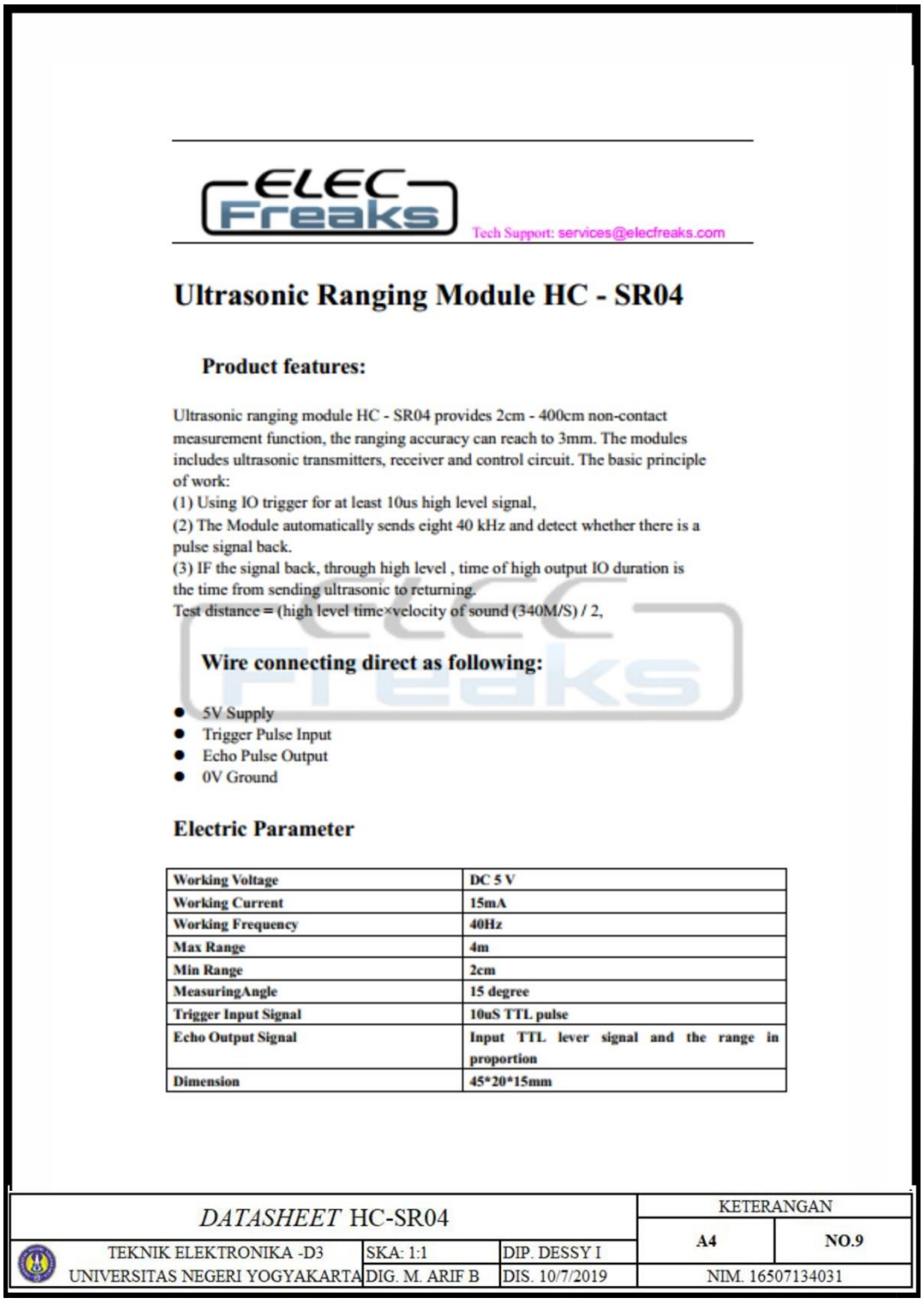
Lampiran 9. *Datasheet* HC-SR04



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**

DATASHEET HC-SR04			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.9
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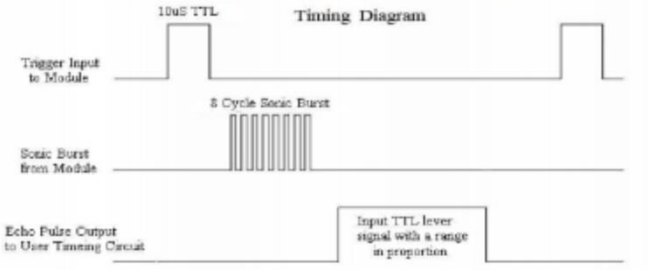
Vcc Trig Echo GND

Timing diagram

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: uS / 58 = centimeters or uS / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



DATASHEET HC-SR04			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	**A4**	**NO.9**
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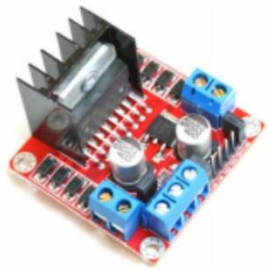
Lampiran 10. *Datasheet Driver Motor* L298N

HT **Handson Technology**

User Guide

L298N Dual H-Bridge Motor Driver

This dual bidirectional motor driver, is based on the very popular L298 Dual H-Bridge Motor Driver Integrated Circuit. The circuit will allow you to easily and independently control two motors of up to 2A each in both directions.It is ideal for robotic applications and well suited for connection to a microcontroller requiring just a couple of control lines per motor. It can also be interfaced with simple manual switches, TTL logic gates, relays, etc. This board equipped with power LED indicators, on-board +5V regulator and protection diodes.



SKU: MDU-1049

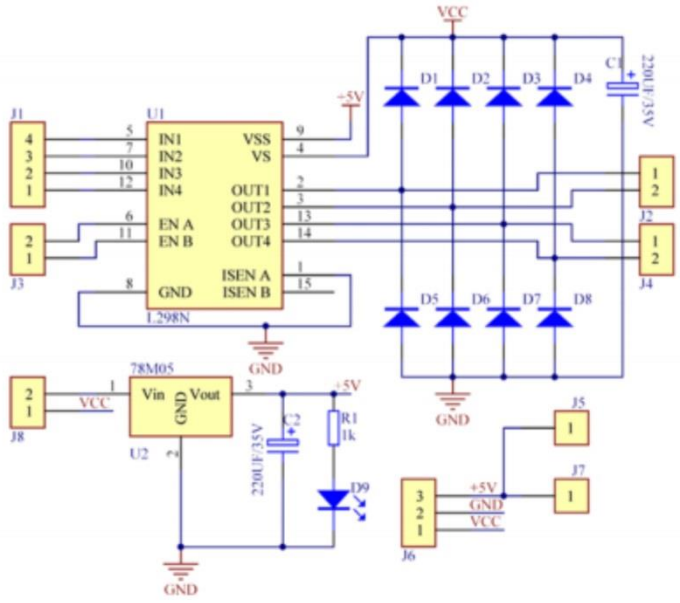
Brief Data:

- Input Voltage: 3.2V~40Vdc.
- Driver: L298N Dual H Bridge DC Motor Driver
- Power Supply: DC 5 V - 35 V
- Peak current: 2 Amp
- Operating current range: 0 ~ 36mA
- Control signal input voltage range :
- Low: -0.3V ≤ Vin ≤ 1.5V.
- High: 2.3V ≤ Vin ≤ Vss.
- Enable signal input voltage range :
  - Low: -0.3 ≤ Vin ≤ 1.5V (control signal is invalid).
  - High: 2.3V ≤ Vin ≤ Vss (control signal active).
- Maximum power consumption: 20W (when the temperature T = 75 ℃).
- Storage temperature: -25 ℃ ~ +130 ℃.
- On-board +5V regulated Output supply (supply to controller board i.e. Arduino).
- Size: 3.4cm x 4.3cm x 2.7cm

1 www.handsontec.com

DATASHEET DRIVER MOTOR L298N			KETERANGAN	
			A4	**NO.10**
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I		
UNIVERSITAS NEGERI YOGYAKARTA	DIG. M. ARIF B	DIS. 10/7/2019	NIM. 16507134031	

Schematic Diagram:



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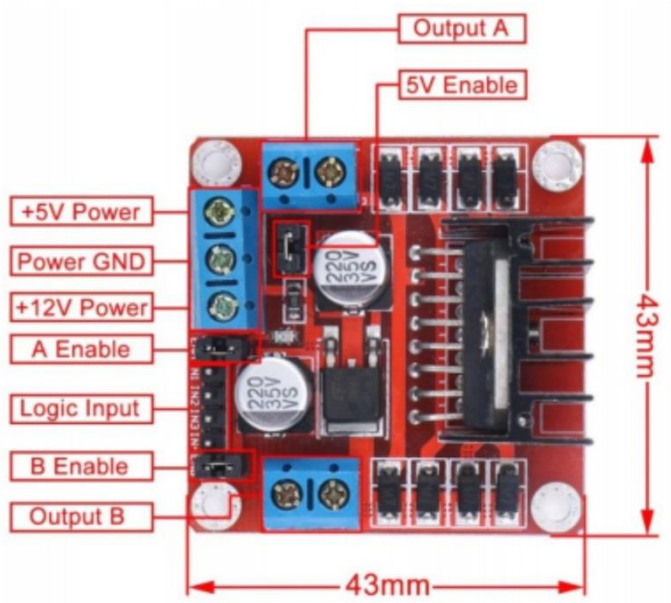
DATASHEET DRIVER MOTOR L298N			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.10
UNIVERSITAS NEGERI YOGYAKARTA	DIG. M. ARIF B	DIS. 10/7/2019	NIM. 16507134031	

Board Dimension & Pins Function:



DATASHEET DRIVER MOTOR L298N			KETERANGAN	
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I	A4	NO.10
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Lampiran 11. *Datasheet* Modul RF 433 Mhz

433Mhz RF Transmitter With Receiver Kit For Arduino ARM MCU Wireless

Description:

This is 433Mhz RF transmitter with receiver kit for Arduino ARM MCU wireless
Application environment:

Remote control switch, receiver module, motorcycles, automobile anti-theft products, home security products, electric doors, shutter doors, windows, remote control socket, remote control LED, remote audio remote control electric doors, garage door remote control, remote control retractable doors, remote volume gate, pan doors, remote control door opener, door closing device control system, remote control curtains, alarm host, alarm, remote control motorcycle remote control electric cars, remote control MP3.

Specification:

Receiver module:
Product Model: XD-RF-5V
Operating voltage: DC5V
Quiescent Current: 4MA
Receiving frequency: 433.92MHZ
Receiver sensitivity: -105DB
Size:30x14x7mm

Transmitter:

Product Model: XD-FST
Launch distance :20-200 meters (different voltage, different results)
Operating voltage :3.5-12V
Dimensions: 19 * 19mm
Operating mode: AM
Transfer rate: 4KB / S
Transmitting power: 10mW
Transmitting frequency: 433M
Pinout from left → right: (DATA; VCC; GND)

See for how to: http://electronics-diy.com/arduino-rf-link-using-433mhz-transmitter-receiver-modules.php

DATASHEET MODUL RF 433 MHZ			KETERANGAN	
			A4	NO.11
TEKNIK ELEKTRONIKA -D3	SKA: 1:1	DIP. DESSY I		
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