

**PENERAPAN ALGORITMA *FUZZY LOGIC* PADA SISTEM
PENGUKUR SUHU TUBUH MANUSIA DAN *HAND*
SANITIZER BERBASIS *ARDUINO UNO R3* DENGAN
MENGUNAKAN SENSOR *PROXIMITY***

SKRIPSI

Oleh

**PUTRI NOVA SARI
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**PROGRAM STUDI TEKNIK INFORMATIKA
FAKULTAS TEKNIK
UNIVERSITAS ISLAM SUMATRA UTARA
MEDAN
2022**

LEMBAR PENGESAHAN

Penerapan Algoritma *Fuzzy Logic* Pada Sistem Pengukur Suhu Tubuh Manusia Dan Hand Sanitizer Berbasis Arduino Uno R3 Dengan Menggunakan Sensor Proximity

SKRIPSI

Diajukan Sebagai Syarat Untuk Memperoleh Gelar Sarjana Pada Program Studi Teknik Informatika Universitas Islam Sumatera Utara

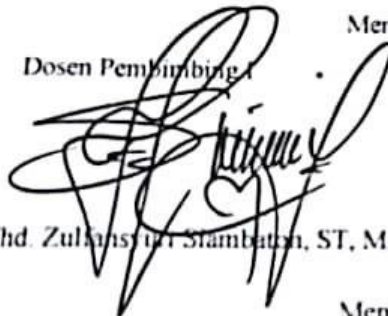
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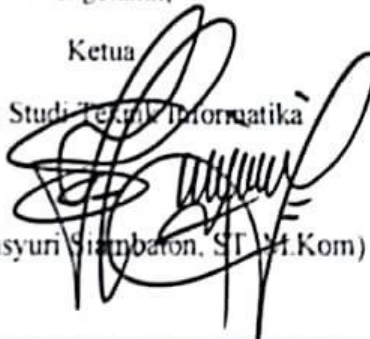


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**PROGRAM STUDI TEKNIK INFORMATIKA
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UNIVERSITAS ISLAM SUMATERA UTARA
MEDAN
2022**

HALAMAN PERNYATAAN KEASLIAN SKRIPSI

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Menyatakan bahwa skripsi dengan judul skripsi "**Penerapan Algoritma Fuzzy Logic Pada Sistem Pengukur Suhu Tubuh Manusia Dan Hand Sanitizer Berbasis Arduino Uno R3 Dengan Menggunakan Sensor Proximity**" tidak terdapat karya yang pernah diajukan untuk memperoleh gelar kesarjanaan di suatu Perguruan Tinggi, dan sepanjang pengetahuan saya juga tidak terdapat karya atau pendapat yang pernah ditulis atau diterbitkan oleh orang lain, kecuali yang secara tertulis diacu dalam skripsi ini dan disebutkan dalam daftar pustaka. Apabila terbukti skripsi saya terdapat kesamaan di Perguruan Tinggi lainnya, saya bersedia menerima konsekuensinya sesuai peraturan yang berlaku.

Demikianlah pernyataan ini saya perbuat dengan sebenarnya dan tanpa paksaan dari pihak tertentu.

Medan, 2022

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KATA PENGANTAR



Assalamu'alaikum Warahmatullahi Wabarakatuh

Alhamdulillah segala puji bagi Allah Tuhan Yang Maha Esa atas limpahan nikmat kasih sayang Nya, Penulis masih mampu menimba sedikit Ilmu yang telah Allah Karuniakan, sehingga penulis dapat menyelesaikan Skripsi tepat pada waktunya. Shalawat dan salam mari kita hadiahkan kepada junjungan alam Nabi besar Muhammad SAW, semoga kita semua mendapatkan safaatnya baik di dunia maupun di akhirat.

Adapun Skripsi ini disusun untuk memenuhi syarat dalam menyelesaikan program studi Strata (S1) Teknik Informatika Fakultas Teknik Universitas Islam Sumatera Utara Skripsi ini berjudul **“Penerapan Algoritma *Fuzzy Logic* Pada Sistem Pengukur Suhu Tubuh Manusia Dan *Hand Sanitizer* Berbasis *Arduino Uno R3* Dengan Menggunakan Sensor *Proximity*”**.

Tentunya dalam penyusunan Skripsi ini penulis banyak mendapatkan bimbingan serta bantuan yang sangat berharga baik secara material, moril maupun spritual. Maka pada kesempatan ini penulis mengucapkan terimakasih kepada semua pihak yang telah membantu terutama kepada :

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2. Bapak Mhd.Zulfansyuri Siambaton,ST.M.Kom, selaku ketua Program Studi Teknik Informatika Universitas Islam Sumatera Utara sekaligus

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- Adi Putra, A. (2017). Mengenal Sekilas Mikrokontroler Arduino Uno R3. *Bab II Dasar Teori*, 3-17.
- Aivanni, N. (2022, February 03). *Ketahui Pengertian Hingga Manfaat Algoritma*. Retrieved from Media Indonesia:
<https://m.mediaindonesia.com/teknologi/469140/kenali-pengertian-hingga-manfaat-algoritma#:~:text=ALGORITMA%20merupakan%20metode%20atau%20langkah,dengan%20sebuah%20intruksi%20atau%20kegiatan>.
- Apa Itu arduino Uno, Spesifikasi, Fungsi Hingga Contoh Projectnya*. (2021, April 6). Retrieved from Pelayanan Publik id:
<https://pelayananpublik.id/2021/04/06/apa-itu-arduino-uno-spesifikasi-fungsi-hingga-contoh-projectnya/>
- Ardiansyah, I., & Nurpulela, L. (2021). Sistem Pengukuran Suhu Tubuh Otomatis Berbasis Arduino Sebagai Alat Deteksi Awal COVID-19. *Power Elektronik: Jurnal Orang Elektro, Vol.10, No.2,2021*, 60-64.
- Ayoe, Y. S. (2022, juni 15). *Apa Itu Termometer, Fungsi, dan Jenis-Jenisnya*. Retrieved from matamata.com:
<https://www.matamata.com/life/2021/03/15/182916/apa-itu-termometer-fungsi-dan-jenis-jenisnya>
- Cahyani, N. M. (2014). Daun Kemangi (*Ocimum Canum*) Sebagai Altrnatif Pembuatan Hand Sanitizer. *Jurnal Kesehatan Masyarakat*, 136-142.
- Diana, A. (2012). *Pengaruh Desiminasi Dokter Kecil Tentang Penggunaan Hand Sanitizer Gel dan Spray Terhadap Penurunan Angka Kuman Tangan Siswa SDN Demakijo Gamping Sleman* . Yogyakarta: Poltekkes Kemenkes.
- Djuandi, F. (2011). *Pengenalan Arduino*. Jakarta: Elexmedia.
- Guyton, A., & Hall, J. (2012). *Buku Ajar Fisiologi Kedokteran*. Jakarta.
- Hapsari, T. I. (2015). *Pemanfaatan Ekstrak Daun Sirih (Piper Betle Linn) Sebagai Hang Sanitizer*. Yogyakarta: Poltekkes Kemenkes .
- Hendrian, Y., & Rais, R. A. (2021). Perancangan Alat Ukur Suhu Tubuh dan Hand Sanitizer Otomatis Berbasis IOT. *Jurnal Infortech*, 33-39.
- Himatepah. (2020, Februari 9). *Ragam dan Manfaat Teknologi Sensor di Bidang Teknologi Pertanian*. Retrieved from Departemen Data dan Informasi:
<http://agritech.unhas.ac.id/kmdtpuh/ragam-dan-manfaat-teknologi-sensor-di-bidang-teknologi->

https://www.researchgate.net/publication/346629720_Otomatisasi_Dalam_Pandemi_Dengan_Sensor_Proximity#:~:text=Sensor%20proximity%20merupakan%20suatu%20sensor,kimiawi%2C%20dan%20korosif%20yang%20berlebihan.

Wulandari, R. (2020). Rancang Bangun Pengukur Suhu Tubuh Berbasis Arduino Sebagai Alat Deteksi Awal Covid-19. *Prosiding SNFA (Seminar Nasional Fisika Dan Aplikasinya)*, 183-189.

Zuhudi, A. M. (2018). *Jenis-jenis Arduino*. Retrieved from Maccarakdecom: <https://maccarakde.blogspot.com/2018/04/jenis-jenis-arduino.html?m=1>

LAMPIRAN

Listing Program

```
void(*ngulang)(void)=0;
#include "Arduino.h"
#include "SoftwareSerial.h"
#include "DFRobotDFPlayerMini.h"
SoftwareSerial mySoftwareSerial(2, 3); // RX, TX
DFRobotDFPlayerMini myDFPlayer;
void printDetail(uint8_t type, int value);
#include <LiquidCrystal.h>
LiquidCrystal lcd(8, 9, 10, 11, 12, 13);
#include <Wire.h>
#include <Adafruit_MLX90614.h>
Adafruit_MLX90614 mlx = Adafruit_MLX90614();

#define S_1 A3
#define S_2 A2
#define pompa 7
double temp_amb;
double temp_obj;
String suhu;
byte data_s1, data_s2;
byte kondisi = 0;
int time_out;

int nilai_1;
int nilai_2;
String val;
```

```

void setup() {
  mlx.begin();
  Serial.begin(9600);
  mySoftwareSerial.begin(9600);
  lcd.begin(16, 2);
  Serial.println(F("DFRobot DFPlayer Mini Demo"));
  Serial.println(F("Initializing DFPlayer ... (May take 3~5 seconds)"));

  if (!myDFPlayer.begin(mySoftwareSerial)) { //Use softwareSerial to
communicate with mp3.
    Serial.println(F("Unable to begin:"));
    Serial.println(F("1.Please recheck the connection!"));
    Serial.println(F("2.Please insert the SD card!"));

    while(true){
      time_out++;
      if(time_out > 60){
        ngulang();
      }
      Serial.println(time_out);
      delay(50);
    }
  }

  Serial.println(F("DFPlayer Mini online.));

  //myDFPlayer.setTimeout(500); //Set serial communicaiton time out 500ms
myDFPlayer.volume(30); //Set volume value (0~30).
myDFPlayer.start();
delay(10);

```

```

myDFPlayer.stop();
pinMode(S_1, INPUT);
pinMode(S_2, INPUT);
pinMode(pompa, OUTPUT);
digitalWrite(pompa, HIGH);
lcd.setCursor(0, 0); lcd.print(" Alat Pengukur ");
lcd.setCursor(0, 1); lcd.print(" Suhu Tubuh ");
delay(3000);
/*byte a=1;
while(a==1){
  baca_suhu();
  delay(300);
}*/
}

void loop() {
  baca_suhu();
  data_s1 = digitalRead(S_1);
  data_s2 = digitalRead(S_2);

  lcd.setCursor(0, 1); lcd.print("SUHU TUBUH ANDA ");
  lcd.setCursor(0, 0); lcd.print(" SILAHKAN UKUR ");
  if(data_s1 == 0){
    delay(100);
    baca_suhu();
    baca_suhu();
    baca_suhu();
    baca_suhu();
    baca_suhu();
  }
}

```

```

    baca_suhu();
    baca_suhu();
    baca_suhu();
    baca_suhu();
    Serial.print("Object temp = ");
    Serial.println(temp_obj);
    if(temp_obj <=35){
        nilai_1 = nilai_1 +35;
        val = String(nilai_1)+"."+String(nilai_2);
        Serial.print("SUHUu== "+val);
        temp_obj = val.toInt();
        Serial.print("Temp== ");
        Serial.println(temp_obj);
    }
    else if(temp_obj >37.70 && temp_obj <= 42){
        nilai_1 = nilai_1 +35;
        val = String(nilai_1)+"."+String(nilai_2);
        Serial.print("SUHUu== "+val);
        temp_obj = val.toInt();
        Serial.print("Temp== ");
        Serial.println(temp_obj);
    }
    else{
        val = String(temp_obj);
    }
    lcd.setCursor(0, 0); lcd.print("SUHU TUBUH ANDA ");
    lcd.setCursor(0, 1); lcd.print("Temp= "+val+" C      ");

//=====suhu normal=====

```



```
if(temp_obj <= 38 && kondisi == 0){
    myDFPlayer.next();
    delay(3100);
    myDFPlayer.stop();
    kondisi = 1;
}
else if(temp_obj <= 38 && kondisi == 1){
    myDFPlayer.next();
    myDFPlayer.previous();
    delay(3200);
    myDFPlayer.stop();
    kondisi = 1;
}
else if(temp_obj <= 38 && kondisi == 2){
    myDFPlayer.previous();
    delay(3200);
    myDFPlayer.stop();
    kondisi = 1;
}

//=====suhu berlebih=====

if(temp_obj > 38 && kondisi == 0){
    Serial.println("OK");
    //myDFPlayer.next();
    myDFPlayer.start();
    //myDFPlayer.previous();
    //myDFPlayer.previous();
    delay(3200);
    myDFPlayer.stop();
}
```

```
kondisi = 2;
}
else if(temp_obj > 38 && kondisi == 1){

    myDFPlayer.previous();
    delay(3200);
    myDFPlayer.stop();
    kondisi = 2;
}
else if(temp_obj > 38 && kondisi == 2){
    myDFPlayer.next();
    myDFPlayer.previous();
    delay(3200);
    myDFPlayer.stop();
    kondisi = 2;
}
data_s1 = digitalRead(S_1);
data_s2 = digitalRead(S_2);

if(data_s1 == 0 && data_s2 == 1){
    delay(200);
    digitalWrite(pompa, LOW);
    delay(300);
    digitalWrite(pompa, HIGH);
}
else if(data_s1 == 0 && data_s2 == 0){
    delay(200);
    digitalWrite(pompa, LOW);
```

```
    delay(300);
    digitalWrite(pompa, HIGH);
    delay(200);
    digitalWrite(pompa, LOW);
    delay(300);
    digitalWrite(pompa, HIGH);

}
delay(1000);
//ngulang();
}
}

void baca_suhu(){
    temp_amb = mlx.readAmbientTempC();
    temp_obj = mlx.readObjectTempC()-2;
// if(temp_obj =
    suhu = String(temp_obj);
    //Serial Monitor
    Serial.print("Temp_sekitar = ");
    Serial.println(temp_amb);
    Serial.print("Temp Object = ");
    Serial.println(suhu);
    Serial.println();

    nilai_1 = random(2);
    nilai_2 = random(9);

    delay(100);
```

```
}
```

```
void printDetail(uint8_t type, int value){  
  switch (type) {  
    case TimeOut:  
      Serial.println(F("Time Out!"));  
      break;  
    case WrongStack:  
      Serial.println(F("Stack Wrong!"));  
      break;  
    case DFPlayerCardInserted:  
      Serial.println(F("Card Inserted!"));  
      break;  
    case DFPlayerCardRemoved:  
      Serial.println(F("Card Removed!"));  
      break;  
    case DFPlayerCardOnline:  
      Serial.println(F("Card Online!"));  
      break;  
    case DFPlayerPlayFinished:  
      Serial.print(F("Number:"));  
      Serial.print(value);  
      Serial.println(F(" Play Finished!"));  
      break;  
    case DFPlayerError:  
      Serial.print(F("DFPlayerError:"));  
      switch (value) {  
        case Busy:  
          Serial.println(F("Card not found"));
```

```
        break;
    case Sleeping:
        Serial.println(F("Sleeping"));
        break;
    case SerialWrongStack:
        Serial.println(F("Get Wrong
Stack"));break;
    case CheckSumNotMatch:
        Serial.println(F("Check Sum Not
Match"));break;
    case FileIndexOut:
        Serial.println(F("File Index Out of
Bound"));break;
    case FileMismatch:
        Serial.println(F("Cannot Find
File"));break;
    case Advertise:
        Serial.println(F("In
Advertise"));break;
    default:
        break;
}
break;
default:
    break;
}
}
```



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Tentang
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Nama : PUTRI NOVA SARI
NPM : 71180915017

telah menyelesaikan sebagian besar tugas-tugas/mata kuliah pada kurikulum Program Studi Teknik Informatika Fakultas Teknik UISU Medan, kecuali Tugas Skripsi mahasiswa.

2. Telah disetujuinya mahasiswa pada butir (1) untuk melaksanakan Tugas Skripsi mahasiswa, dengan judul skripsi :

" Penerapan Algoritma Fuzzy Logic Pada Sistem Pengukur Suhu Tubuh Manusia dan Hand Sanitizer Berbasis Arduino Uno R3 Dengan Menggunakan Sensor Proximity "

Bahwa perlu menetapkan dan mengangkat pembimbing untuk mahasiswa pada butir (1) dalam menyelesaikan Tugas Skripsi nya.

MEMUTUSKAN

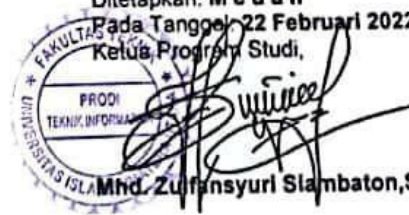
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2. Dosen Pembimbing untuk mahasiswa pada butir (1) adalah sebagai berikut :

a. Pembimbing I : Mhd. Zulfansyuri Siambaton, ST, M.Kom
b. Pembimbing II: Tasliyah Haramaini, S.Si, M.Kom

3. Surat Keputusan ini diberikan kepada yang bersangkutan untuk dilaksanakan sebaik-baiknya dan berlaku mulai tanggal 22 Februari s/d 22 Juli 2022
4. Bilamana dikemudian hari ternyata ada kekeliruan dalam penetapan ini, akan diperbaiki sebagaimana mestinya.

Ditetapkan: Medan
Pada Tanggal: 22 Februari 2022
Ketub. Program Studi,



Mhd. Zulfansyuri Siambaton, ST, M.Kom

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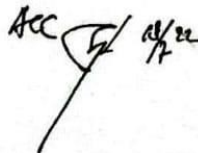
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PERIODE X BULAN JULI SEMESTER B. TA – 2021 / 2022**

Setelah memperhatikan dan mengamati kegiatan seminar Tugas Skripsi yang diadakan pada hari Selasa tanggal 05 Juli 2022, waktu 13.30 WIB s/d selesai di Ruang Serbaguna FT. UISU atas Nama Mahasiswa :

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NPM : 71180915017
PROGRAM STUDI : TEKNIK INFORMATIKA
JUDUL SKRIPSI : Penerapan Algoritma Fuzzy Logic Pada Sistem
Pengukur Suhu Tubuh Manusia dan Hand Sanitizer
Berbasis Arduino Uno R3 Dengan Menggunakan
Sensor Proximity
Dosen Pembimbing : 1. Mhd. Zulfansyuri Siambaton, ST, M.Kom
: 2. Tasliyah Haramaini, S.Si, M.Kom
Dosen Pembanding : 1. Dr. Syahwin, M.Si
: 2. Khairuddin Nasution, ST, M.Kom
: 3. Heri Santoso, S.Kom, M.Kom

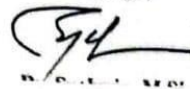
Maka oleh karena itu saya sebagai Dosen Pembanding memberikan saran sebagai bahan masukan untuk mahasiswa tersebut di atas dalam menghadapi sidang sarjana adalah sebagai berikut :

1. Perbaiki penulisan sesuai dengan pedoman penulisan
2. Tambahkan algoritma Fuzzy Logic pada sistem
3. Tambahkan sumber rujukan pada setiap kutipan
4. Perbaiki / sesuaikan antara Rumusan Masalah, Tujuan, Kesimpulan
5. sesuaikan kutipan dengan Daftar Pustaka
6. Tambahkan semua Data sheet Hardware yang digunakan pada lampiran

ACC 

Medan, 05 Juli 2022

Pembanding I,





الجامعة الإسلامية في سومطرة الشمالية
UNIVERSITAS ISLAM SUMATERA UTARA
FAKULTAS TEKNIK
PROGRAM STUDI TEKNIK INFORMATIKA
JL. S. M. RAJA TELP. : (061) 7868049 FAX. : (061) 7868049 TELADAN MEDAN KODE POS 20217
www.ft.uisu.ac.id

**BERITA ACARA DAN EVALUASI SARAN PEMBANDING SEMINAR SKRIPSI
PERIODE X BULAN JULI SEMESTER B. TA – 2021 / 2022**

Setelah memperhatikan dan mengamati kegiatan seminar Tugas Skripsi yang diadakan pada hari Selasa tanggal 05 Juli 2022, waktu 13.30 WIB s/d selesai di Ruang Serbaguna FT. UISU atas Nama Mahasiswa :

N A M A : PUTRI NOVA SARI
NPM : 71180915017
PROGRAM STUDI : TEKNIK INFORMATIKA
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Maka oleh karena itu saya sebagai Dosen Pembanding memberikan saran sebagai bahan masukan untuk mahasiswa tersebut di atas dalam menghadapi sidang sarjana adalah sebagai berikut :

1. Perhatikan kembali kata.
2. Pahami mengenai fuzzy logic.
- 3.
- 4.
- 5.

- kelas syahwin
Khairuddin Nasution

Medan, 05 Juli 2022

Pembanding II,



الجامعة الإسلامية في سومطرة الشمالية
UNIVERSITAS ISLAM SUMATERA UTARA
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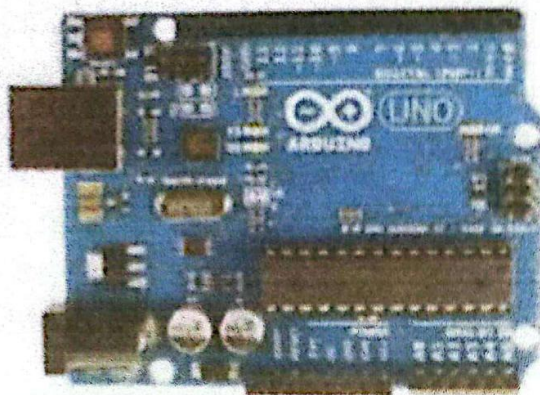
Maka oleh karena itu saya sebagai Dosen Pembanding memberikan saran sebagai bahan masukan untuk mahasiswa tersebut di atas dalam menghadapi sidang skripsi adalah sebagai berikut :

1. *Atas belakung - ke badan*
2. *ke penelitian - target & optik na*
3. *penelitian yg tr akurat.*
4. *Atas belakung - ke Ilmuan yg si kaitan*
5.

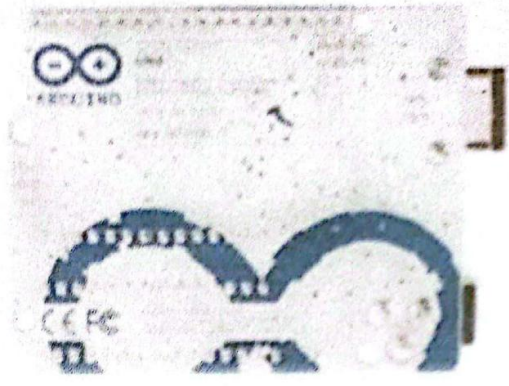
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 Pembanding III,

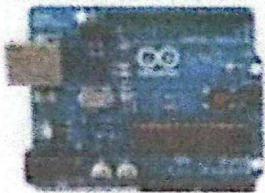
Data Sheet Arduino Uno R3



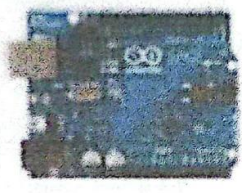
Arduino Uno R3 Front



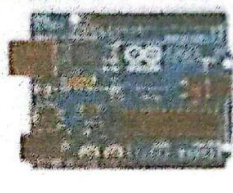
Arduino Uno R3 Back



Arduino Uno R2 Front



Arduino Uno SMD



Arduino Uno Front



Arduino Uno Back

Overview

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

[Revision 1](#) of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

[Revision 1](#) of the board has the following new features:

- I/O pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the ICREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the [index of Arduino boards](#).

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 (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

Schematic & Reference Design

EAGLE files: [arduino-uno-Rev 3-reference-design.zip](#) (NOTE: works with Eagle 6.0 and newer)

Schematic: [arduino-uno-Rev 3-schematic.pdf](#)

Note: The Arduino reference design can use an Atmega8, 168, or 328. Current models use an ATmega328, but an Atmega8 is shown in the schematic for reference. The pin configuration is identical on all three processors.

Power

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- **VIN.** The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V.** This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- **3V3.** A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **GND.** Ground pins.

LM2596

3.0 A, Step-Down Switching Regulator

The LM2596 regulator is monolithic integrated circuit ideally suited for easy and convenient design of a step-down switching regulator (buck converter). It is capable of driving a 3.0 A load with excellent line and load regulation. This device is available in adjustable output version and it is internally compensated to minimize the number of external components to simplify the power supply design.

Since LM2596 converter is a switch-mode power supply, its efficiency is significantly higher in comparison with popular three-terminal linear regulators, especially with higher input voltages.

The LM2596 operates at a switching frequency of 150 kHz thus allowing smaller sized filter components than what would be needed with lower frequency switching regulators. Available in a standard 5-lead TO-220 package with several different lead bend options, and D²PAK surface mount package.

The other features include a guaranteed $\pm 4\%$ tolerance on output voltage within specified input voltages and output load conditions, and $\pm 15\%$ on the oscillator frequency. External shutdown is included, featuring 80 μ A (typical) standby current. Self protection features include switch cycle-by-cycle current limit for the output switch, as well as thermal shutdown for complete protection under fault conditions.

Features

- Adjustable Output Voltage Range 1.23 V – 37 V
- Guaranteed 3.0 A Output Load Current
- Wide Input Voltage Range up to 40 V
- 150 kHz Fixed Frequency Internal Oscillator
- TTL Shutdown Capability
- Low Power Standby Mode, typ 80 μ A
- Thermal Shutdown and Current Limit Protection
- Internal Loop Compensation
- Moisture Sensitivity Level (MSL) Equals 1
- Pb-Free Packages are Available

Applications

- Simple High-Efficiency Step-Down (Buck) Regulator
- Efficient Pre-Regulator for Linear Regulators
- On-Card Switching Regulators
- Positive to Negative Converter (Buck-Boost)
- Negative Step-Up Converters
- Power Supply for Battery Chargers



ON Semiconductor®

<http://onsemi.com>



TO-220
TV SUFFIX
CASE 314B

Heatsink surface connected to Pin 3



TO-220
T SUFFIX
CASE 314D

Pin
1: V_{in}
2: Output
3: Ground
4: Feedback
5: ON/OFF



D²PAK
D2T SUFFIX
CASE 936A

Heatsink surface (shown as terminal 6 in case outline drawing) is connected to Pin 3

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 23 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 23 of this data sheet.



CrystalFontz America, Inc.
15611 East Washington Road
Valleyford, WA 99036

Phone: (509) 291-3514
Fax: (509) 291-3345

<http://www.crystalfontz.com>
email: sales@crystalfontz.com

CrystalFontz America, Inc.

CUSTOMER		
MODEL	CFAH1602A-AGB-JP	
APPROVAL	BY:	DATA:

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

CrystalFontz America, Inc.

15611 East Washington Road
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Contents

1. Module Classification Information
2. Precautions in use of LCD Modules
3. General Specification
4. Absolute Maximum Ratings
5. Electrical Characteristics
6. Optical Characteristics
7. Interface Pin Function
8. Contour Drawing & Block Diagram
9. Function Description
10. Character Generator ROM Pattern
11. Instruction Table
12. Timing Characteristics
13. Initializing of LCM
14. Quality Assurance
15. Reliability
16. Backlight Information



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email: sales@crystalfontz.com

1. Module Classification Information

CFA H 1602 A-ΔGB- JP
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	Brand CRYSTALFONTZ AMERICA, INCORPORATED	
②	Display Type H → Character Type, G → Graphic Type	
③	Display's logical dimensions: 16 columns by 02 lines	
④	Model serials no.	
⑤	Backlight Type	N → Without backlight B → EL, Blue green D → EL, Green W → EL, White F → CCFL, White Y → LED, Yellow Green A → LED, Amber R → LED, Red O → LED, Orange G → LED, Green
⑥	LCD Mode	B → TN Positive, Gray N → TN Negative G → STN Positive, Gray Y → STN Positive, Yellow Green M → STN Negative, Blue F → FSTN Positive I → FSTN Negative
⑦	LCD Polarizer Type, Temperature range, Viewing direction:	A → Reflective, N I, 6:00 D → Reflective, N I, 12:00 G → Reflective, W I, 6:00 J → Reflective, W I, 12:00 B → Transflective, N, I, 6:00 E → Transflective, N I, 12:00 H → Transflective, W I, 6:00 K → Transflective, W I, 12:00 C → Transmissive, N I, 6:00 F → Transmissive, N I, 12:00 I → Transmissive, W I, 6:00 L → Transmissive, W I, 12:00
⑧	Special Code	JP → English and Japanese standard font

Data Sheet Modul MP3-TF-16P

DFPLayer Mini

1. Summary

1.1 .Brief Instruction

DFPLayer Mini module is a serial MP3 module provides the perfect integrated MP3, WMV hardware decoding. While the software supports TF card driver, supports FAT16, FAT32 file system. Through simple serial commands to specify music playing, as well as how to play music and other functions, without the cumbersome underlying operating, easy to use, stable and reliable are the most important features of this module

1.2 .Features

- Support Mp3 and WMV decoding
- Support sampling rate of 8KHz,11.025KHz,12KHz,16KHz,22.05KHz,24KHz,32KHz,44.1KHz,48KHz
- 24-bit DAC output, dynamic range support 90dB, SNR supports 85dB
- Supports FAT16, FAT32 file system, maximum support 32GB TF card
- A variety of control modes, serial mode, AD key control mode
- The broadcast language spots feature, you can pause the background music being played
- Built-in 3W amplifier
- The audio data is sorted by folder, supports up to 100 folders, each folder can be assigned to 1000 songs
- 30 levels volume adjustable, 10 levels EQ adjustable.

1.3 .Application

- Car navigation voice broadcast
- Road transport inspectors, toll stations voice prompts
- Railway station, bus safety inspection voice prompts
- Electricity, communications, financial business hall voice prompts
- Vehicle into and out of the channel verify that the voice prompts
- The public security border control channel voice prompts
- Multi-channel voice alarm or equipment operating guide voice
- The electric tourist car safe driving voice notices
- Electromechanical equipment failure alarm
- Fire alarm voice prompts
- The automatic broadcast equipment, regular broadcast.

2. Module Application Instruction

2.1. Specification Description

Item	Description
MP3 format	1. Support 11172-3 and ISO13813-3 layer3 audio decoding
	2. Support sampling rate (KHz) 8/11.025/12/16/22.05/24/32/44.1/48
	3. Support Normal, Jazz, Classic, Pop, Rock etc
UART Port	Standard Serial, TTL Level, Baud rate adjustable(default baud rate is 9600)
Working Voltage	DC 3.2-5.0V, Type :DC 4.2V
Standby Current	20mA
Operating Temperature	-40~+70
Humidity	5%~95%

Table 2.1 Specification Description

2.2 .Pin Description

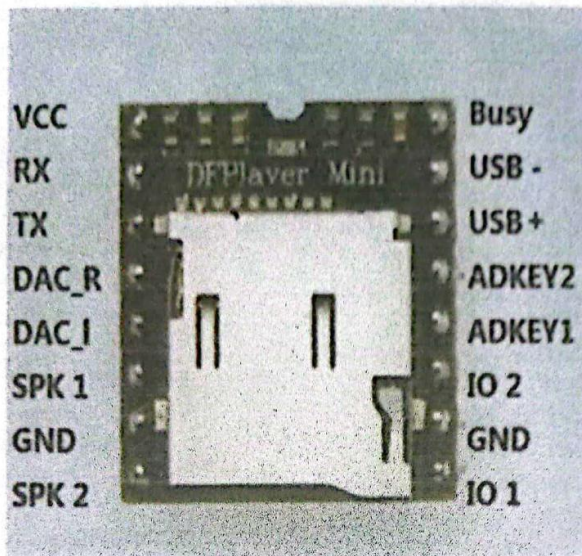


Figure 2.1

No	Pin	Description	Note
1	VCC	Input Voltage	DC 3.2-5.0V, Type: DC 4.2V
2	RX	UART serial input	
3	TX	UART serial output	
4	DAC_R	Audio output right channel	Drive earphone and amplifier
5	DAC_L	Audio output left channel	Drive earphone and amplifier
6	SPK2	Speaker	Drive speaker less than 3W
7	GND	Ground	Power GND
8	SPK1	Speaker	Drive speaker less than 3W
9	IO1	Trigger port 1	Short press to play previous / long press to decrease volume
10	GND	Ground	Power GND
11	IO2	Trigger port 2	Short press to play next / long press to increase volume
12	ADKEY1	AD Port 1	Trigger play first segment
13	ADKEY2	AD Port 2	Trigger play fifth segment
14	USB+	USB+ DP	USB Port
15	USB-	USB- DM	USB Port
16	BUSY	Playing Status	Low means playing / High means no

Table 2.2 Pin Description

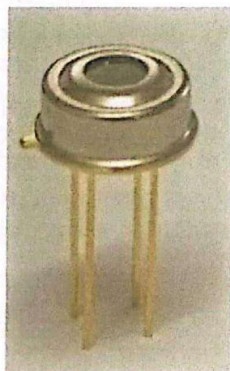
Features and Benefits

- Small size, low cost
- Easy to integrate
- Factory calibrated in wide temperature range:
-40 to 125 °C for sensor temperature and
-70 to 380 °C for object temperature.
- High accuracy of 0.5°C over wide temperature range (0..+50°C for both Ta and To)
- High (medical) accuracy calibration
- Measurement resolution of 0.02°C
- Single and dual zone versions
- SMBus compatible digital interface
- Customizable PWM output for continuous reading
- Available in 3V and 5V versions
- Simple adaptation for 8 to 16V applications
- Power saving mode
- Different package options for applications and measurements versatility
- Automotive grade

Applications Examples

- High precision non-contact temperature measurements;
- Thermal Comfort sensor for Mobile Air Conditioning control system;
- Temperature sensing element for residential, commercial and industrial building air conditioning;
- Windshield defogging;
- Automotive blind angle detection;
- Industrial temperature control of moving parts;
- Temperature control in printers and copiers;
- Home appliances with temperature control;
- Healthcare;
- Livestock monitoring;
- Movement detection;
- Multiple zone temperature control – up to 100 sensors can be read via common 2 wires
- Thermal relay/alert
- Body temperature measurement

Ordering Information



Part No.
MLX90614

Temperature Code
E (-40°C to 85°C)
K (-40°C to 125°C)

Package Code
SF (TO-39)

- Option Code
- X X X
(1) (2) (3)

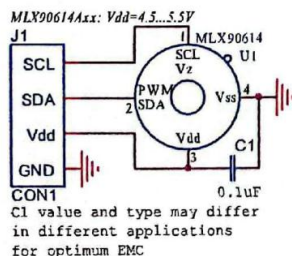
(1) Supply Voltage/
Accuracy
A - 5V
B - 3V
C - Reserved
D - 3V medical accuracy

(2) Number of thermopiles:
A – single zone
B – dual zone

(3) Package options:
A – Standard package
B – Reserved
C – 35° FOV

Example:
MLX90614ESF-BAA

1 Functional diagram



MLX90614 connection to SMBus

Figure 1 Typical application schematics

2 General Description

The MLX90614 is an Infra Red thermometer for non contact temperature measurements. Both the IR sensitive thermopile detector chip and the signal conditioning ASSP are integrated in the same TO-39 can.

Thanks to its low noise amplifier, 17-bit ADC and powerful DSP unit, a high accuracy and resolution of the thermometer is achieved.

The thermometer comes factory calibrated with a digital PWM and SMBus (System Management Bus) output.

As a standard, the 10-bit PWM is configured to continuously transmit the measured temperature in range of -20 to 120 °C, with an output resolution of 0.14 °C and the POR default is SMBus.

General description (continued)

The MLX90614 is built from 2 chips developed and manufactured by Melexis:

- The Infra Red thermopile detector MLX81101
- The signal conditioning ASSP MLX90302, specially designed to process the output of IR sensor.

The device is available in an industry standard TO-39 package.

Thanks to the low noise amplifier, high resolution 17-bit ADC and powerful DSP unit of MLX90302 high accuracy and resolution of the thermometer is achieved. The calculated object and ambient temperatures are available in RAM of MLX90302 with resolution of 0.01 °C. They are accessible by 2 wire serial SMBus compatible protocol (0.02°C resolution) or via 10-bit PWM (Pulse Width Modulated) output of the device.

The MLX90614 is factory calibrated in wide temperature ranges: -40 to 125 °C for the ambient temperature and -70 to 382.2 °C for the object temperature. The 10-bit PWM is as a standard configured to transmit continuously the measured object temperature for an object temperature range of -20 to 120 °C with an output resolution of 0.14 °C. The PWM can be easily customized for virtually any range desired by the customer by changing the content of 2 EEPROM cells. This has no effect on the factory calibration of the device.

The PWM pin can also be configured to act as a thermal relay (input is T_o), thus allowing for an easy and cost effective implementation in thermostats or temperature (freezing/boiling) alert applications. The temperature threshold is user programmable. In an SMBus system this feature can act as a processor interrupt that can trigger reading all slaves on the bus and to determine the precise condition.

As a standard, the MLX90614 is calibrated for an object emissivity of 1. It can be easily customized by the customer for any other emissivity in the range 0.1-1.0 without the need of recalibration with a black body.

The thermometer is available in 2 supply voltage options: 5V compatible or 3V (battery) compatible. The 5V can be easily adopted to operate from a higher supply voltage (8-16V, for example) by use of few external components (refer to "Applications information" section for details).

An optical filter (long-wave pass) that cuts off the visible and near infra-red radiant flux is integrated in the package to provide sunlight immunity.

Proximity Sensor/Switch E18-D80NK



Description

A very cheap, easy to assemble, easy to use Infrared sensor with a long detection distance and has less interference by visible light. The implementations of modulated IR signal immune the sensor to the interferences caused by the normal light of a light bulb or the sun light. This sensor has a screwdriver adjustment to set the appropriate detected distance to make it useful in many applications, and then gives a digital output when it senses something within that

range. This sensor does not measure a distance value. It can be used for collision avoidance robot and machine automation. The sensor provides a non-contact detection.

Specifications

- Input voltage : +5V DC
- Current consumption : > 25mA (min) ~ 100mA (max)
- Dimension : 1.7cm (diameter) x 4.5cm (length)
- Cable length : 45cm
- Detection of objects : transparent or opaque
- Diffuse reflective type
- Sensing range : 3cm to 80cm (depends on obstacle surface)
- NPN output (normally high)
- Environment temperature : -25 °C ~ 55 °C

Pin Configuration

- Red wire : **+5V**
- Green wire : **GND**
- Yellow wire : **DIGITAL OUTPUT**

PRODUCT SPECIFICATION

PCB JQC-T73

- 10A switching capability
- Small footprint
- Sealed type available
- Class B/F available
- Conform to RoHS,ELV directive
- Size : 19.2X15.4X15.4mm



ORDERING CODE

JQC-3FF-S-H 1 2 3	
1. Relay Model JQC-T73 2. S: sealed	3. Z: Form C H: Form A D: Form B

COIL DATA (at 20 °C)

Nominal Voltage (VDC)	3	5	6	9	12	18	24	48	0.35W
Coil Resistance ($\Omega \pm 10\%$)	25	69	100	225	400	900	1600	6400	
Rated Current (mA)	120	71.4	60	40	30	20	15	7.5	
Max Operate Voltage (VDC)	2.25	3.75	4.5	6.75	9	13.5	18	36	
Min Release Voltage (VDC)	0.15	0.25	0.3	0.45	0.6	0.9	1.2	2.4	
Max Applicable Voltage	130% of nominal voltage at 70 °C 170% of nominal voltage at 23 °C								

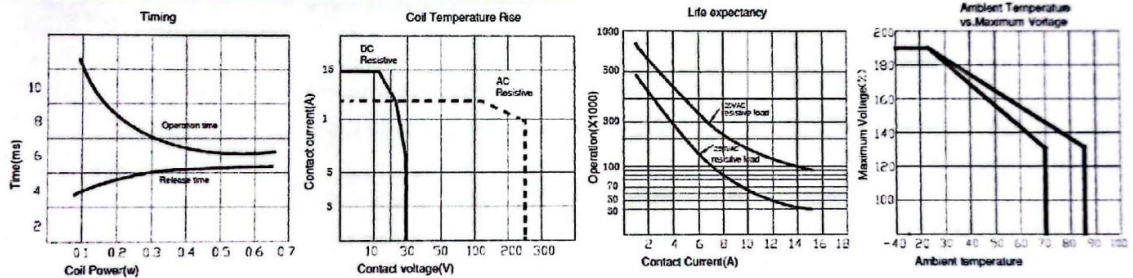
CONTACT DATA

Contact Form	1H/1Z
Contact Material	Silver Alloy
Load	Resistive load(COS ϕ = 1)
Contact Ratings	10A 250vac 15A 125vac 10A 28vdc
Minimum load	100mA 5VDC
Max Switching Voltage	250VAC/30VDC
Max Switching Current	15A
Max Switching Power	2770VA/240W
Contact Resistance	100m Ω Max at 6VDC 1A
Life Expectancy	Electrical : 100,000 Operations(at30Operations/minute)
	Mechanical : 10,000,000 Operations(at300Operations/minute)

CHARACTERISTICS DATA

Insulation Resistance	100MΩmin at 500VDC
Dielectric Strength Between Open Contacts	750VAC(50/60Hz for one minute)
Between Contacts and coil	1500VAC(50/60Hz for one minute)
Operate Time	10ms
Release Time	5ms
Temperature Range	-40 °C to +85 °C
Shock Resistance	Operating Extremes: 10G
	Damage Limits: 100G
Vibration Resistance	10-55Hz, 1.5mm
Max. switching frequency	Mechanical: 18,000 operations/hr
	Electrical: 1,800 operations/hr
Humidity	40-85%
Weight	Approx 10g
Safety Standard	CQC UL SGS TUV

ENGINEERING DATA



OVERALL AND MOUNTING DIMENSIONS

