# PENERAPAN ALGORITMA SEKUENSIAL PADA PENYIRAMAN TANAMAN OTOMATIS BERBASIS ARDUINO UNO R3

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**SKRIPSI**

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

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Menyatakan bahwa skripsi dengan judul skripsi "**Penerapan Algoritma Sekuensial Pada Penyiraman Tanaman Otomatis Berbasis Arduino Uno R3**" 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.

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# KATA PENGANTAR

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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Penulis

Suaibatul Aslamiah Ritonga
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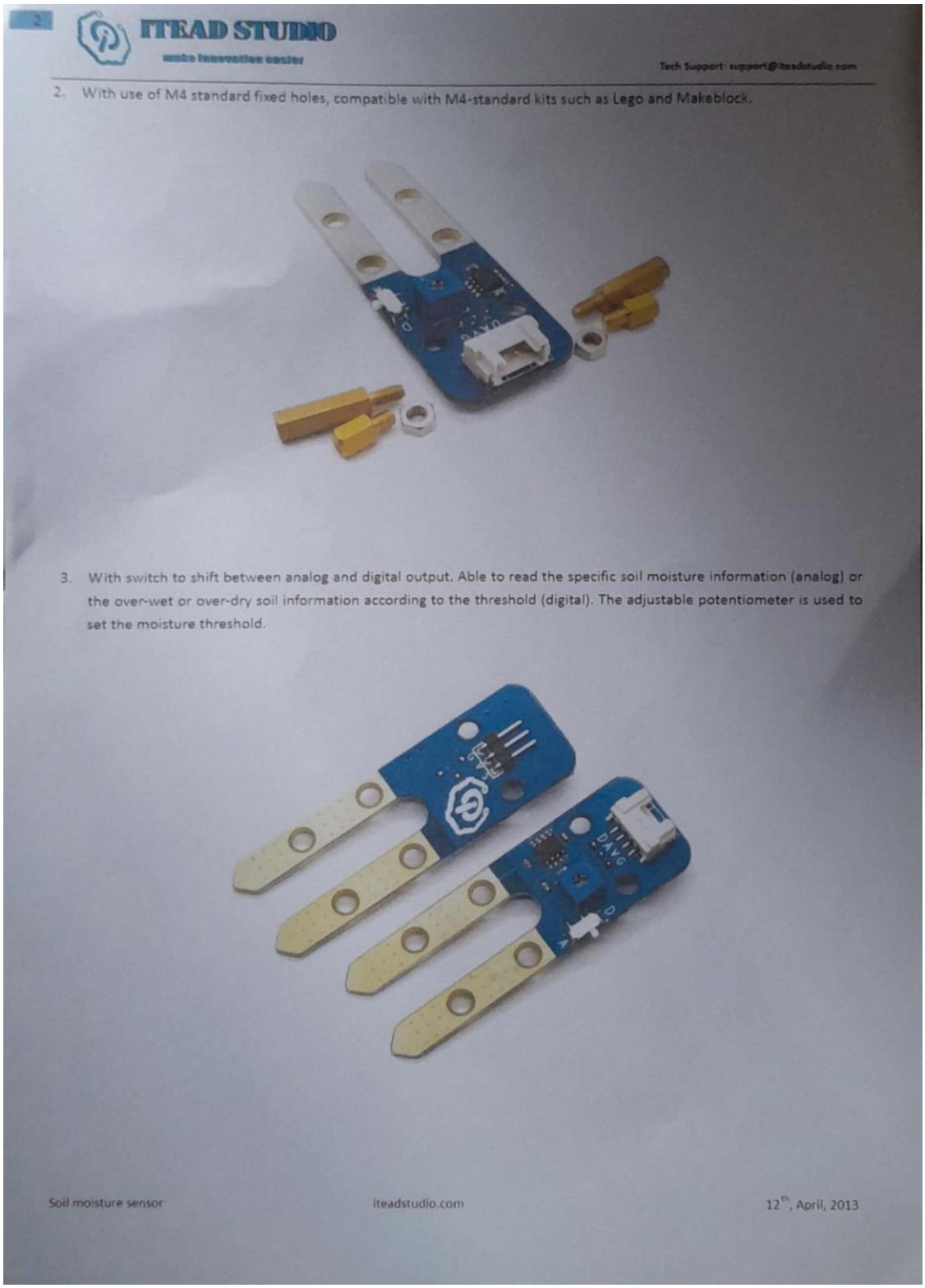
```
#define sensor1 A1
#define sensor2 A2
#define pompa_1 A3
#define pompa_2 A4

int data_S1, data_S2;

int kering = 1000;
int lembab = 500;
int basah = 380;

int waktu_proses_1;
int waktu_proses_2;

void setup() {
  Serial.begin(9600);
  pinMode(sensor1, INPUT);
  pinMode(sensor1, INPUT);
  pinMode(pompa_1, OUTPUT);
  pinMode(pompa_2, OUTPUT);

  digitalWrite(pompa_1, HIGH);
```

```
  digitalWrite(pompa_2, HIGH);


}

void loop() {
  data_S1 = analogRead(sensor1);
  data_S2 = analogRead(sensor2);

  if(data_S1 >= kering){
    waktu_proses_1 = 5;
  }
  else if(data_S1 > basah && data_S1 < kering){
    waktu_proses_1 = 3;
  }
  else{
    waktu_proses_1 = 0;
  }

  if(data_S2 >= kering){
    waktu_proses_2 = 5;
  }
  else if(data_S2 > basah && data_S2 < kering){
```

```
  waktu_proses_2 = 3;
}
else{
  waktu_proses_2 = 0;
}

Serial.println(waktu_proses_1);
if(waktu_proses_1 >0){
  for(int a=0; a<waktu_proses_1; a++){
    digitalWrite(pompa_1, LOW);
    delay(1000);
  }
}
else{
  digitalWrite(pompa_1, HIGH);
}

if(waktu_proses_2 >0){
  for(int a=0; a<waktu_proses_2; a++){
    digitalWrite(pompa_2, LOW);
    delay(1000);
  }
```

```
  }
  else{
    digitalWrite(pompa_2, HIGH);
  }
  Serial.println("ADC 1 = "+String(data_S1));
  Serial.println("ADC 2 = "+String(data_S2));

  delay(200);

}
```

DATA SHEET SENSOR KELEMBABAN



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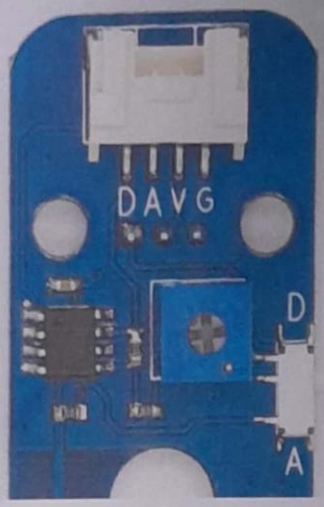
4. With hysteresis comparator circuit for more stable digital output voltage.




## Specifications

| | |
|---|---|
| PCB size | 71.65mm X 24.00mm X 1.6mm |
| Working voltage | 3.3or 5V DC |
| Operating voltage | 3.3 or 5V DC |
| Compatible interfaces | 2.54 3-pin interface and 4-pin Grove interface[1][2] |

*Note 1 : D for digital output port, A for analog output port, S for analog/digital output port ( defined according to the switch), V and G for voltage at the common collector and ground respectively*

*Note 2 : When setting as analog output, output range is 0-3.3V or 0-5V according to the working voltage; when setting as digital output, output is 0/3.3V or 0/5V according to the working voltage.*

## Electrical characteristics

| Parameter | Min | Typical | Max | Unit |
|---|---|---|---|---|
| Working voltage | 2.1 | 5 | 5.5 | VDC |
| Analog output voltage ( VCC=5V ) | 0 | Vout | 5 | V |
| Digital output voltage ( VCC=5V ) | 0 | - | 5 | V |
| Working current ( VCC=5V ) | - | 5 | - | mA |
| Threshold hysteresis ΔUth | - | VCC*0.09 | - | V |

# Soil Moisture Sensor

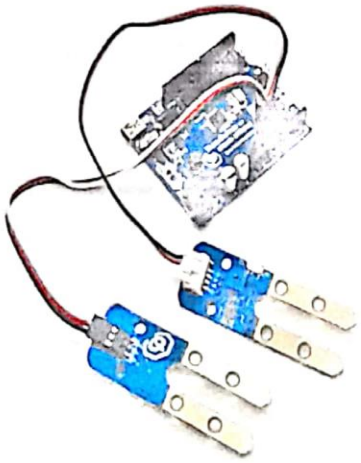
## Overview

What is an electronic brick? An electronic brick is an electronic module which can be assembled like Lego bricks simply by plugging in and pulling out. Compared to traditional universal boards and circuit modules assembled with various electronic components, electronic brick has standardized interfaces, plug and play, simplifying construction of prototype circuit on one' s own. There are many types of electronic bricks, and we provide more than twenty types with different functions including buttons, sensors, Bluetooth modules, etc, whose functions cover from sensor to motor drive, from Ethernet to wireless communication via Bluetooth, and so on. We will continue to add more types to meet the various needs of different projects.

Electronic brick of soil moisture sensor is mainly used to detect the moisture content in the soil. The control board can get the moisture value or threshold in the soil via analog or digital pins.

## Features

1. Plug and play, easy to use. Compatible with the mainstream 2.54 interfaces and 4-Pin Grove interfaces in the market.



DATA SHEET RELAY

Relay

Melexis
Microelectronic Integrated Systems

# MLX90614 family

***Single and Dual Zone***
***Infra Red Thermometer in TO-39***

## 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. | Temperature Code | Package Code | - Option Code |
|---|---|---|---|
| MLX90614 | E (-40°C to 85°C)<br>K (-40°C to 125°C) | SF (TO-39) | - X X X<br>(1) (2) (3) |

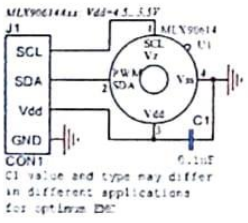
(1) Supply Voltage/ Acccuracy
- A - 5V
- B - 3V
- C - Reserved
- D - 3V medical accuracy

(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 To), 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.

## 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 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.
Revision 3 of the board has the following new features:

- 1.0 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 IOREF 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-Rev3-reference-design.zip (NOTE: works with Eagle 6.0 and newer)
Schematic: arduino-uno-Rev3-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.

**Data Sheet regulator LM2596**

# 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 $D^2PAK$ surface mount package.

The other features include a guaranteed ±4% tolerance on output voltage within specified input voltages and output load conditions, and ±15% on the oscillator frequency. External shutdown is included, featuring 80 μA (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 μA
- 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

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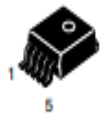
**TO−220**
**TV SUFFIX**
**CASE 314B**

Heatsink surface connected to Pin 3


**TO−220**
**T SUFFIX**
**CASE 314D**

Pin 1. $V_{in}$
2. Output
3. Ground
4. Feedback
5. $\overline{ON}$/OFF




**$D^2PAK$**
**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.

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**S U R A T – K E P U T U S A N**
**Nomor : 05 /UISU/KPSTIK/II/2022**

**Tentang**
**TUGAS SKRIPSI MAHASISWA**

Memperhatikan :1. Kemajuan studi mahasiswa

**Nama : SUAIBATUL ASLAMIAH RITONGA**
**NPM : 71180915030**

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 Algortima Skuensial Pada Sistem Penyiraman Tanaman Otomatis Berbasis Mikrokontroller Arduino Uno R3 "**

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

**M E M U T U S K A N**

Menetapkan : 1. Merekomendasikan kepada mahasiswa tersebut diatas untuk melaksanakan Tugas Skripsi.

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

a.Pembimbing I : **Dr. Syahwin, M.Si**
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 **23 Februari s/d 23 Juli 2022**

4. Bilamana dikemudian hari ternyata ada kekeliruan dalam penetapan ini, akan diperbaiki sebagaimana mestinya.

Ditetapkan: **M e d a n**
Pada Tanggal: **23 Februari 2022**
Ketua Program Studi,

**Mhd. Zulfansyuri Siambaton,ST, M.Kom**

Tembusan:
1. Dosen Pembimbing
2. Mahasiswa ybs.
3. Pertinggal

# KARTU BIMBINGAN SKRIPSI

**NAMA** : **SUAIBATUL ASLAMIAH RITONGA**

**N P M** : **71180915030**

**JUDUL** : **Penerapan Algortima Skuensial Pada Sistem**

**SKRIPSI** **Penyiraman Tanaman Otomatis Berbasis**

**Mikrokontroller Arduino Uno R3**

**DOSEN PEMBIMBING I** : **Dr. Syahwin, M.Si**

| NO | HARI/TANGGAL | CATATAN | PARAF |
|---|---|---|---|
| 1 | Selasa 22/02/2022 | Pengerahan SK Pembimbing konsul fasi dan acc judul | |
| 2 | Selasa 01/03/2022 | Bab I Ok lanjut Bab II | |
| 3 | Jumat 11/03/2022 | Revisi Bab II lanjut Bab III | |
| 4 | Senin 21/03/2022 | Bab III Revisi penulisan | |
| 5 | Rabu 06/04/2022 | Bab III Ok lanjut Bab IV.V | |
| 6 | Rabu 08/06/2022 | Bab IV, Bab V Revisi | |
| 7 | | acc seminar | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

Medan, 2022

Dosen Pembimbing I,

(Dr. Syahwin, M.Si)

# KARTU BIMBINGAN SKRIPSI

**NAMA** : **SUAIBATUL ASLAMIAH RITONGA**

**N P M** : **71180915030**

**JUDUL** : **Penerapan Algortima Skuensial Pada Sistem**

**SKRIPSI** **Penyiraman Tanaman Otomatis Berbasis**

**Mikrokontroller Arduino Uno R3**

**DOSEN PEMBIMBING II** : **Tasliyah Haramaini, S.Si, M.Kom**

| NO | HARI/TANGGAL | CATATAN | PARAF |
|---|---|---|---|
| 1 | Senin /14-03-2022 | Revisi Bab I | |
| 2 | Kamis /17-03-2022 | Acc Bab I, Revisi Bab II | |
| 3 | Senin /21-03-2022 | Acc Bab II | |
| 4 | Rabu, 03-3-2022 | Revisi Bab III | |
| 5 | Kamis, 07-04-2022 | Acc Bab III, Revisi Bab IV | |
| 6 | Senin /23 Mei /22 | Acc Bab IV, Revisi Bab V | |
| 7 | Kamis /2 Juni /22 | Acc Bab V, Revisi. D. Pustaka | |
| 8 | Senin /20 Juni /22 | D. Pustaka (Acc), Siap u/ Seminar | |
| 9 | | | |
| 10 | | | |

Medan, 20 Juni 2022

Dosen Pembimbing II,

(Tasliyah Haramaini, S.Si, M.Kom)

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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 :

| | |
|---|---|
| **N A M A** | **: SUAIBATUL ASLAMIAH RITONGA** |
| **NPM** | **: 71180915030** |
| **PROGRAM STUDI** | **: TEKNIK INFORMATIKA** |
| **JUDUL SKRIPSI** | **: Penerapan Algortima Sekuensial Pada Penyiraman Tanaman Otomatis Berbasis Arduino Uno R3** |
| **Dosen Pembimbing** | **: 1. Dr. Syahwin, M.Si** |
| | **: 2. Tasliyah Haramaini, S.Si, M.Kom** |
| **Dosen Pembanding** | **: 1. Khairuddin Nasution, ST, M.Kom** |
| | **: 2. Heri Santoso, S.Kom, M.Kom** |
| | **: 3. Mhd. Zulfansyuri Siambaton, ST, 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 skripsi sesuai pandua.
2. Bab IV perbaiki hasil pengujian (Tabel)
3. .....
4. .....
5. .....

ACC Selesai
12/07-2022

**Medan, 05 Juli 2022**
**Pembanding III,**

**Mhd. Zulfansyuri Siambaton, ST, M.Kom**

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| **PROGRAM STUDI** | **: TEKNIK INFORMATIKA** |
| **JUDUL SKRIPSI** | **: Penerapan Algortima Sekuensial Pada Penyiraman Tanaman Otomatis Berbasis Arduino Uno R3** |

**Dosen Pembimbing** : **1. Dr. Syahwin, M.Si**
: **2. Tasliyah Haramaini, S.Si, M.Kom**

**Dosen Pembanding** : **1. Khairuddin Nasution, ST, M.Kom**
: **2. Heri Santoso, S.Kom, M.Kom**
: **3. Mhd. Zulfansyuri Siambaton, ST, 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. Latar belakang cerita. Keyword disingkat
2. Latar belakang kasi contoh kasus.
3. Metode penelitian buat apa tempat dan capturing data.
4. penelitian terdahulu.
5.

**Medan, 05 Juli 2022**
**Pembanding II,**

**Heri Santoso, S.Kom, M.Kom**

15/7/2022.

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|---|---|
| **N A M A** | **: SUAIBATUL ASLAMIAH RITONGA** |
| **NPM** | **: 71180915030** |
| **PROGRAM STUDI** | **: TEKNIK INFORMATIKA** |
| **JUDUL SKRIPSI** | **: Penerapan Algortima Sekuensial Pada Penyiraman Tanaman Otomatis Berbasis Arduino Uno R3** |
| **Dosen Pembimbing** | **: 1. Dr. Syahwin, M.Si** |
| | **: 2. Tasliyah Haramaini, S.Si, M.Kom** |
| **Dosen Pembanding** | **: 1. Khairuddin Nasution, ST, M.Kom** |
| | **: 2. Heri Santoso, S.Kom, M.Kom** |
| | **: 3. Mhd. Zulfansyuri Siambaton, ST, 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 kesalahan ketika.
2. Pahami HS metode Sequential
3. .....
4. .....
5. .....

**Medan, 05 Juli 2022**

**Pembanding I,**

**Khairuddin Nasution, ST, M.Kom**