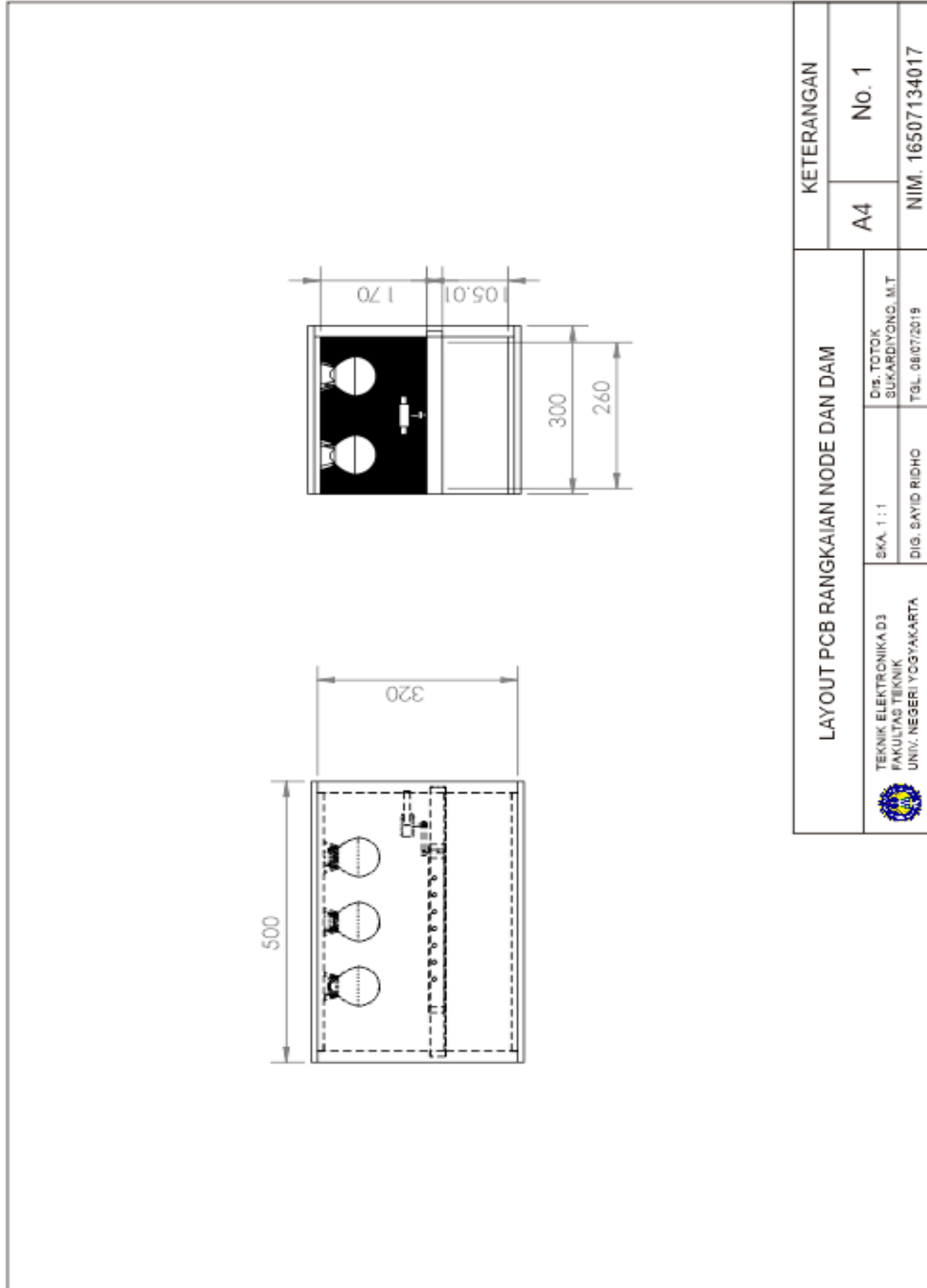


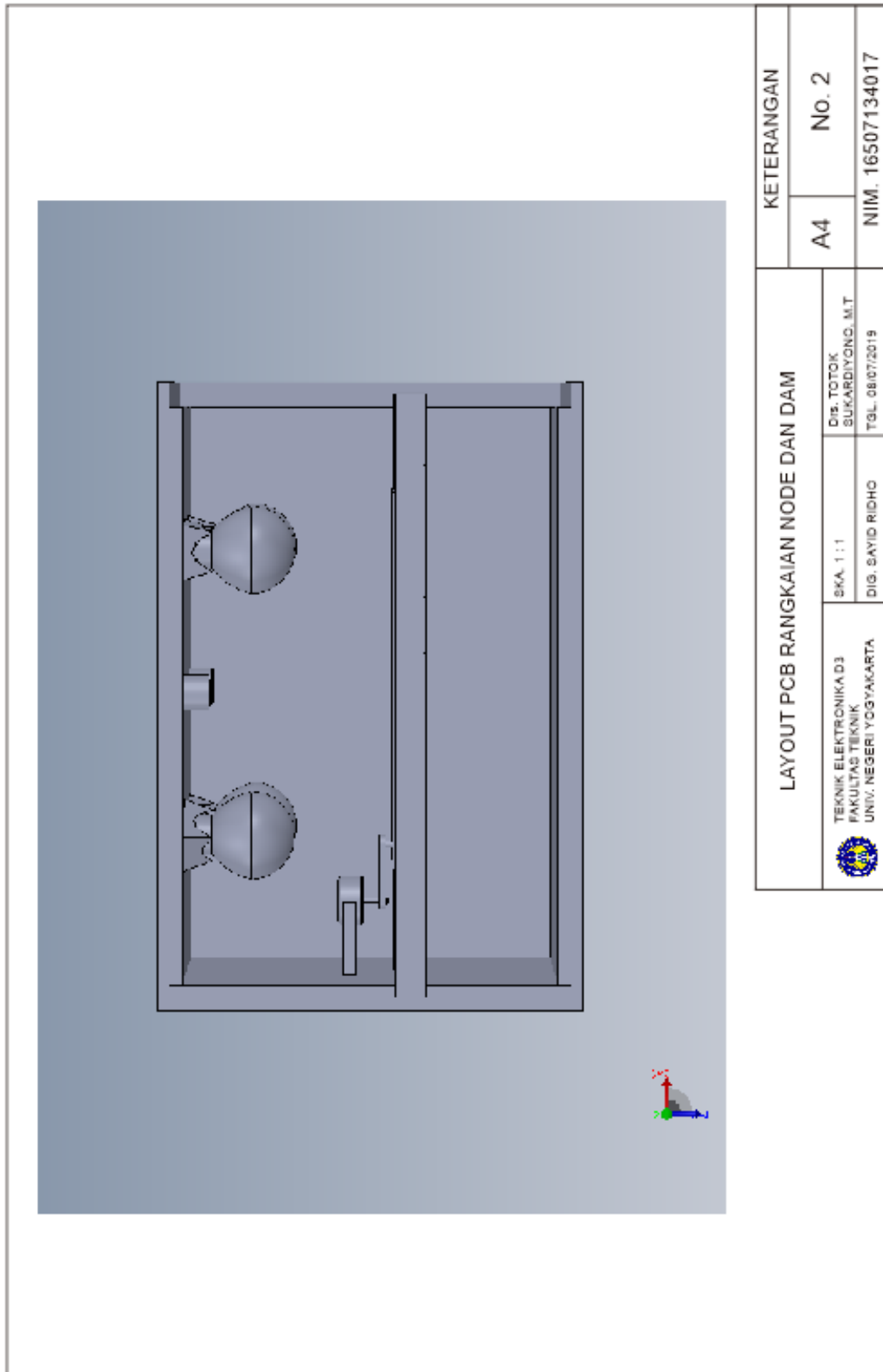
## **LAMPIRAN**

## Lampiran 1. Desain Rancangan Box



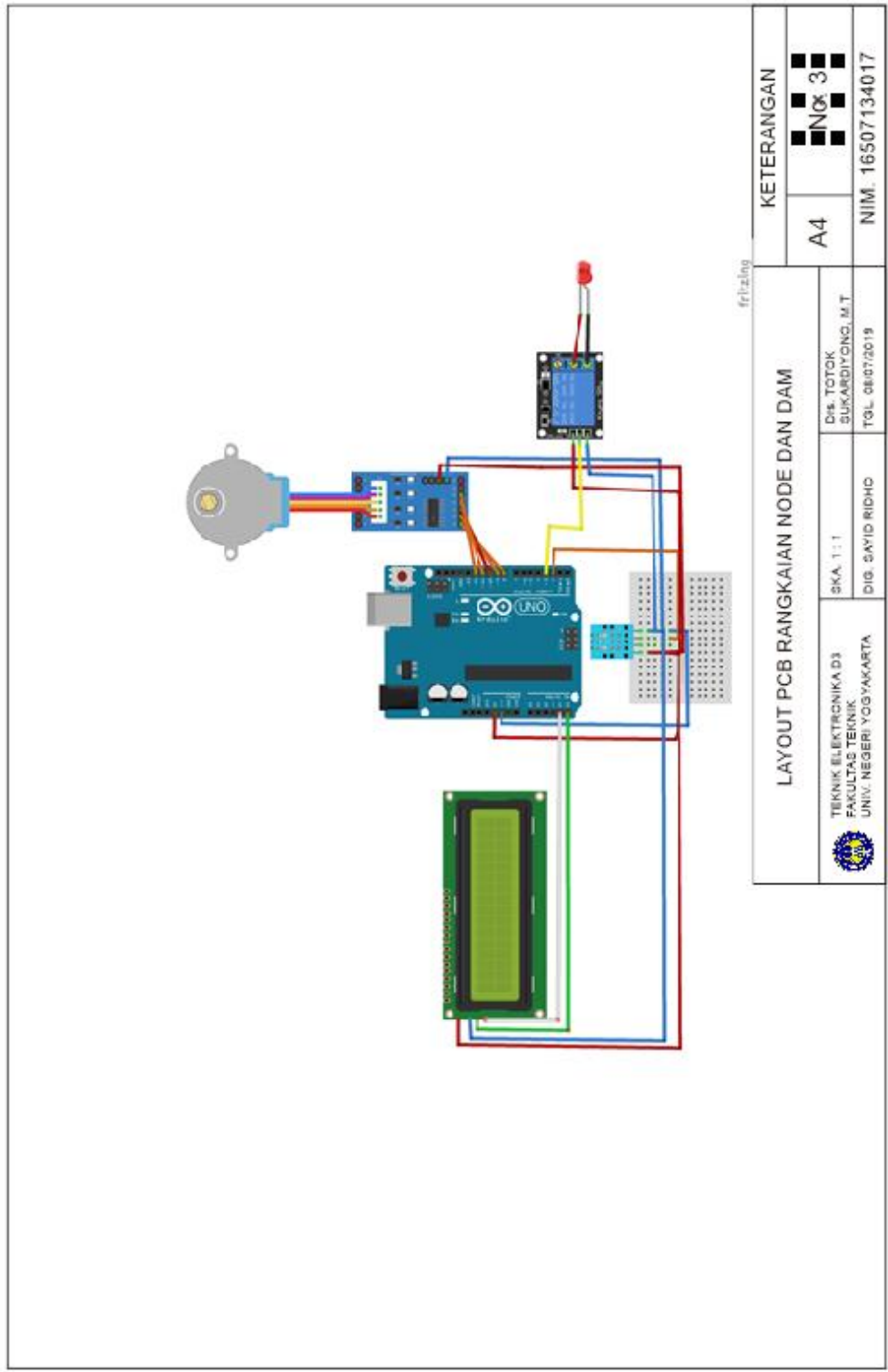
KETERANGAN	
A4	No. 1
<p><b>LAYOUT PCB RANGKAIAN NODE DAN DAM</b></p>	
<p>TEKNIK ELEKTRONIKA D3 FAKULTAS TEKNIK UNIV. NEGERI YOGYAKARTA</p> 	<p>SKA. 1 : 1 DIG. SAYID RIDHO</p>
<p>Drs. TOTOK BUKARDIYONO, M.T.</p>	<p>Tgl. 08/07/2019</p>
<p>NIM. 16507134017</p>	

## Lampiran 2. Desain Box Tampak depan




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		A4	No. 2
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SKA. 1 : 1 DIG. SAYID RIDHO			

### Lampiran 3. Rangkaian Komponen

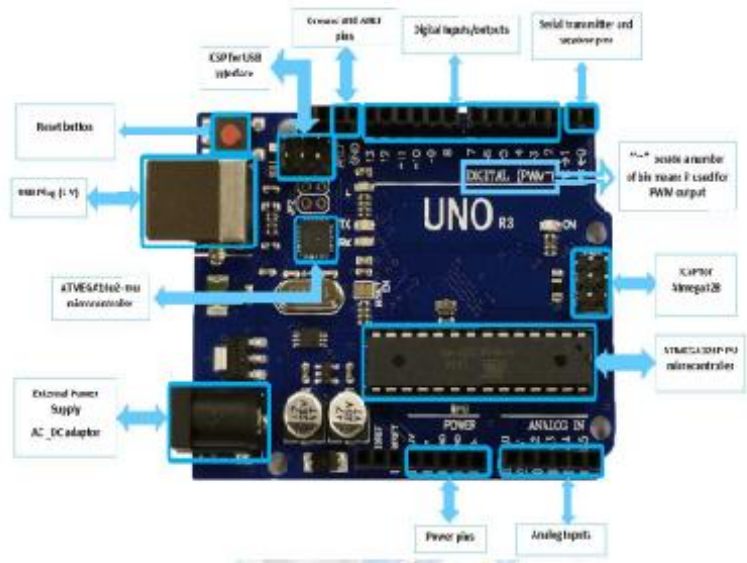


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## Lampiran 4. Data Sheet Arduino Uno R3




**Arduino Uno R3**



**INTRODUCTION**

Arduino is used for building different types of electronic circuits easily using of both a physical programmable circuit board usually microcontroller and piece of code running on computer with USB connection between the computer and Arduino.

Programming language used in Arduino is just a simplified version of C++ that can easily replace thousands of wires with words.

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NO. 4		NIM. 16507134017



### ARDUINO UNO-R3 PHYSICAL COMPONENTS

#### ATMEGA328P-PU microcontroller

The most important element in Arduino Uno R3 is ATMEGA328P-PU is an 8-bit Microcontroller with flash memory reach to 32k bytes. It's features as follow:

- **High Performance, Low Power AVR**

- **Advanced RISC Architecture**

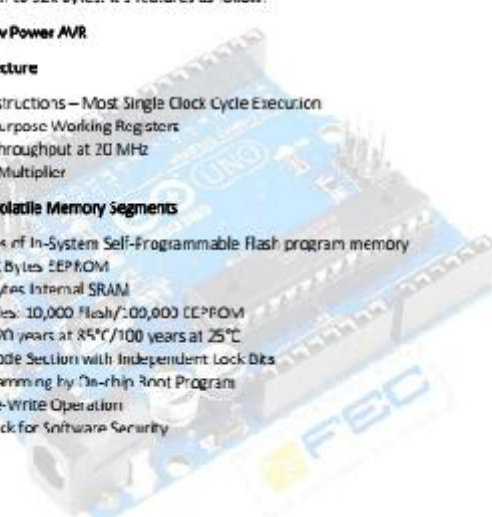
- 131 Powerful Instructions – Most Single Clock Cycle Execution
- 32 x 8 General Purpose Working Registers
- Up to 20 MIPS Throughput at 20 MHz
- On-chip 2-cycle Multiplier

- **High Endurance Non-volatile Memory Segments**

- 4K/16/32K Bytes of In-System Self-Programmable Flash program memory
- 256/512/512/1K Bytes EEPROM
- 512/1K/1K/2K Bytes Internal SRAM
- Write/Erase Cycles: 10,000 Flash/100,000 EEPROM
- Data retention: 20 years at 85°C/100 years at 25°C
- Optional BOOT Loader Section with Independent Lock Bits
- In-System Programming by On-chip Boot Program
- True Read-While-Write Operation
- Programming Lock for Software Security

- **Peripheral Features**

- Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
- One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
- Real Time Counter with Separate Oscillator
- Six PWM Channels
- 8-channel 10-bit ADC in TQFP and QFN/MLF package
- Temperature Measurement
- 6-channel 10-bit ADC in PDIP Package
- Temperature Measurement
- Programmable Serial USART



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DIB. SAVID RICHDO	TGL. 08/07/2019	
KETERANGAN		NIM. 16507134017
A4	NO. 4	



- o Master/Slave SPI Serial Interface
- o Byte-oriented 2-wire Serial Interface (Philips I2 C compatible)
- o Programmable Watchdog Timer with Separate On-chip Oscillator
- o On-chip Analog Comparator
- o Interrupt and Wake-up on Pin Change

• **Special Microcontroller Features**

- o Power-on Reset and Programmable Brown-out Detection
- o Internal Calibrated Oscillator
- o External and Internal Interrupt Sources
- o Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby

• **I/O and Packages**

- o 23 Programmable I/O Lines
- o 28-pin PDIP, 32-lead TQFP, 28-pad QFN/MLF and 32 pad QFN/MLF

• **Operating Voltage:**

- o 1.8 - 5.5V

• **Temperature Range:**

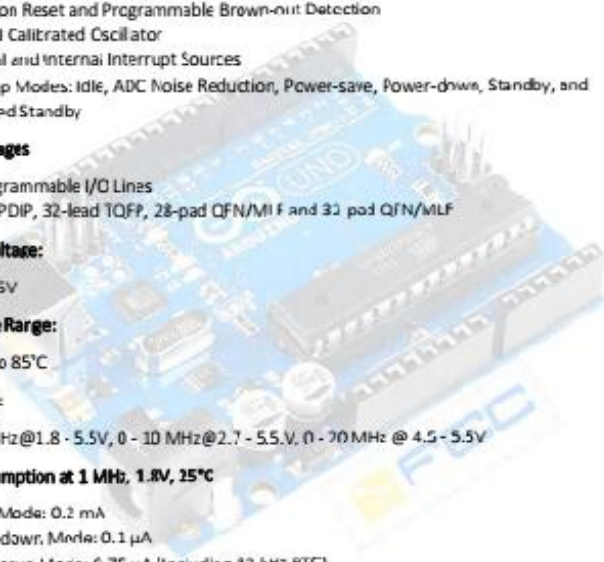
- o -40°C to 85°C


• **Speed Grade:**

- o 0 - 4 MHz@1.8 - 5.5V, 0 - 10 MHz@2.7 - 5.5.V, 0 - 20 MHz @ 4.5 - 5.5V

• **Power Consumption at 1 MHz, 1.8V, 25°C**

- o Active Mode: 0.2 mA
- o Power-down, Min: 0.1 µA
- o Power-save Mode: 0.75 µA (Including 32 kHz RTC)



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	Drs. TOTOK SUKARDIYONO, M.T	TGL. 08/07/2019
KETERANGAN		
A4	NO. 4	NIM. 16507134017

## Lampiran 5. List Program

<pre>#include &lt;LiquidCrystal_I2C.h&gt; #include "DHT.h" LiquidCrystal_I2C lcd(0x27, 16, 2); #define DHTPIN 2 #define DHTTYPE DHT11 DHT dht(DHTPIN, DHTTYPE); #include &lt;Stepper.h&gt; #define STEPSMOTOR 32 #define STEPSOUTPUT 32*64 Stepper motorku(STEPSMOTOR,8,10,9,11); int Berputar; const int lampu1 = 3; const int lampu2 = 4; const int lampu3 = 5; const int lampu4 = 6; #define suhuon 11 #define suhuoff 12 void setup() {   pinMode(lampu1,OUTPUT);   pinMode(lampu2,OUTPUT);   pinMode(lampu3,OUTPUT);   pinMode(lampu4,OUTPUT);   Serial.begin(9600);   Serial.println("DHT11 test!");   dht.begin();   lcd.begin();   lcd.backlight();</pre>	<pre>digitalWrite(lampu4,LOW); } else if (t&gt;40)//OFF {   digitalWrite(lampu1,HIGH);   digitalWrite(lampu2,LOW);   digitalWrite(lampu3,LOW);   digitalWrite(lampu4,LOW); } Serial.print("Humidity: "); Serial.print(h); Serial.print(" %t"); Serial.print("Temperature: "); Serial.print(t); Serial.println(" *C"); lcd.setCursor(0,0); lcd.print("Humi: "); lcd.print(h); lcd.print(" % "); lcd.setCursor(0,1); lcd.print("Temp: "); lcd.print(t); lcd.print(" C "); }</pre>
---	---



```

lcd.setCursor(0,0);
lcd.print("ALAT PENETAS");
lcd.setCursor(0,1);
lcd.print("TELUR OTOMATIS");
delay(5000);
lcd.clear();
lcd.setCursor(2,0);
lcd.print("(TUGAS AKHIR)");
lcd.setCursor(2,1);
lcd.print("SAYYID RIDHO");
delay(5000);
lcd.clear();
}
void loop() {
    float h = dht.readHumidity();
    float t = dht.readTemperature();
    if (isnan(t) || isnan(h)) {
        Serial.println("Failed to read from
DHT");
        Berputar=STEPSOUTPUT*2;
        motorku.setSpeed(100);
        motorku.step(Berputar);
        delay(28800000);
        return; }
    if (t<38)// ON
    {
        digitalWrite(lampu1,LOW);
        digitalWrite(lampu2,LOW);
        digitalWrite(lampu3,LOW);

```

## Lampiran 6. Brosur Alat Penetas Telur Otomatis

### PRINSIP KERJA

Prinsip kerja dari alat pemeras telur ini adalah dengan menggunakan kestabilan suhu dan kelembaban ruangan, dan dengan rak geser telur otomatis. Dengan sistem otomatis yang dikendalikan oleh mikrokontroler Arduino uno.

Arduino merupakan sebuah board minimum system mikrokontroler yang bersifat open source dengan seri ATmega 328.

### ALAT PENETAS TELUR OTOMATIS BERBASIS MIKROKONTROLER



### CARA PENGOPRASIAN

1. Sebelum mengoperasikan atau menggunakan mesin tetas, pastikan mesin dalam keadaan steril bebas dari bakteri.
2. Hidupkan arduino ke sumber menggunakan adaptor, agar mikrokontroler dan sensor suhu dapat bekerja dengan sesuai yang diharuskan.
3. Siapkan air di dalam bak yang tersedia untuk dapat menstabilkan suhu dan kelembaban ruangan.
4. Diambil alat penetas dalam waktu 30 menit, untuk dapat mendapatkan suhu yang ideal.
5. Siapkan telur yang akan ditetaskan.
6. Rak telur akan bergeser selama 3 hari sekali secara otomatis.

### D3 TEKNIK ELEKTRONIKA PENDIDIKAN TEKNIK ELEKTROMIKA DAN INFORMATIKA FAKULTAS TEKNIK UNY





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			NIM. 16507134017
			Dis. TOTOK BUKARDIYONO, M.T TGL 08/07/2019.

## Lampiran 7. Data Sheet DHT11

### Digital-output relative humidity & temperature sensor/module – DHT11



Resistive-type humidity and temperature module/sensor

#### 1. Feature & Application:

- Full range temperature compensated
- Calibrated digital signal
- Long transmission distance
- Relative humidity and temperature measurement
- Outstanding long-term stability
- Low power consumption
- Extra components not needed
- \*4 pins packaged and fully interchangeable

#### 2. Description:

DHT11 output calibrated digital signal. It utilizes exclusive digital-signal-collecting-technique and humidity sensing technology, assuring its reliability and stability. Its sensing elements is connected with 8-bit single-chip computer.

Every sensor of this model is temperature compensated and calibrated in accurate calibration chamber and the calibration-coefficient is saved in OTP memory.

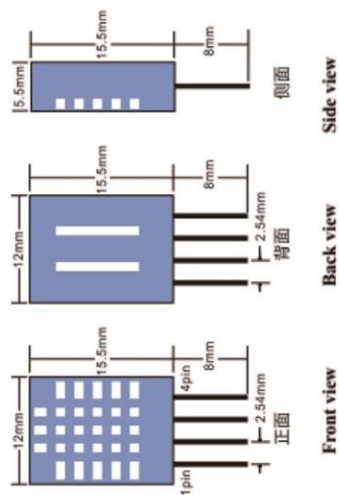
Small size & low consumption & long transmission distance(20m) enable DHT11 to be suited in all kinds of harsh application occasions. Single-row packaged with four pins, making the connection very convenient.


LAYOUT PCB RANGKAIAN NODE DAN DAM		KETERANGAN	
		A4	No. 7
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	DIG. SAYID RIDHO	NIM. 16507134017	

3. Technical Specification:

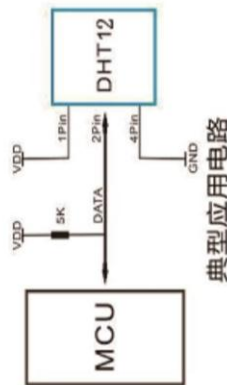
Model	DHT11
Power supply	3-5.5V DC
Output signal	digital signal via single-bus
Sensing element	Polymer resistor
Measuring range	humidity 20-90%RH; temperature 0-50 Celsius
Accuracy	humidity $\pm 4\%$ RH (Max $\pm 5\%$ RH); temperature $\pm 2.0$ Celsius
Resolution	humidity 1%RH; or temperature 0.1 Celsius
Repeatability	humidity $\pm 1\%$ RH; temperature $\pm 1$ Celsius
Humidity hysteresis	$\pm 1\%$ RH
Long-term Stability	$\pm 0.5\%$ RH/year
Sensing period	Average: 2s
Interchangeability	fully interchangeable
Dimensions	size 12*15.5*5.5mm

4. Dimensions: (unit----mm)



LAYOUT PCB RANGKAIAN NODE DAN DAM		KETERANGAN	
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		NIM. 16507134017	

### 5. Typical application



### 3Pin-NULL, MCU=Microcomputer or single-chip computer

### 6. Operating specifications:

#### (1) Power and Pins

Power's voltage should be 3-5.5V DC. When power is supplied to sensor, don't send any instruction to the sensor within one second to pass unstable status. One capacitor valued 100uF can be added between VDD and GND for power filtering.

#### (2) Communication and signal

Single-bus data is used for communication between MCU and DHT11.

### 7. Electrical Characteristics:

Item	Condition	Min	Typical	Max	Unit
Power supply	DC	3	5	5.5	V
Current supply	Measuring	0.5		2.5	mA
	Stand-by	100	Null	150	uA
	Average	0.2	Null	1	mA

LAYOUT PCB RANGKAIAN NODE DAN DAM		KETERANGAN	
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	Drs. TOTOK SUKARDIYONO, M.T TGL. 08/07/2019		NIM. 16507134017

