LAMPIRAN

Lampiran 1 Program Alat

Program Keseluruhan

```
#include <Wire.h>
#include <RTClib.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
#include <DHT.h>

DHT dht1(2, DHT11);
DHT dht2(3, DHT11);
DHT dht3(4, DHT11);
DHT dht4(5, DHT11);
RTC_DS3231 rtc;

const int kipas1 = 6;
const int kipas2 = 7;
const int kipas3 = 8;
const int kipas4 = 9;
const int heaterPin = 10;
const uint8_t OFF=HIGH, ON=LOW;
int jam, menit, detik;
float Sr, s1,s2,s3,s4, Kr,k1,k2,k3,k4;
void setup() {
   pinMode(heaterPin, OUTPUT);
   pinMode(kipas1, OUTPUT);
   pinMode(kipas2, OUTPUT);
```

```
pinMode(kipas3, OUTPUT);
pinMode(kipas4, OUTPUT);
digitalWrite(heaterPin,HIGH);
digitalWrite(kipas1, HIGH);
digitalWrite(kipas2, HIGH);
digitalWrite(kipas3, HIGH);
digitalWrite(kipas4, HIGH);
Serial.begin(9600);
lcd.begin();
lcd.backlight();
if (! rtc.begin()) {
  Serial.println("RTC tidak terbaca");
 while (1);
}
//uncomment to set RTC
//rtc.adjust(DateTime(2024, 1, 25, 9, 30, 0));

if (rtc.lostPower()) {
  //atur waktu sesuai waktu pada komputer
  //rtc.adjust(DateTime(F(__DATE__), F(__TIME__)));
  //atur waktu secara manual
  // January 25, 2024 jam 10:0:00
  //rtc.adjust(DateTime(2024, 1, 25, 10, 0, 0));
 }
 dht1.begin();
 dht2.begin();
 dht3.begin();
 dht4.begin();
```

```
 }
void loop() {
  DateTime now = rtc.now();
  jam = now.hour();
  menit = now.minute();
  detik = now.second();
  Serial.println(String(jam)+':'+
                 String(menit)+':'+
                 String(detik));
  Serial.println();
  k1 = dht1.readHumidity();
  s1 = dht1.readTemperature();
  k2 = dht2.readHumidity();
  s2 = dht2.readTemperature();
  k3 = dht3.readHumidity();
  s3 = dht3.readTemperature();
  k4 = dht4.readHumidity();
  s4 = dht4.readTemperature();
  Kr= (k1+k2+k3+k4)/4;
  Sr= (s1+s2+s3+s4)/4;
  Serial.println("K1: "+String(k1)+
                 "  S1: "+String(s1));
  Serial.println("K2: "+String(k2)+
                 "  S2: "+String(s2));
  Serial.println("K3: "+String(k3)+
                 "  S3: "+String(s3));
  Serial.println("K4: "+String(k3)+
                 "  S4: "+String(s4));
```

```
Serial.println("Kr: "+String(Kr)+
               "  Sr: "+String(Sr));
lcd.setCursor(0,0);
lcd.print("Jam ");
if(jam<10) { lcd.print('0');}
lcd.print(jam); lcd.print(':');
if(menit<10) { lcd.print('0');}
lcd.print(menit); lcd.print(':');
if(detik<10) { lcd.print('0');}
lcd.print(detik);
lcd.setCursor(0,1);
lcd.print("Kr:    Sr:     C");
lcd.setCursor(14,1);
lcd.print((char)223);
lcd.setCursor(4,1);
lcd.print(Kr,0);
lcd.setCursor(11,1);
lcd.print(Sr,0);

if(menit>30) menit=menit-30;
lcd.setCursor(13,0);
lcd.print("H");
if(menit<10) lcd.print("0");
lcd.print(menit+1);
if(menit<=5){
   if (Sr > 30.0) {
    heater(OFF);
    kipas(ON);
```

```
    }
    else if(Sr < 29.0) {
      heater(ON);
      kipas(OFF);
    }
  }
  else if(menit>5 && menit<=10){
     if (Sr >= 28.0) {
       heater(OFF);
       kipas(ON);
     }
     else if(Sr < 27.0) {
       heater(ON);
       kipas(OFF);
     }
   }
   else if(menit>10 && menit<=30){
      if(Sr >= 26.0) {
         heater(OFF);
         kipas(ON);
      }
      else if(Sr < 25.0) {
       heater(ON);
       kipas(OFF);
     }
  }
  delay(1000);
}
```

```
void heater(uint8_t state){
   digitalWrite(heaterPin, state);
}
void kipas(uint8_t state){
   digitalWrite(kipas1, state);
   digitalWrite(kipas2, state);
   digitalWrite(kipas3, state);
   digitalWrite(kipas4, state);
}
```

Lampiran 2 Alat Penelitian

1. Pengujian Kipas 1, 2, 3 dan 4




2. Pengujian Kipas 1.2, 1.3, 1.4 dan 2.3




3. Pengujian Kipas 2.4, 3.4, 1.2.3, 1.2.4, 1.3.4, 2.3.4 dan 1.2.3.4

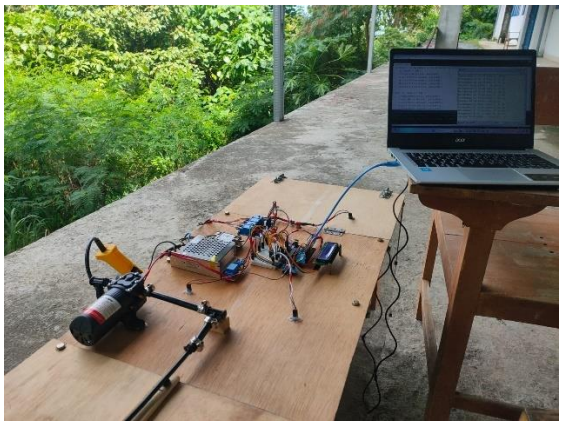






4. Pengujian Pendingin


5. Pengujian Keseluruhan

Lampiran 3 Datasheet

1. Arduino Uno

Product Reference Manual
SKU: A000066

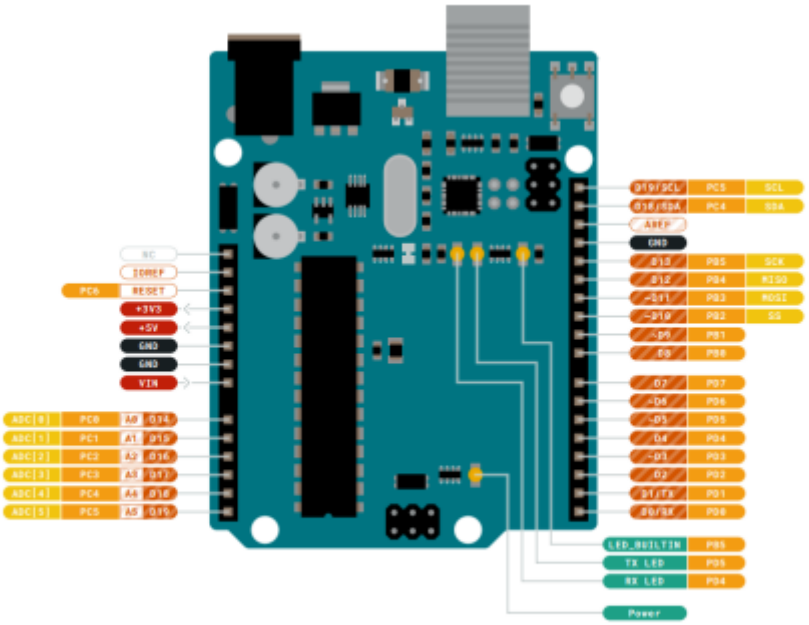
Description

The Arduino® UNO R3 is the perfect board to get familiar with electronics and coding. This versatile development board is equipped with the well-known ATmega328P and the ATMega 16U2 Processor.

This board will give you a great first experience within the world of Arduino.

Target areas:

Maker, introduction, industries



Pinout

5.1 JANALOG

Pin	Function	Type	Description
1	NC	NC	Not connected
2	IOREF	IOREF	Reference for digital logic V - connected to 5V
3	Reset	Reset	Reset
4	+3V3	Power	+3V3 Power Rail
5	+5V	Power	+5V Power Rail
6	GND	Power	Ground
7	GND	Power	Ground
8	VIN	Power	Voltage Input
9	A0	Analog/GPIO	Analog input 0 /GPIO
10	A1	Analog/GPIO	Analog input 1 /GPIO
11	A2	Analog/GPIO	Analog input 2 /GPIO
12	A3	Analog/GPIO	Analog input 3 /GPIO
13	A4/SDA	Analog input/I2C	Analog input 4/I2C Data line
14	A5/SCL	Analog input/I2C	Analog input 5/I2C Clock line

5.2 JDIGITAL

Pin	Function	Type	Description
1	D0	Digital/GPIO	Digital pin 0/GPIO
2	D1	Digital/GPIO	Digital pin 1/GPIO
3	D2	Digital/GPIO	Digital pin 2/GPIO
4	D3	Digital/GPIO	Digital pin 3/GPIO
5	D4	Digital/GPIO	Digital pin 4/GPIO
6	D5	Digital/GPIO	Digital pin 5/GPIO
7	D6	Digital/GPIO	Digital pin 6/GPIO
8	D7	Digital/GPIO	Digital pin 7/GPIO
9	D8	Digital/GPIO	Digital pin 8/GPIO
10	D9	Digital/GPIO	Digital pin 9/GPIO
11	SS	Digital	SPI Chip Select
12	MOSI	Digital	SPI1 Main Out Secondary In
13	MISO	Digital	SPI Main In Secondary Out
14	SCK	Digital	SPI serial clock output
15	GND	Power	Ground
16	AREF	Digital	Analog reference voltage
17	A4/SD4	Digital	Analog input 4/I2C Data line (duplicated)
18	A5/SD5	Digital	Analog input 5/I2C Clock line (duplicated)

2. RTC (Real Time Clock)

DS3231 — **Extremely Accurate I²C-Integrated RTC/TCXO/Crystal**

General Description

The DS3231 is a low-cost, extremely accurate I²C real-time clock (RTC) with an integrated temperature-compensated crystal oscillator (TCXO) and crystal. The device incorporates a battery input, and maintains accurate timekeeping when main power to the device is interrupted. The integration of the crystal resonator enhances the long-term accuracy of the device as well as reduces the piece-part count in a manufacturing line. The DS3231 is available in commercial and industrial temperature ranges, and is offered in a 16-pin, 300-mil SO package.

The RTC maintains seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with an AM/PM indicator. Two programmable time-of-day alarms and a programmable square-wave output are provided. Address and data are transferred serially through an I²C bidirectional bus.

A precision temperature-compensated voltage reference and comparator circuit monitors the status of V_{CC} to detect power failures, to provide a reset output, and to automatically switch to the backup supply when necessary. Additionally, the RST pin is monitored as a pushbutton input for generating a µP reset.

Benefits and Features

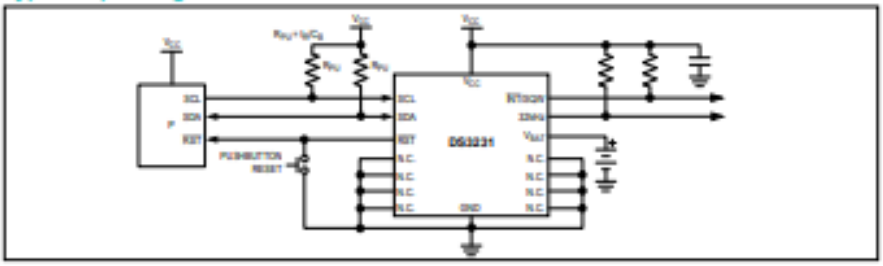
- Highly Accurate RTC Completely Manages All Timekeeping Functions
  - Real-Time Clock Counts Seconds, Minutes, Hours, Date of the Month, Month, Day of the Week, and Year, with Leap-Year Compensation Valid Up to 2100
  - Accuracy ±2ppm from 0°C to +40°C
  - Accuracy ±3.5ppm from -40°C to +85°C
  - Digital Temp Sensor Output: ±3°C Accuracy
  - Register for Aging Trim
  - RST Output/Pushbutton Reset Debounce Input
  - Two Time-of-Day Alarms
  - Programmable Square-Wave Output Signal
- Simple Serial Interface Connects to Most Microcontrollers
  - Fast (400kHz) I²C Interface
- Battery-Backup Input for Continuous Timekeeping
  - Low Power Operation Extends Battery-Backup Run Time
  - 3.3V Operation
- Operating Temperature Ranges: Commercial (0°C to +70°C) and Industrial (-40°C to +85°C)
- Underwriters Laboratories® (UL) Recognized

Applications

- Servers
- Telematics
- Utility Power Meters
- GPS

Ordering Information and Pin Configuration appear at end of data sheet.

Typical Operating Circuit



19-5170; Rev 10; 3/15

maxim integrated

Absolute Maximum Ratings

Voltage Range on Any Pin Relative to Ground.....-0.3V to +6.0V
Junction-to-Ambient Thermal Resistance (θ_{JA}) (Note 1)73°C/W
Junction-to-Case Thermal Resistance (θ_{JC}) (Note 1).....23°C/W
Operating Temperature Range
DS3231S .....0°C to +70°C
DS3231SN.....-40°C to +85°C
Junction Temperature.....+125°C
Storage Temperature Range.....-40°C to +85°C
Lead Temperature (soldering, 10s).....+260°C
Soldering Temperature (reflow, 2 times max) .....+260°C
(see the *Handling, PCB Layout, and Assembly* section)

Note 1: Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to www.maximintegrated.com/thermal-tutorial.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Recommended Operating Conditions

(T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	V_{CC}		2.3	3.3	5.5	V
	V_{BAT}		2.3	3.0	5.5	V
Logic 1 Input SDA, SCL	V_{IH}		0.7 x V_{CC}		V_{CC} + 0.3	V
Logic 0 Input SDA, SCL	V_{IL}		-0.3		0.3 x V_{CC}	V

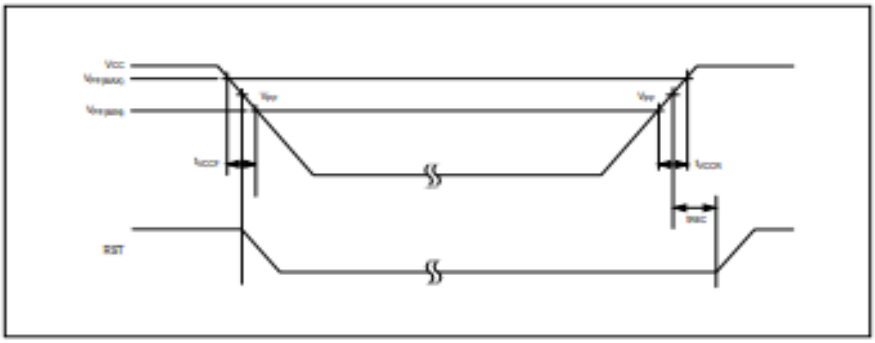
Electrical Characteristics

(V_{CC} = 2.3V to 5.5V, V_{CC} = Active Supply (see Table 1), T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Typical values are at V_{CC} = 3.3V, V_{BAT} = 3.0V, and T_A = +25°C, unless otherwise noted.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Active Supply Current	I_{CCA}	(Notes 4, 5)	V_{CC} = 3.63V			200	µA
			V_{CC} = 5.5V			300	
Standby Supply Current	I_{CCS}	I²C bus inactive, 32kHz output on, SQW output off (Note 5)	V_{CC} = 3.63V			110	µA
			V_{CC} = 5.5V			170	
Temperature Conversion Current	$I_{CCSCONV}$	I²C bus inactive, 32kHz output on, SQW output off	V_{CC} = 3.63V			575	µA
			V_{CC} = 5.5V			650	
Power-Fail Voltage	V_{PF}			2.45	2.575	2.70	V
Logic 0 Output, 32kHz, INT/SQW, SDA	V_{OL}	I_{OL} = 3mA				0.4	V
Logic 0 Output, RST	V_{OL}	I_{OL} = 1mA				0.4	V
Output Leakage Current 32kHz, INT/SQW, SDA	I_{LO}	Output high impedance		-1	0	+1	µA
Input Leakage SCL	I_{LI}			-1		+1	µA
RST Pin I/O Leakage	I_{OL}	RST high impedance (Note 6)		-200		+10	µA
V_{BAT} Leakage Current (V_{CC} Active)	I_{BATLKG}				25	100	nA

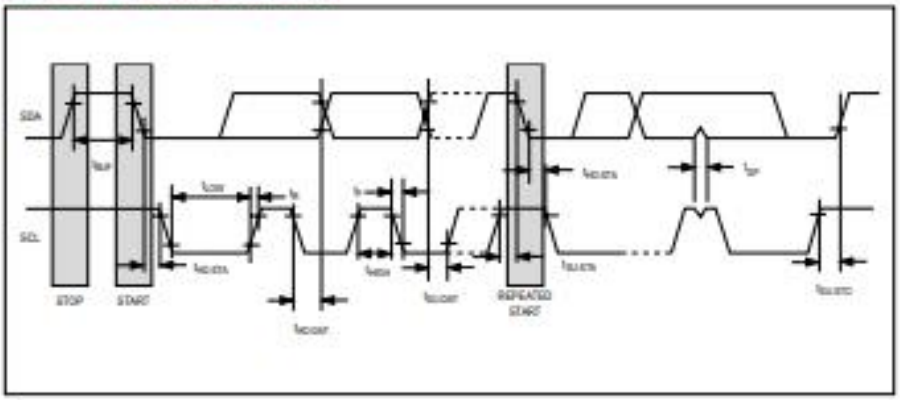
Pushbutton Reset Timing

Power-Switch Timing



DS3231 Extremely Accurate I2C-Integrated RTC/TCXO/Crystal

Data Transfer on I2C Serial Bus



WARNING: Negative undershoots below -0.3V while the part is in battery-backed mode may cause loss of data.

Note 2: Limits at -40°C are guaranteed by design and not production tested.

Note 3: All voltages are referenced to ground.

Note 4: I_{CCA}—SCL clocking at max frequency = 400kHz.

Note 5: Current is the averaged input current, which includes the temperature conversion current.

Note 6: The $\overline{RST}$ pin has an internal 50kΩ (nominal) pullup resistor to V_{CC}.

Note 7: After this period, the first clock pulse is generated.

Note 8: A device must internally provide a hold time of at least 300ns for the SDA signal (referred to the $V_{IH(MIN)}$ of the SCL signal) to bridge the undefined region of the falling edge of SCL.

Note 9: The maximum $t_{HD:DAT}$ needs only to be met if the device does not stretch the low period (t_{LOW}) of the SCL signal.

Note 10: A fast-mode device can be used in a standard-mode system, but the requirement $t_{SU:DAT} \geq 250ns$ must then be met. This is automatically the case if the device does not stretch the low period of the SCL signal. If such a device does stretch the low period of the SCL signal, it must output the next data bit to the SDA line $t_{R(MAX)} + t_{SU:DAT} = 1000 + 250 = 1250ns$ before the SCL line is released.

Note 11: C_B—total capacitance of one bus line in pF.

Note 12: The parameter t_{OSF} is the period of time the oscillator must be stopped for the OSF flag to be set over the voltage range of $0.0V \leq V_{CC} \leq V_{CC(MAX)}$ and $2.3V \leq V_{BAT} \leq 3.4V$.

Note 13: This delay applies only if the oscillator is enabled and running. If the EOSC bit is a 1, t_{REC} is bypassed and $\overline{RST}$ immediately goes high. The state of $\overline{RST}$ does not affect the I²C interface, RTC, or TCXO.

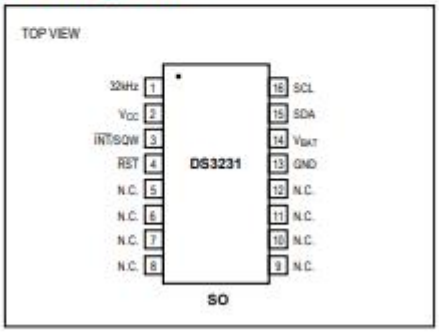
Handling, PCB Layout, and Assembly

The DS3231 package contains a quartz tuning-fork crystal. Pick-and-place equipment can be used, but precautions should be taken to ensure that excessive shocks are avoided. Ultrasonic cleaning should be avoided to prevent damage to the crystal.

Avoid running signal traces under the package, unless a ground plane is placed between the package and the signal line. All N.C. (no connect) pins must be connected to ground.

Moisture-sensitive packages are shipped from the factory dry packed. Handling instructions listed on the package label must be followed to prevent damage during reflow. Refer to the IPC/JEDEC J-STD-020 standard for moisture-sensitive device (MSD) classifications and reflow profiles. Exposure to reflow is limited to 2 times maximum.

Pin Configuration



Chip Information

SUBSTRATE CONNECTED TO GROUND

PROCESS: CMOS

Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
DS3231S#	0°C to +70°C	16 SO
DS3231SN#	-40°C to +85°C	16 SO

#Denotes an RoHS-compliant device that may include lead (Pb) that is exempt under RoHS requirements. The lead finish is JESD97 category e3, and is compatible with both lead-based and lead-free soldering processes. A "#" anywhere on the top mark denotes an RoHS-compliant device.

Package Information

For the latest package outline information and land patterns (footprints), go to www.maximintegrated.com/packages. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
16 SO	W16#H2	21-0042	90-0107

3. Modul Relay 4 Chanel

Handson Technology

User Guide

4 Channel 5V Optical Isolated Relay Module

This is a LOW Level 5V 4-channel relay interface board, and each channel needs a 15-20mA driver current. It can be used to control various appliances and equipment with large current. It is equipped with high-current relays that work under AC250V 10A or DC30V 10A. It has a standard interface that can be controlled directly by microcontroller. This module is optically isolated from high voltage side for safety requirement and also prevent ground loop when interface to microcontroller.

Brief Data:

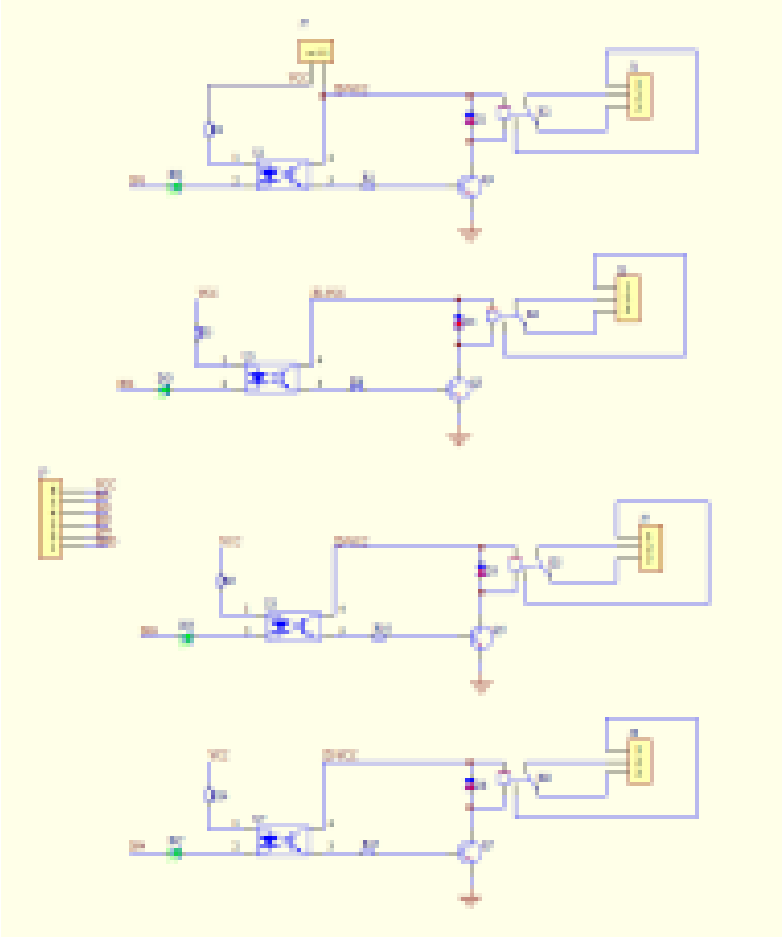
- Relay Maximum output: DC 30V/10A, AC 250V/10A.
- 4 Channel Relay Module with Opto-coupler. LOW Level Trigger expansion board, which is compatible with Arduino control board.
- Standard interface that can be controlled directly by microcontroller (8051, AVR, *PIC, DSP, ARM, ARM, MSP430, TTL logic).
- Relay of high quality low noise relays SPDT. A common terminal, a normally open, one normally closed terminal.
- Opto-Coupler isolation, for high voltage safety and prevent ground loop with microcontroller.

Schematic:

VCC and RY-VCC are also the power supply of the relay module. When you need to drive a large power load, you can take the jumper cap off and connect an extra power to RY-VCC to supply the relay; connect VCC to 5V of the MCU board to supply input signals.

NOTES: If you want complete optical isolation, connect "Vcc" to Arduino +5 volts but do NOT connect Arduino Ground. Remove the Vcc to JD-Vcc jumper. Connect a separate +5 supply to "JD-Vcc" and board Gnd. This will supply power to the transistor drivers and relay coils.

If relay isolation is enough for your application, connect Arduino +5 and Gnd, and leave Vcc to JD-Vcc jumper in place.



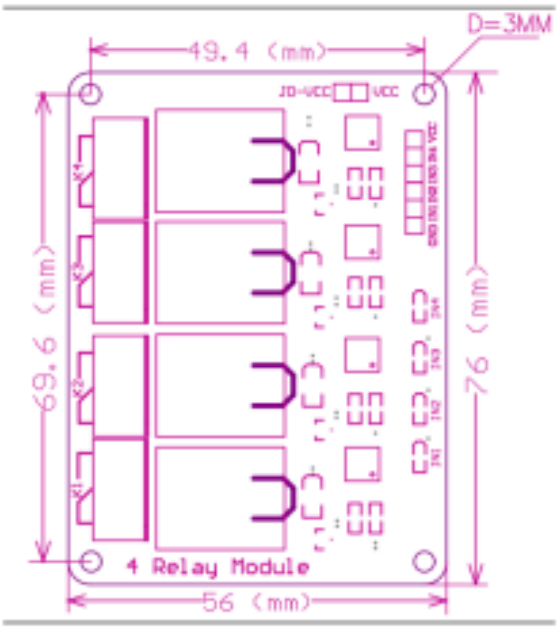
4 Channel Relay Module Schematic

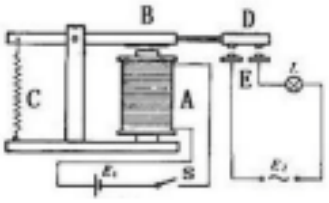
It is sometimes possible to use this relay boards with 3.3V signals, if the JD-VCC (Relay Power) is provided from a +5V supply and the VCC to JD-VCC jumper is removed. That 5V relay supply could be totally isolated from the 3.3V device, or have a common ground if opto-isolation is not needed. If used with isolated 3.3V signals, VCC (To the input of the opto-isolator, next to the IN pins) should be connected to the 3.3V device's +3.3V supply.

NOTE: Some Raspberry-Pi users have found that some relays are reliable and others do not actuate sometimes. It may be necessary to change the value of R1 from 1000 ohms to something like 220 ohms, or supply +5V to the VCC connection.

NOTE: The digital inputs from Arduino are Active LOW: The relay actuates and LED lights when the input pin is LOW, and turns off on HIGH.

Module Layout:





Supply voltage to the coil and some currents will pass through the coil thus generating the electromagnetic effect. So the armature overcomes the tension of the spring and is attracted to the core, thus closing the moving contact of the armature and the normally open (NO) contact or you may say releasing the former and the normally closed (NC) contact. After the coil is de-energized, the electromagnetic force disappears and the armature moves back to the original position, releasing the moving contact and normally closed contact. The closing and releasing of the contacts results in power on and off of the circuit.

Input:

VCC : Connected to positive supply voltage (supply power according to relay voltage)

GND : Connected to supply ground.

IN1: Signal triggering terminal 1 of relay module

IN2: Signal triggering terminal 2 of relay module

IN3: Signal triggering terminal 3 of relay module

IN4: Signal triggering terminal 4 of relay module

Output:

Each module of the relay has one NC (normally close), one NO (normally open) and one COM (Common) terminal. So there are 4 NC, 4 NO and 4 COM of the channel relay in total. NC stands for the normal close port contact and the state without power. NO stands for the normal open port contact and the state with power. COM means the common port. You can choose NC port or NO port according to whether power or not.

Testing Setup:

When a low level is supplied to signal terminal of the 4-channel relay, the LED at the output terminal will light up. Otherwise, it will turn off. If a periodic high and low level is supplied to the signal terminal, you can see the LED will cycle between on and off.

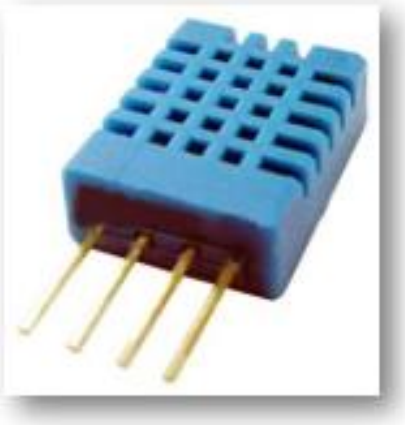
For Arduino:

Step 1:

Connect the signal terminal IN1、IN2, IN3 & IN4 of 4-channel relay to digital pin 4, 5, 6, 7 of the Arduino Uno or ATMega2560 board, and connect an LED at the output terminal.

IN1> 4; IN2> 5; IN3>6; IN4>7

4. Sensor Suhu DHT11



Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programmes in the OTP memory, which are used by the sensor's internal signal detecting process. The single-wire serial interface makes system integration quick and easy. Its small size, low power consumption and up-to-20 meter signal transmission making it the best choice for various applications, including those most demanding ones. The component is 4-pin single row pin package. It is convenient to connect and special packages can be provided according to users' request.

2. Technical Specifications:

Overview:

Item	Measurement Range	Humidity Accuracy	Temperature Accuracy	Resolution	Package
DHT11	20-90%RH 0-50 ℃	±5%RH	±2℃	1	4 Pin Single Row

Detailed Specifications:

Parameters	Conditions	Minimum	Typical	Maximum
Humidity				
Resolution		1%RH	1%RH	1%RH
			8 Bit	
Repeatability			±1%RH	
Accuracy	25℃		±4%RH	
	0-50℃			±5%RH
Interchangeability	Fully Interchangeable			
Measurement Range	0℃	30%RH		90%RH
	25℃	20%RH		90%RH
	50℃	20%RH		80%RH
Response Time (Seconds)	1/e(63%)25℃, 1m/s Air	6 S	10 S	15 S
Hysteresis			±1%RH	
Long-Term Stability	Typical		±1%RH/year	
Temperature				
Resolution		1℃	1℃	1℃
		8 Bit	8 Bit	8 Bit
Repeatability			±1℃	
Accuracy		±1℃		±2℃
Measurement Range		0℃		50℃
Response Time (Seconds)	1/e(63%)	6 S		30 S

3. Typical Application (Figure 1)

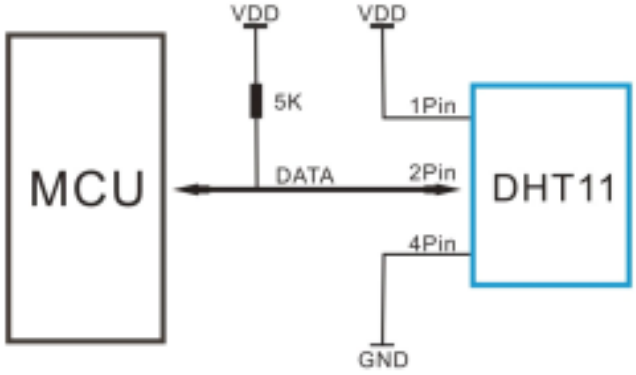


Figure 1 Typical Application

Note: 3Pin – Null; MCU = Micro-computer Unite or single chip Computer

When the connecting cable is shorter than 20 metres, a 5K pull-up resistor is recommended; when the connecting cable is longer than 20 metres, choose a appropriate pull-up resistor as needed.

4. Power and Pin

DHT11's power supply is 3-5.5V DC. When power is supplied to the sensor, do not send any instruction to the sensor in within one second in order to pass the unstable status. One capacitor valued 100nF can be added between VDD and GND for power filtering.

5. Communication Process: Serial Interface (Single-Wire Two-Way)

Single-bus data format is used for communication and synchronization between MCU and DHT11 sensor. One communication process is about 4ms.

Data consists of decimal and integral parts. A complete data transmission is **40bit**, and the sensor sends **higher data bit** first.
Data format: 8bit integral RH data + 8bit decimal RH data + 8bit integral T data + 8bit decimal T data + 8bit check sum. If the data transmission is right, the check-sum should be the last 8bit of "8bit integral RH data + 8bit decimal RH data + 8bit integral T data + 8bit decimal T data".

5. LCD (Liquid Crystal Display)

Datasheet

I2C 1602 Serial LCD Module

Product features:

The I2C 1602 LCD module is a 2 line by 16 character display interfaced to an I2C daughter board. The I2C interface only requires 2 data connections, +5 VDC and GND to operate

For in depth information on I2C interface and history, visit: http://www.wikipedia/wiki/i2c

Specifications:

	2 lines by 16 character
I2C Address Range	0x20 to 0x27 (Default=0x27, addressable)
Operating Voltage	5 Vdc
Backlight	White
Contrast	Adjustable by potentiometer on I2c interface
Size	80mm x 36mm x 20 mm
Viewable area	66mm x 16mm

Power:

The device is powered by a single 5Vdc connection.

Pinout Diagram:

Pin/Control Descriptions:

Pin #	Name	Type	Description
1	GND	Power	Supply & Logic ground
2	VCC	Power	Digital I/O 0 or RX (serial receive)
3	SDA	I/O	Serial Data line
4	SCL	CLK	Serial Clock line
A0	A0	Jumper	Optional address selection A0 - see below
A1	A1	Jumper	Optional address selection A1 - see below
A2	A2	Jumper	Optional address selection A2 - see below
Backlight		Jumper	Jumpered - enable backlight, Open - disable backlight
Contrast		Pot	Adjust for best viewing

Addressing:

A0	A1	A2	Address
Open	Open	Open	0x27
Jumper	Open	Open	0x26
Open	Jumper	Open	0x25
Jumper	Jumper	Open	0x24
Open	Open	Jumper	0x23
Jumper	Open	Jumper	0x22
Open	Jumper	Jumper	0x21
Jumper	Jumper	Jumper	0x20

Software:

Download the required LCD Arduino™ library for this device from:

http://www.circuitattic.com/downloads/category/3-sample-code.html?download=9%3Another-i2c-library-easier-to-use

Replace current liquid crystal library found in the Arduino library directory with the above
(Note: If you use the examples included with the library, be sure to change address to 0x27)

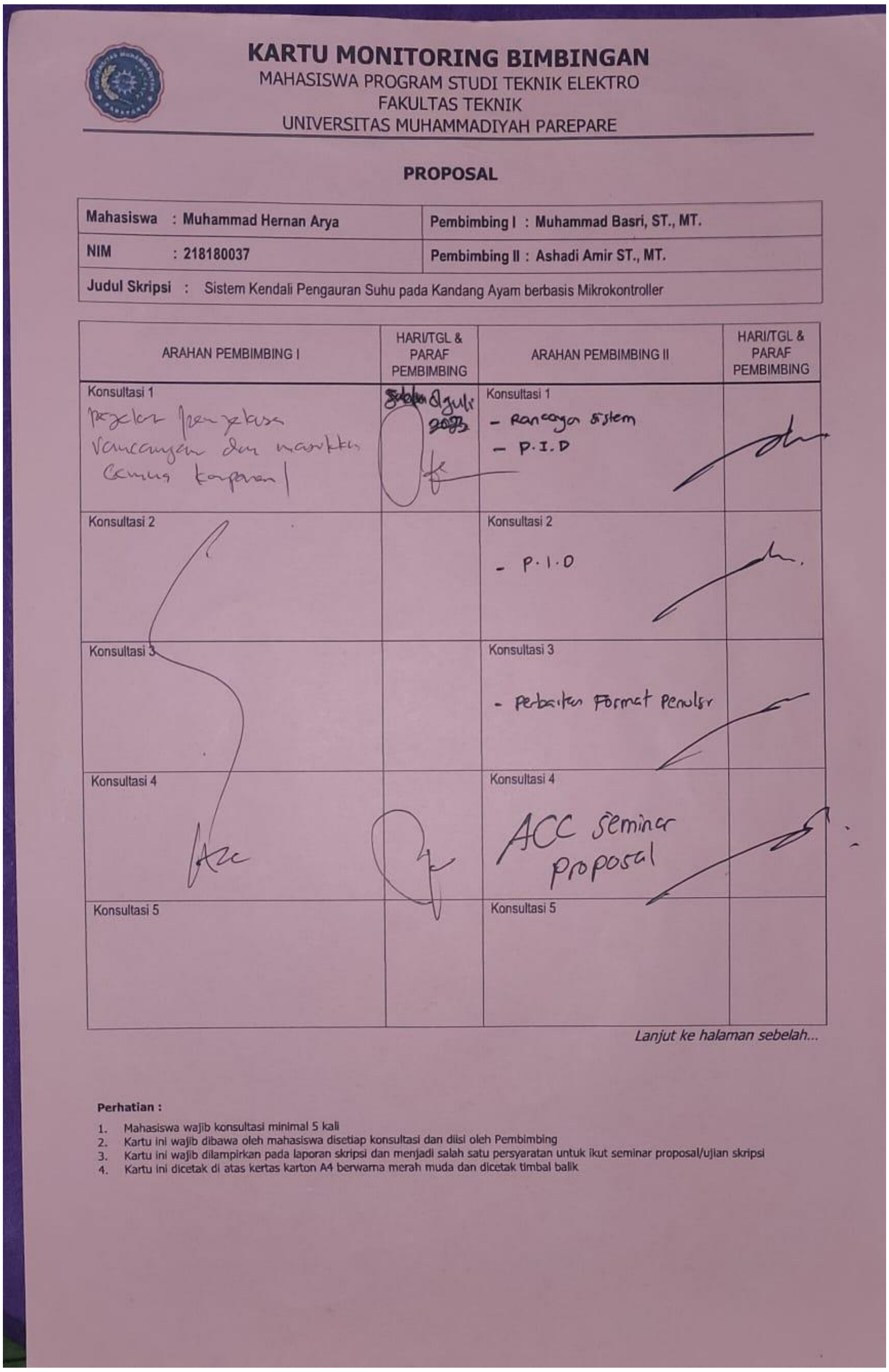
Simple example using library above.

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#if defined(ARDUINO) && ARDUINO >= 100
#define printByte(args) write(args);
#else
#define printByte(args) print(args,BYTE);
#endif
LiquidCrystal_I2C lcd(0x27,16,2); // set the LCD address to 0x27 for a
//chars and 2 line display
void setup()
{
      lcd.init(); // initialize the lcd
      lcd.backlight();
      lcd.clear();
      delay(100);
      for(int i = 0; i< 3; i++)
      {
            lcd.backlight();
            delay(250);
            lcd.noBacklight();
            delay(250);
      }
      lcd.backlight();


   }
   void loop()
   {
         int x=0;
         lcd.clear();
         lcd.setCursor(2,0); //Start at character 0 on line 0
         lcd.print("Hello World");
         lcd.setCursor(0,1); //Start at character 0 on line 1
         lcd.print(" opencircuit.nl");
         delay(3000); //Wait 3 seconds
         lcd.clear();
         lcd.setCursor(0,0); //Start at character 0 on line 0
         lcd.print("Cursor Blink");
         lcd.blink();
         delay(2000);
         lcd.setCursor(0,0);
         lcd.print("Cursor noBlink");
         lcd.noBlink();
         delay(2000);
   }
```

Lampiran 4 Kartu Monitoring Bimbingan

1. Kartu Monitoring Bimbingan Proposal



KARTU MONITORING BIMBINGAN
MAHASISWA PROGRAM STUDI TEKNIK ELEKTRO
FAKULTAS TEKNIK
UNIVERSITAS MUHAMMADIYAH PAREPARE

PROPOSAL

Mahasiswa : **Muhammad Hernan Arya**	**Pembimbing I** : **Muhammad Basri, ST., MT.**
NIM : **218180037**	**Pembimbing II** : **Ashadi Amir ST., MT.**
Judul Skripsi : Sistem Kendali Pengauran Suhu pada Kandang Ayam berbasis Mikrokontroller	

ARAHAN PEMBIMBING I	HARI/TGL & PARAF PEMBIMBING	ARAHAN PEMBIMBING II	HARI/TGL & PARAF PEMBIMBING
Konsultasi 1 perjelas penjelasan rancangan dan masukkan rumus kaparan	8 Juli 2023	Konsultasi 1 - Rancangan sistem - P.I.D	
Konsultasi 2		Konsultasi 2 - P.I.D	
Konsultasi 3		Konsultasi 3 - perbaikan Format penulisan	
Konsultasi 4 Acc		Konsultasi 4 ACC seminar proposal	
Konsultasi 5		Konsultasi 5	

Lanjut ke halaman sebelah...

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4. Kartu ini dicetak di atas kertas karton A4 berwarna merah muda dan dicetak timbal balik

Lanjutan ...

ARAHAN PEMBIMBING I	HARI/TGL & PARAF PEMBIMBING	ARAHAN PEMBIMBING II	HARI/TGL & PARAF PEMBIMBING
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Konsultasi 7		Konsultasi 7	
Konsultasi 8		Konsultasi 8	
Konsultasi 9		Konsultasi 9	
Konsultasi 10		Konsultasi 10	

Parepare, 12 / 7 / 2023

Mengetahui
Ketua Program Studi

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NBM. 986 836

Mahasiswa

Muhammad Hernan Arya
NIM. 218180037

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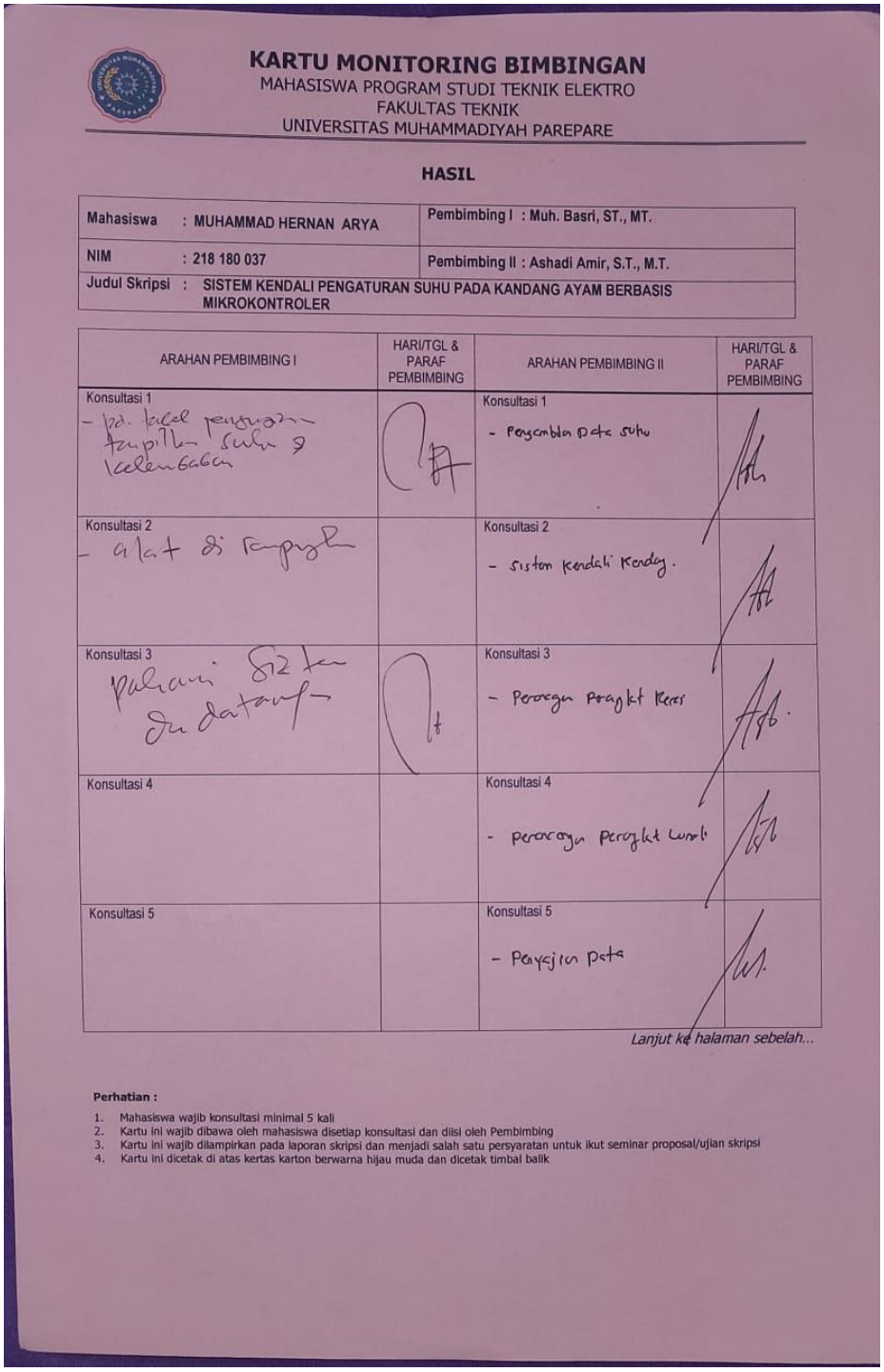
2. Kartu Monitoring Bimbingan Hasil (Skripsi)



KARTU MONITORING BIMBINGAN
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UNIVERSITAS MUHAMMADIYAH PAREPARE

HASIL

Mahasiswa : MUHAMMAD HERNAN ARYA	Pembimbing I : Muh. Basri, ST., MT.
NIM : 218 180 037	Pembimbing II : Ashadi Amir, S.T., M.T.
Judul Skripsi : SISTEM KENDALI PENGATURAN SUHU PADA KANDANG AYAM BERBASIS MIKROKONTROLER	

ARAHAN PEMBIMBING I	HARI/TGL & PARAF PEMBIMBING	ARAHAN PEMBIMBING II	HARI/TGL & PARAF PEMBIMBING
Konsultasi 1 - Pd. kasel pengaturan tampilan suhu & kelembaban		Konsultasi 1 - Pengambilan data suhu	
Konsultasi 2 - alat di tampilkan		Konsultasi 2 - sistem kendali kandang.	
Konsultasi 3 pahami sistem dan data		Konsultasi 3 - Perancang Prangkat Keras	
Konsultasi 4		Konsultasi 4 - perancang perangkat lunak	
Konsultasi 5		Konsultasi 5 - Pengujian data	

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Lanjutan ...

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Konsultasi 6		Konsultasi 6 - Analisis Data	
Konsultasi 7		Konsultasi 7 - Kesimpulan - Daftar Pustaka	
Konsultasi 8		Konsultasi 8 ACC 09/05/2024 Seminar Hasil	
Konsultasi 9		Konsultasi 9	
Konsultasi 10		Konsultasi 10	

Parepare, 10/7/ 2024

Mengetahui
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Mahasiswa

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NIM. *218 180 037*

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