LAMPIRAN

Lampiran 1 Rekomendasi Sidang

KEMENTERIAN, PENDIDIKAN KEBUDAYAAN
RISET DAN TEKNOLOGI
POLITEKNIK NEGERI SRIWIJAYA
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Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id

REKOMENDASI UJIAN TUGAS AKHIR (TA)

Pembimbing Laporan Akhir memberikan rekomendasi kepada,

Nama	:	NUR ALIF ZAKI BIBROSI
NIM	:	081940341937
Jurusan/Program Studi	:	Teknik Elektro/ D4 Mekatronika
Judul Tugas Akhir	:	Analisis Sistem Monitoring Pada Kualitas Air Kolam Berdasarkan Suhu Berbasis Internet Of Things di Tani Mulya Plaju

Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti Ujian Tugas Akhir (TA) pada Tahun Akademik 2022/2023

Palembang, 7-8-2023

Pembimbing I,	Pembimbing II,
(Yudi Wijanarko, S.T., M.T.)	(Selamat Muslimin, S.T.,M.Kom)
NIP. 196705111992031003	NIP. 197907222008011007

Lampiran 2 LoA (Letter of Acceptance)

JTIP UNP
Jurnal Teknologi Informasi dan Pendidikan
Department of Electronics, Faculty of Engineering
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LETTER OF ACCEPTANCE
No. 52/UN35/JTIP-LOA/Acc/2023

Dear Selamat Muslimin,

No. 752

All Authors
Selamat Muslimin, Yudi Wijanarko, Nur Alif Zaki Bibrosi

Article Title
"Real-time Fishpond Water Temperature Monitoring with Internet of Things (IoT) Technology"

Based on the recommendations from the peer review board, we are delighted to inform you that your following manuscript has been **ACCEPTED** for possible publication in **Jurnal Teknologi Informasi dan Pendidikan (JTIP) Vol. 16, No. 2, (2023).**

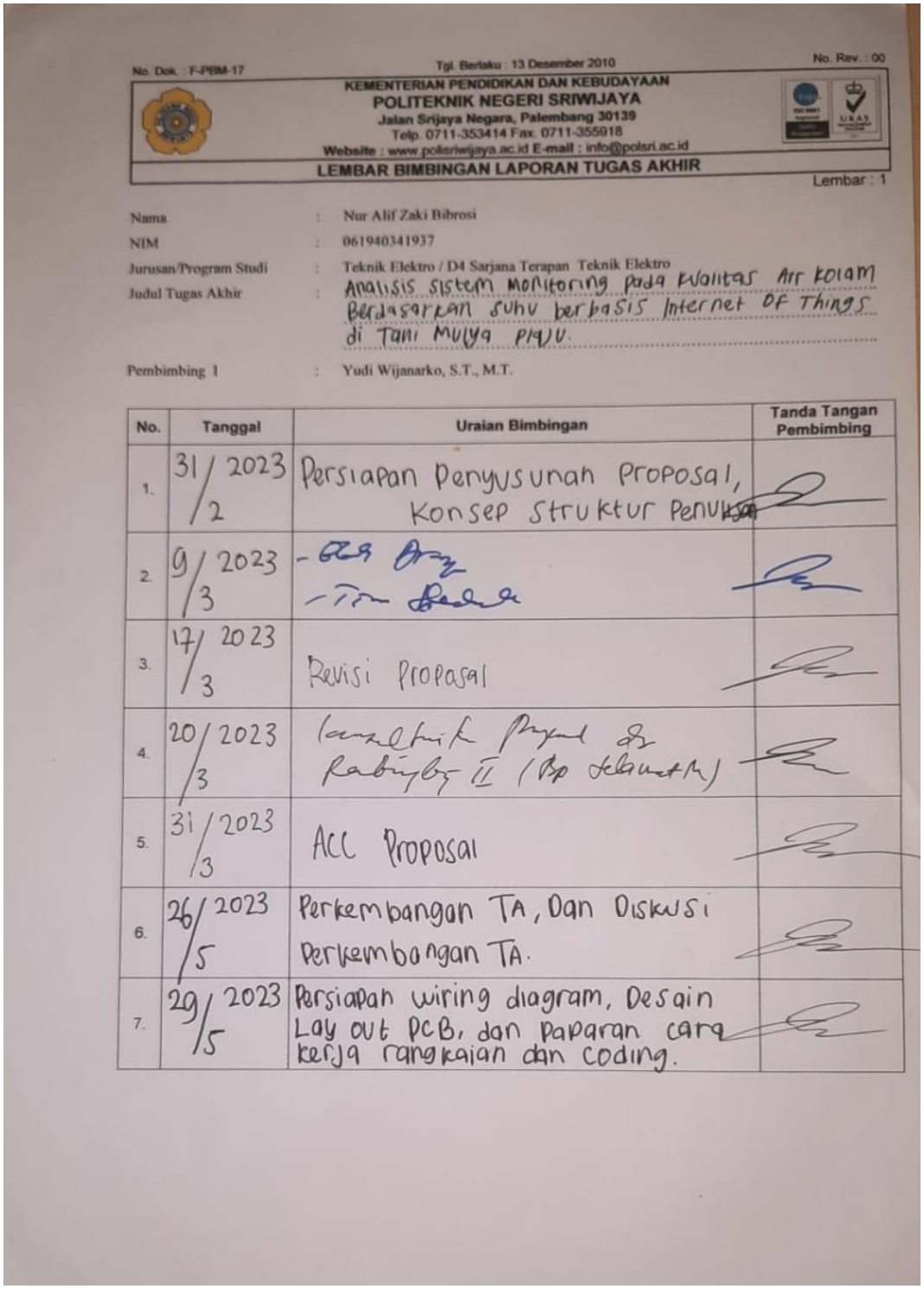
Thank you for making the journal a vehicle for your research interests.

July 28, 2023
Best wishes,

Chief Editor
(Jurnal Teknologi Informasi dan Pendidikan)
Mobile Phone. +628 1363 609 995

This journal has been nationally accredited Sinta 3 based on
SK No. 200/M/KPT/2020 (23 Desember 2020).

Lampiran 3 Lembar Bimbingan Tugas Akhir Pembimbing I



No. Dok. : F-PBM-17 | Tgl. Berlaku : 13 Desember 2010 | No. Rev. : 00

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LEMBAR BIMBINGAN LAPORAN TUGAS AKHIR

Lembar : 1

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NIM : 061940341937
Jurusan/Program Studi : Teknik Elektro / D4 Sarjana Terapan Teknik Elektro
Judul Tugas Akhir : Analisis sistem Monitoring pada kualitas air kolam berdasarkan suhu berbasis Internet Of Things di Tani Mulya PIVU.
Pembimbing 1 : Yudi Wijanarko, S.T., M.T.

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	31/2/2023	Persiapan Penyusunan Proposal, Konsep struktur penulisan	
2.	9/3/2023	- ACC Bab I - Tambah Daftar Pustaka	
3.	17/3/2023	Revisi Proposal	
4.	20/3/2023	Konsultasi Proposal dan Rabiyah II (Bp Sebastian)	
5.	31/3/2023	ACC Proposal	
6.	26/5/2023	Perkembangan TA, Dan Diskusi Perkembangan TA.	
7.	29/5/2023	Persiapan wiring diagram, Desain Lay out PCB, dan paparan cara kerja rangkaian dan coding.	

No. Dok. F-PBM-17 Tgl. Berlaku : 13 Desember 2010 No. Rev. : 00
Lembar : 2

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	29/5/2023	Analisa wiring diagram dan Finali-sasi bab III perancangan dan faktor.	
9.	7/6/2023	karakteristik dan analisa sistem rangkaian, test Point dan analisa rangkaian dan Penyempurnaan penulisan LAPTA.	
10.	13/6/2023	Evaluasi dan cara kerja rangkaian, perbaikan contents bab III, dan Persi-apan penyelesaian menuju bab IV.	
11.	14/6/2023	Koreksi bab III menuju analisa rangkaian test Poin bab IV	
12.	16/6/2023	Konsep/draft bab IV, Evaluasi capaian peralatan yg dibangun, Full PPt MAX 12 slide. → persiapan ujian LA.	

Palembang, ...

Ketua Jurusan/KPS,

(Ir. Iskandar Lutfi, M.T.)
NIP 196501291991031002

Catatan:
*) melingkari angka yang sesuai.
Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.
Lembar pembimbingan LA ini harus dilampirkan dalam Laporan Akhir.

Lampiran 4 Lembar Bimbingan Tugas Akhir Pembimbing II

No. Dok. : F-PBM-17 Tgl. Berlaku : 13 Desember 2010 No. Rev. : 00

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LEMBAR BIMBINGAN LAPORAN TUGAS AKHIR

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Nama : Nur Alif Zaki Bibrosi
NIM : 061940341937
Jurusan/Program Studi : Teknik Elektro / D4 Sarjana Terapan Teknik Elektro
Judul Tugas Akhir : Analisis sistem monitoring pada kualitas air kolam berdasarkan suhu berbasis internet of things di tani mulya agung
Pembimbing II : Selamat Muslimin, S.T., M. Kom.

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.		Proposal, [illegible] rumusan masalah PA [illegible]	
2.		kontrol dan monitoring	
3.		[illegible] proposal, proses [illegible] kontrol, di rancang [illegible]	
4.		[illegible] (- -).	
5.	20/03 2023	mengganti pembahasan [illegible] belum update	
6.	5/4 2023	BAB 1 – 3. dirunut cara tugas akhir.	
7.	30/5 2023	BAB 3. perancangan —.	

Dipindai dengan CamScanner

No. Dok. : F-PBM-17 | Tgl. Berlaku : 13 Desember 2010 | No. Rev. : 00
Lembar : 2

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	6/6 2023	Penambahan data suhu di heat [illegible] exchanger [illegible] di Pd	
9.		[illegible]	
10.	9/8 2023	Bab IV, Analisa ok, - Data pengujian.	
11.		- analisa data. Pd suhu 28–70[illegible] - suhu perbandingannya.	
12.		- acuan; ~~motor~~ Heater sebagai out. Direkomendasi 9/8 2023.	

Palembang, ...

Ketua Jurusan/KPS,

(Ir. Iskandar Lutfi, M.T.)
NIP 196501291991031002

*) melingkari angka yang sesuai.
Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.
Lembar pembimbingan LA ini harus dilampirkan dalam Laporan Akhir.

Lampiran 5 Data Sheet Sensor Suhu DS18B20

PRELIMINARY

DALLAS SEMICONDUCTOR

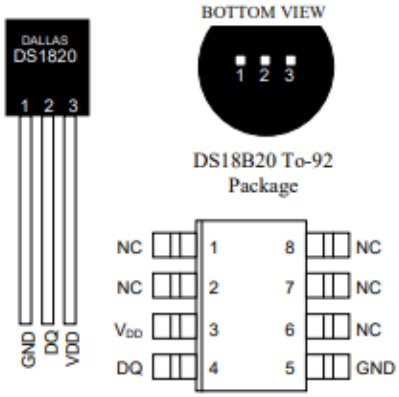
DS18B20
Programmable Resolution 1-Wire® Digital Thermometer

www.dalsemi.com

FEATURES

- Unique 1-Wire interface requires only one port pin for communication
- Multidrop capability simplifies distributed temperature sensing applications
- Requires no external components
- Can be powered from data line. Power supply range is 3.0V to 5.5V
- Zero standby power required
- Measures temperatures from -55°C to +125°C. Fahrenheit equivalent is -67°F to +257°F
- ±0.5°C accuracy from -10°C to +85°C
- Thermometer resolution is programmable from 9 to 12 bits
- Converts 12-bit temperature to digital word in 750 ms (max.)
- User-definable, nonvolatile temperature alarm settings
- Alarm search command identifies and addresses devices whose temperature is outside of programmed limits (temperature alarm condition)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system

PIN ASSIGNMENT



DS18B20 To-92 Package

DS18B20Z
8-Pin SOIC (150 mil)

PIN DESCRIPTION

GND - Ground
DQ - Data In/Out
V_{DD} - Power Supply Voltage
NC - No Connect

DESCRIPTION

The DS18B20 Digital Thermometer provides 9 to 12-bit (configurable) temperature readings which indicate the temperature of the device.

Information is sent to/from the DS18B20 over a 1-Wire interface, so that only one wire (and ground) needs to be connected from a central microprocessor to a DS18B20. Power for reading, writing, and performing temperature conversions can be derived from the data line itself with no need for an external power source.

Because each DS18B20 contains a unique silicon serial number, multiple DS18B20s can exist on the same 1-Wire bus. This allows for placing temperature sensors in many different places. Applications where this feature is useful include HVAC environmental controls, sensing temperatures inside buildings, equipment or machinery, and process monitoring and control.

DETAILED PIN DESCRIPTION Table 1

PIN 8PIN SOIC	PIN TO92	SYMBOL	DESCRIPTION
5	1	GND	Ground.
4	2	DQ	**Data Input/Output pin.** For 1-Wire operation: Open drain. (See "Parasite Power" section.)
3	3	V_{DD}	**Optional V_{DD} pin.** See "Parasite Power" section for details of connection. V_{DD} must be grounded for operation in parasite power mode.

DS18B20Z (8-pin SOIC): All pins not specified in this table are not to be connected.

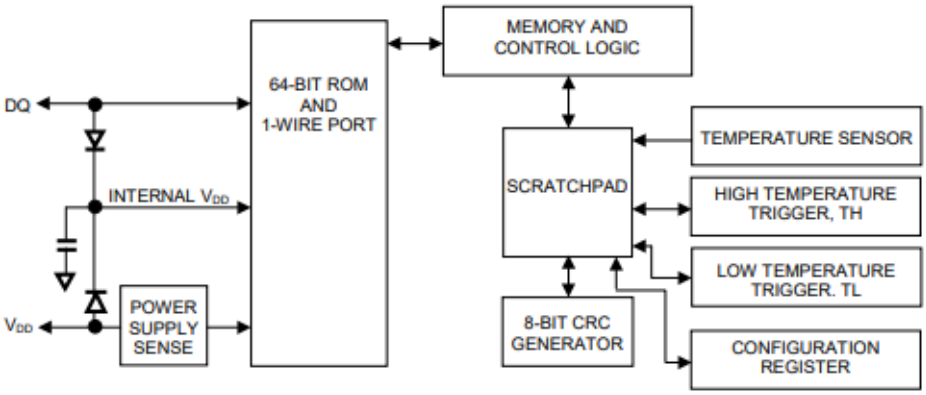
OVERVIEW

The block diagram of Figure 1 shows the major components of the DS18B20. The DS18B20 has four main data components: 1) 64-bit lasered ROM, 2) temperature sensor, 3) nonvolatile temperature alarm triggers TH and TL, and 4) a configuration register. The device derives its power from the 1-Wire communication line by storing energy on an internal capacitor during periods of time when the signal line is high and continues to operate off this power source during the low times of the 1-Wire line until it returns high to replenish the parasite (capacitor) supply. As an alternative, the DS18B20 may also be powered from an external 3 volt - 5.5 volt supply.

Communication to the DS18B20 is via a 1-Wire port. With the 1-Wire port, the memory and control functions will not be available before the ROM function protocol has been established. The master must first provide one of five ROM function commands: 1) Read ROM, 2) Match ROM, 3) Search ROM, 4) Skip ROM, or 5) Alarm Search. These commands operate on the 64-bit lasered ROM portion of each device and can single out a specific device if many are present on the 1-Wire line as well as indicate to the bus master how many and what types of devices are present. After a ROM function sequence has been successfully executed, the memory and control functions are accessible and the master may then provide any one of the six memory and control function commands.

One control function command instructs the DS18B20 to perform a temperature measurement. The result of this measurement will be placed in the DS18B20's scratch-pad memory, and may be read by issuing a memory function command which reads the contents of the scratchpad memory. The temperature alarm triggers TH and TL consist of 1 byte EEPROM each. If the alarm search command is not applied to the DS18B20, these registers may be used as general purpose user memory. The scratchpad also contains a configuration byte to set the desired resolution of the temperature to digital conversion. Writing TH, TL, and the configuration byte is done using a memory function command. Read access to these registers is through the scratchpad. All data is read and written least significant bit first.

DS18B20 BLOCK DIAGRAM Figure 1



PARASITE POWER

The block diagram (Figure 1) shows the parasite-powered circuitry. This circuitry "steals" power whenever the DQ or V_{DD} pins are high. DQ will provide sufficient power as long as the specified timing and voltage requirements are met (see the section titled "1-Wire Bus System"). The advantages of parasite power are twofold: 1) by parasiting off this pin, no local power source is needed for remote sensing of temperature, and 2) the ROM may be read in absence of normal power.

In order for the DS18B20 to be able to perform accurate temperature conversions, sufficient power must be provided over the DQ line when a temperature conversion is taking place. Since the operating current of the DS18B20 is up to 1.5 mA, the DQ line will not have sufficient drive due to the 5k pullup resistor. This problem is particularly acute if several DS18B20s are on the same DQ and attempting to convert simultaneously.

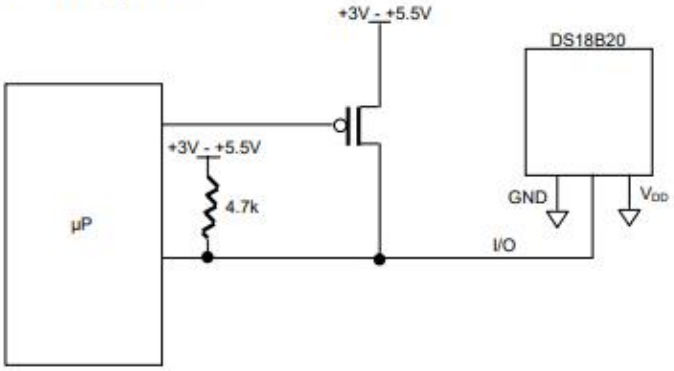
There are two ways to assure that the DS18B20 has sufficient supply current during its active conversion cycle. The first is to provide a strong pullup on the DQ line whenever temperature conversions or copies to the E^2 memory are taking place. This may be accomplished by using a MOSFET to pull the DQ line directly to the power supply as shown in Figure 2. The DQ line must be switched over to the strong pull-up within 10 µs maximum after issuing any protocol that involves copying to the E^2 memory or initiates temperature conversions. When using the parasite power mode, the V_{DD} pin must be tied to ground.

Another method of supplying current to the DS18B20 is through the use of an external power supply tied to the V_{DD} pin, as shown in Figure 3. The advantage to this is that the strong pullup is not required on the DQ line, and the bus master need not be tied up holding that line high during temperature conversions. This allows other data traffic on the 1-Wire bus during the conversion time. In addition, any number of DS18B20s may be placed on the 1-Wire bus, and if they all use external power, they may all simultaneously perform temperature conversions by issuing the Skip ROM command and then issuing the Convert T command. Note that as long as the external power supply is active, the GND pin may not be floating.

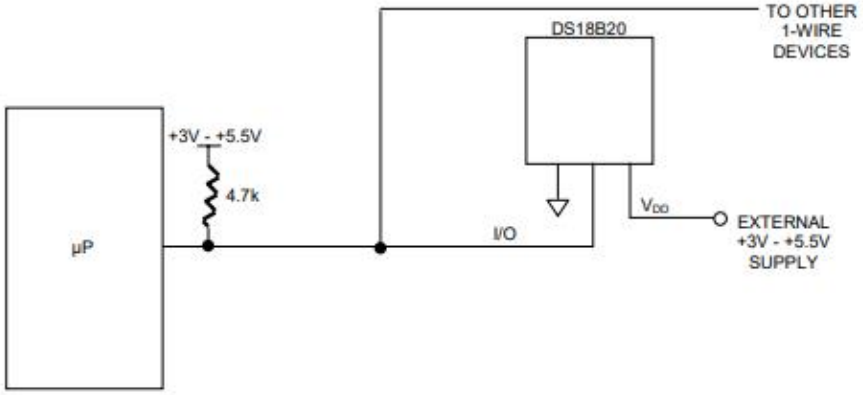
The use of parasite power is not recommended above 100°C, since it may not be able to sustain communications given the higher leakage currents the DS18B20 exhibits at these temperatures. For applications in which such temperatures are likely, it is strongly recommended that V_{DD} be applied to the DS18B20.

For situations where the bus master does not know whether the DS18B20s on the bus are parasite powered or supplied with external V_{DD}, a provision is made in the DS18B20 to signal the power supply scheme used. The bus master can determine if any DS18B20s are on the bus which require the strong pullup by sending a Skip ROM protocol, then issuing the read power supply command. After this command is issued, the master then issues read time slots. The DS18B20 will send back "0" on the 1-Wire bus if it is parasite powered; it will send back a "1" if it is powered from the V_{DD} pin. If the master receives a "0," it knows that it must supply the strong pullup on the DQ line during temperature conversions. See "Memory Command Functions" section for more detail on this command protocol.

STRONG PULLUP FOR SUPPLYING DS18B20 DURING TEMPERATURE CONVERSION Figure 2



USING V_{DD} TO SUPPLY TEMPERATURE CONVERSION CURRENT Figure 3



OPERATION - MEASURING TEMPERATURE

The core functionality of the DS18B20 is its direct-to-digital temperature sensor. The resolution of the DS18B20 is configurable (9, 10, 11, or 12 bits), with 12-bit readings the factory default state. This equates to a temperature resolution of 0.5°C, 0.25°C, 0.125°C, or 0.0625°C. Following the issuance of the Convert T [44h] command, a temperature conversion is performed and the thermal data is stored in the scratchpad memory in a 16-bit, sign-extended two's complement format. The temperature information can be retrieved over the 1-Wire interface by issuing a Read Scratchpad [BEh] command once the conversion has been performed. The data is transferred over the 1-Wire bus, LSB first. The MSB of the temperature register contains the "sign" (S) bit, denoting whether the temperature is positive or negative.

Table 2 describes the exact relationship of output data to measured temperature. The table assumes 12-bit resolution. If the DS18B20 is configured for a lower resolution, insignificant bits will contain zeros. For Fahrenheit usage, a lookup table or conversion routine must be used.

Temperature/Data Relationships Table 2

2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	LSB
MSb				(unit = °C)			LSb	
S	S	S	S	S	2^6	2^5	2^4	MSB

TEMPERATURE	DIGITAL OUTPUT (Binary)	DIGITAL OUTPUT (Hex)
+125°C	0000 0111 1101 0000	07D0h
+85°C	0000 0101 0101 0000	0550h*
+25.0625°C	0000 0001 1001 0001	0191h
+10.125°C	0000 0000 1010 0010	00A2h
+0.5°C	0000 0000 0000 1000	0008h
0°C	0000 0000 0000 0000	0000h
-0.5°C	1111 1111 1111 1000	FFF8h
-10.125°C	1111 1111 0101 1110	FF5Eh
-25.0625°C	1111 1110 0110 1111	FF6Fh
-55°C	1111 1100 1001 0000	FC90h

*The power on reset register value is +85°C.

OPERATION - ALARM SIGNALING

After the DS18B20 has performed a temperature conversion, the temperature value is compared to the trigger values stored in TH and TL. Since these registers are 8-bit only, bits 9-12 are ignored for comparison. The most significant bit of TH or TL directly corresponds to the sign bit of the 16-bit temperature register. If the result of a temperature measurement is higher than TH or lower than TL, an alarm flag inside the device is set. This flag is updated with every temperature measurement. As long as the alarm flag is set, the DS18B20 will respond to the alarm search command. This allows many DS18B20s to be connected in parallel doing simultaneous temperature measurements. If somewhere the temperature exceeds the limits, the alarming device(s) can be identified and read immediately without having to read non-alarming devices.

Lampiran 6 Data Sheet Heater

General Description

Heater can supply only one model of heater which is a 1000 Watts electrical heater.

The heater power level can be adjusted between 0 and 1.0 which means into range of 0 Watt (heater is off) and 1000 Watts (completely turned on). We describe in section Heater device Outline methods linked to this device.

Device properties

Property name	Constant name	Value	Default Value	Type	Modifiable
heater.powerLevel	HEATER_POWER_LEVEL	[0-1.0]	0.0	Double	Yes
heater.maxPowerLevel	HEATER_MAX_POWER_LEVEL	1000	1000	Double	No

Note: 0.0 means 0% of 1000 Watts and 1.0 means 100% of 1000 Watts.

Thermal considerations

Here we describe the global functioning of the simulated device Heater. We take into account physical consideration to compute the temperature (expressed in Kelvin unit) returned by the device. We have considered that the room has no thermal loss and the external temperature does not influence the internal temperature.

Through some differential equations we finally obtain that:

$$T - T_0 = \frac{heater.powerLevel * heater.maxPowerLevel}{C} * t$$

With:

- T [K]: compute temperature
- heater.maxPowerLevel[Watts]: thermal power of the heater
- heater.powerLevel [percentage]: power level of the heater
- t [s]: delta time variation between two temperature calculation
- T_0 [K]: intial temperature
- C [J/K]: thermal capacity which is compute by the formula:

$$C = M_{air} * Volume * C_m \begin{cases} M_{air}: air\ mass\ at\ 20°C\ [1.2Kg/m^3] \\ Volume: the\ volume\ of\ the\ room\ [m^3] \\ C_m: air\ mass\ thermal\ capacity\ [\frac{1000J}{Kg}.K] \end{cases}$$

Note: This calculus is part of the simulator and it is not computed and returned by the device itself.

The illustration beside shows how the heater temperature curve:

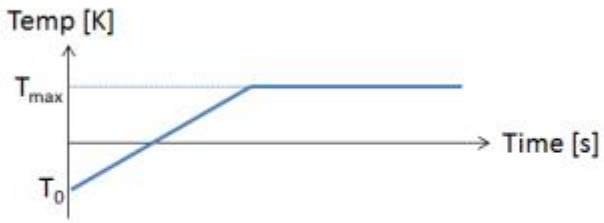


Figure 1: Characteristics curve of heater devices

With:

- T_0: Initial temperature (normally never under 283,16 Kelvin)
- T_{max}: Clipping value of temperature fixed to 303,16 Kelvin

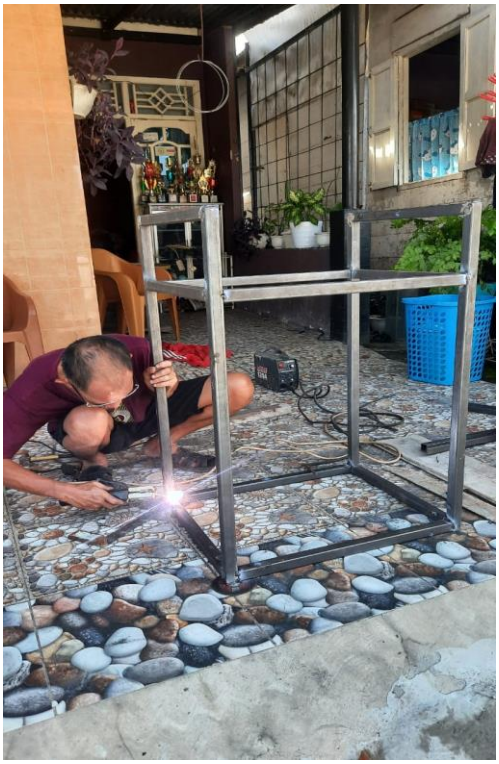
Heater device Outline

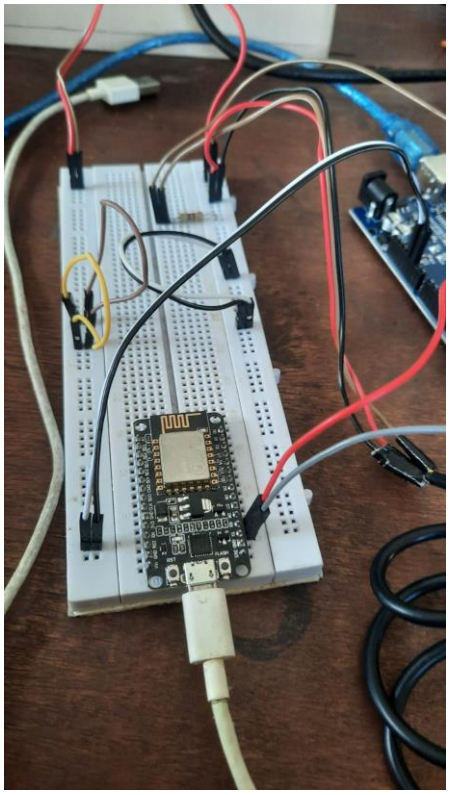
Hereafter we explain methods that can be useful for the user to control a heater.

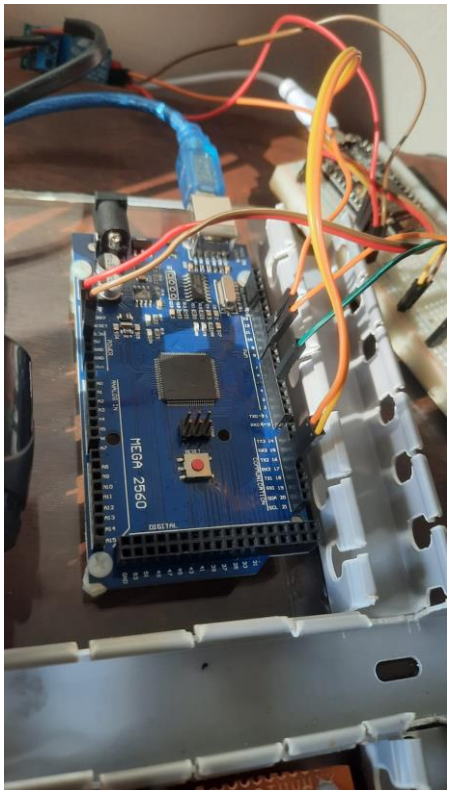
Interface: **fr.liglab.adele.icasa.device.temperature.Heater**

getSerialNumber()	Get the device ID
getPowerLevel()	Get the power level in percentage
setPowerLevel(double level)	Set the power level of the heater in percentage
getMaxPowerLevel()	Get the max power level of the heater in Watts

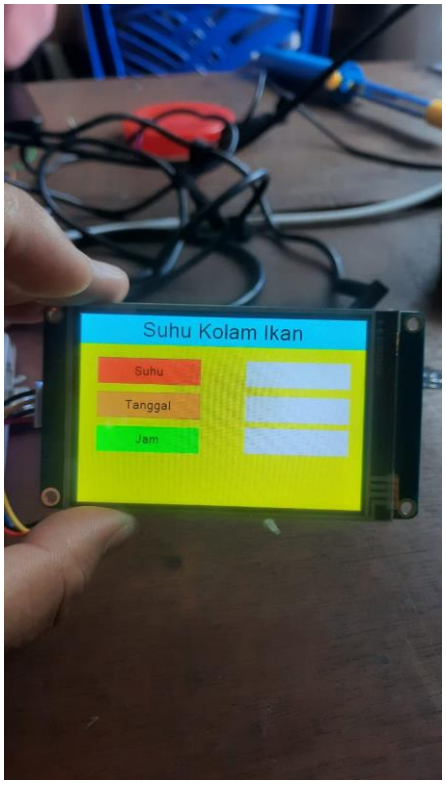
Lampiran 7 Foto Dokumentasi






MEGA 2560


HOMURA
POWER INVERTER
1000W
054


Suhu Kolam Ikan
Suhu
Tanggal
Jam

Lampiran 8 Pelaksanaan Revisi Laporan Tugas Akhir (TA)

KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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PELAKSANAAN REVISI LAPORAN TUGAS AKHIR (TA)

Mahasiswa berikut,

Nama	:	Nur Alif Zaki Bibrosi
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Judul Laporan Akhir	:	Analisis Sistem Monitoring pada Kualitas Air Kolam Berdasarkan Suhu Berbasis *Internet oF Things* di Tani Mulya Plaju

Telah melaksanakan revisi terhadap Laporan Tugas Akhir yang diujikan pada hari Kamis tanggal 10 bulan Agustus tahun 2023. Pelaksanaan revisi terhadap Laporan Tugas Akhir tersebut telah disetujui oleh Dosen Penguji yang memberikan revisi:

No	Komentar	Nama Dosen Penguji *)	Tanggal	Tanda Tangan
1.	Telah diperbaiki	Ir. M. Nawawi, M.T.		
2.		Amperawan, S.T., M.T.		
3.		Sabilal Rasyad, S.T., M.Kom.	26/8-23	
4.	Tdk Revisi	Yudi Wijanarko, S.T., M.T.	18-8-23	
5.	ACC	Yeni Irdayanti, S.T., M.Kom.	16/8-23	
6.	Revised	Yurni Oktarina, S.T., M.T.	14/8 2023	

Palembang, Agustus 2023
Ketua Penguji **),

(Ir. M. Nawawi, M.T.)
NIP.196312221991031006