SELAMAT DATANG

Terimakasih telah membeli produk dari perusahaan kami. Untuk mengoperasikan unit dengan benarsilahkan baca manual operasi ini untuk referensi di masa mendatang.

CATATAN TENTANG PEMASANGAN

Unit ini dirancang untuk mengubah tenaga surya menjadi tenaga listrik. Untuk hasil yang optimal pada pemasangan permukaan unit harus menghadap ke atas atau menghadap ke arah yang mudah mendapat sinar matahari secara langsung. Perlakukan unit dengan baik dan hati-hati karena permukaan beresiko pecah terkena benturan.

DETAIL PRODUK

1. **Kondisi Kerja**
   a. Di bawah sinar matahari temp : -20°C ~ 80°C
2. **Kondisi Standard Pengujian**
   a. E : 1000W/m
   b. Temp : 25°C, kelembaban : 30~90%, Am : 1.5
3. **Material**
   a. Sel :
   b. Metode segel : Lapis kaca
   c. Bahan : Kaca ketebalan 3.2mm, TPE,EVA,Bingkai aluminium
4. **Spesifikiasi**
   a. Sel : MONO
   b. Jumlah sel : 36PCS
   c. Berat : 1.5KGS
   d. Dimensi : 350*290*30MM
   e. Tegangan maksimum : 18V
   f. Arus maksimum : 0.97A

SPESIFIKASI PRODUK

Sumber energi sinar matahari

Material sel

Keluaran tegangan

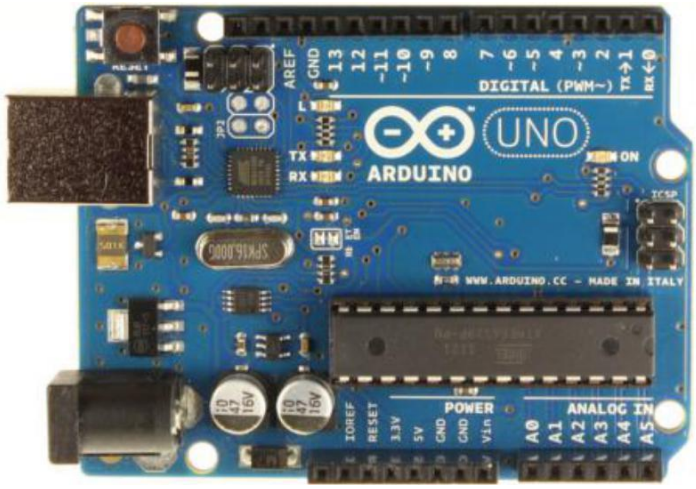
TINDAKAN PENCEGAHAN

1. Perlakukan dengan hati-hati untuk menghindari kerusakan fungsi dan kerusakan fisik
2. Untuk pencegahan resiko benturan, lapisi unit dengan peredam benturan
3. Hindari tempat pemasangan yang terlalu sulit dari jangkauan sinar matahari
4. Perhatikan dengan baik dan benar pada saat pemasangan kabel-kabel (-) dan (+) agar tidak terjadi hubung singkat

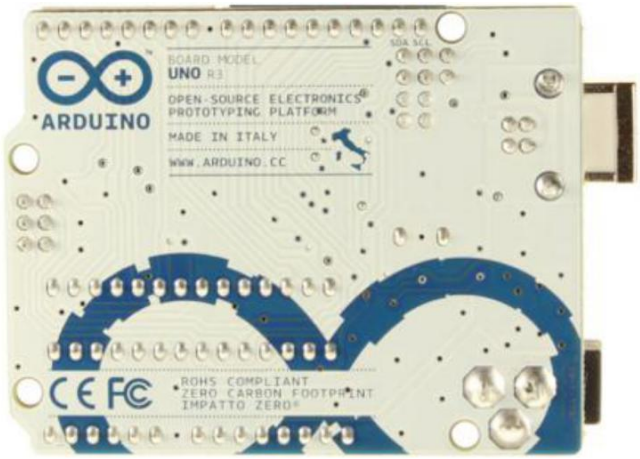
PETUNJUK PEMASANGAN

1. Tentukan lokasi pemasangan unit di tempat yang mudah terpapar sinar matahari
2. Posisikan permukaan unit menghadap ke atas atau ke arah yang mudah terpapar sinar matahari untuk mengoptimalkan sinar matahari yang diterima
3. Hubungkan terminal (-) pada panel surya ke terminal (-) pada alat kontrol pengisian baterai
4. Hubungkan terminal (+) pada panel surya ke terminal (+) pada alat kontrol pengisian baterai
5. Bila penyambungan kabel telah selesai, perangkat siap dioperasikan

Arduino Uno

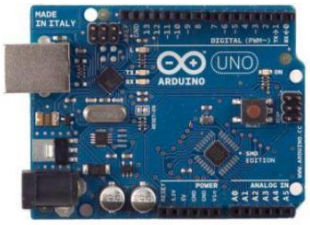


Arduino Uno R3 Front

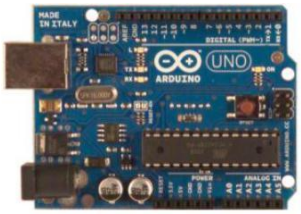


Arduino Uno R3 Back

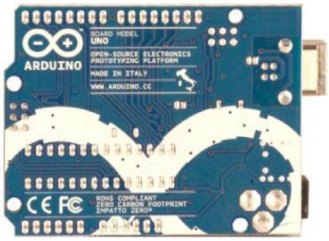
Arduino Uno R2 Front



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.

Memory

The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms.
In addition, some pins have specialized functions:

- **Serial: 0 (RX) and 1 (TX).** Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- ☐ **External Interrupts: 2 and 3.** These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.
- ☐ **PWM: 3, 5, 6, 9, 10, and 11.** Provide 8-bit PWM output with the analogWrite() function.

- ☐ **SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK).** These pins support SPI communication using the SPI library.
- **LED: 13.** There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. Additionally, some pins have specialized functionality:

- ☐ **TWI: A4 or SDA pin and A5 or SCL pin.** Support TWI communication using the Wire library.

There are a couple of other pins on the board:

- ☐ **AREF.** Reference voltage for the analog inputs. Used with analogReference().
- **Reset.** Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

See also the mapping between Arduino pins and ATmega328 ports. The mapping for the Atmega8, 168, and 328 is identical.

Communication

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).
A SoftwareSerial library allows for serial communication on any of the Uno's digital pins.
The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

Programming

The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno from the **Tools > Board** menu (according to the microcontroller on your board). For details, see the reference and tutorials.
The ATmega328 on the Arduino Uno comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).
You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details.
The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available . The ATmega16U2/8U2 is loaded with a DFU bootloader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.
- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU bootloader). See this user-contributed tutorial for more information.

Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.
The Uno contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line; see this forum thread for details.

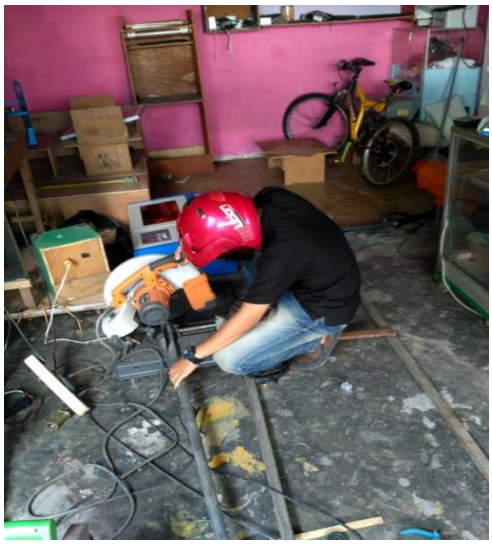
USB Overcurrent Protection

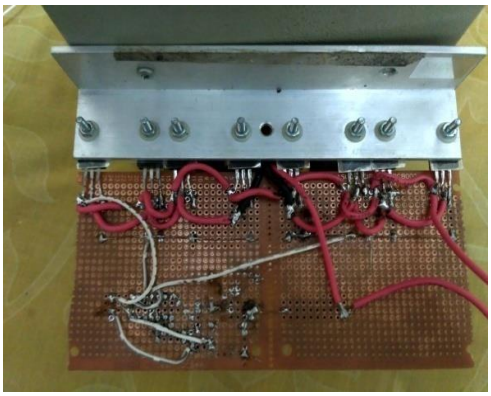
The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

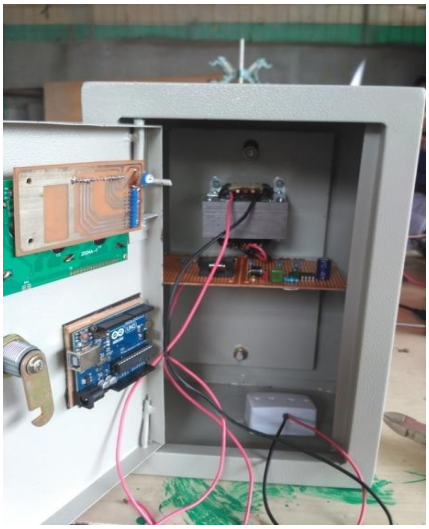
Physical Characteristics

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

Proses Pembuatan Alat







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Jurusan	: Teknik Elektro
Program Studi	: Teknik Listrik

Pada hari ini ..Senin..... tanggal ...17 April 2017..... telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari ..Senin & kamis. pukul ..10.00....., tempat di Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Laporan Akhir.

Palembang, ...17 April 2017...

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Program Studi	: Teknik Listrik

Pada hari ini ..Rabu.. tanggal ..03 Mei 2017.. telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

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Palembang, ..3 MEI 2017..

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No. Dok. : F-PBM-17 | Tgl. Berlaku : 31 Desember 2017 | No. Rev. : 00

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Pembimbing (I)/ II *) : SUTAN MARSUS, S.S.T., M.T.

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	8/5-17	Bab I (perbaiki Bab II ((lihat pada tulisan)	
2.	17/5-17	Bab II → perbaiki (lihat tulisan) Bab I → ACC.	
3.	18/5-17	Bab II → Perbaiki lagi (lihat tulisan)	
4.	22/5-17	Bab II → Perbaiki (setiap Gambar diberi Footnote & jarak sub bab 2 spasi)	
5.	23/5-17	Bab II → perbaiki (lihat tulisan)	
6.	24/5-17	Bab II → Perbaiki Tambahkan Bhs. pemrograman (assembler)	
7.	29/5-17	Bab II → ACC Lanjutkan ke Bab III	

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	7/6-17	Bab III → perbaiki lihat pd tulisan	
9.	13/6-17	Bab III → perbaiki. lagi lihat pd tulisan	
10.	19/6-17	Bab II → ACC Lanjut Bab IV	
11.	20/6-17	Bab IV → perbaiki. lihat pd tulisan	
12.	23/6-17	Bab IV → Acc. Lanjut Bab V	
13.	3/7-17	Bab V → Acc Tambah dengan Daftar ... Kata pengantar, Abstrak	
14.		Siap untuk	
15.		di sidangkan	
16.			
17.			

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
18.	3/7-17	Tambahkan dengan	
19.		Daftar ∑ tabel, gambar	
20.		Pustaka, Lampiran	
21.		Kata pengantar dan	
22.		abstrak.	
23.			
24.			

Palembang, 27 Juli 2017

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Pembimbing I / (II) *) : INDAH SUSANTI, S.T., M.T

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	16/2 -2017	*Proposal → konsultasi →perbaikan bab 1 dan 2.	
2.	23/2 -2017	Proposal acc.	
3.	8/5 -2017	perbaikan bab 1 ⇒ paragraf 1 dan 2 latar belakang dipersjelas. ⇒ tujuan, perumusan masalah diperbaiki	
4.	10/5 -2017	* Bab I acc * Bab 2 ⇒ Diperbaiki tulisan, kalimat, penggunaan catatan kaki, tabel - tabel,	
5.	17/5 -2017	* Bab 2 ⇒ penulisan ket. tabel, ket. gambar, tata cara penulisan setelah paragraf.	
6.	31/5 -2017	* Bab 2 ⇒ acc. * lanjutkan bab 3.	
7.	12/6 -2017	* Bab 3 ⇒ - perbaiki ket. gambar rancang bangun. tdk menggambarkan karya ilmiah. - penulisan pada tabel tolong diperbaiki - peletakkan gambar kurang rapi.	

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	14/6 - 2017	* Bab 3 ⇒ Penjelasan tentang rancang bangun kurang jelas.	
9.	21/6 - 2017	* Bab 3 acc * Bab 4 tambahkan grafik V, I, intensitas, kemiringan.	
10.	6/7 - 2017	* Bab 4 poin 4.8 harus menggunakan angka, bukan huruf. * Bab 5 perbaiki kesimpulan, 2, 3, 4 dan saran. * Dilengkapi daftar isi, kata pengantar.	
11.	13/7 - 2017	* bab 4 acc * Bab 5 acc Semangat sidang! PPT tolong sebrat,	
12.			

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Catatan:
*) melingkari angka yang sesuai.
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Pembimbing Laporan Akhir memberikan rekomendasi kepada,

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Judul Laporan Akhir	:	Rancang Bangun Pemanfaatan *Solar Cell* Pada Sistem Otomatisasi Lampu Penerangan Taman Berbasis *Arduino Uno*

Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti Ujian Laporan Akhir (LA) pada Tahun Akademik 2016/2017

Palembang, 6 JULI 2017

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REVISI UJIAN LAPORAN AKHIR (LA)

Ruang : 2
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Jurusan/Program Studi : T. Elektro
Judul Laporan Akhir : Solar Cell

No	Uraian Revisi	Paraf
1	Daftar Pustaka dibuat NO.	Telah di Revisi 20/7 2017
2	T. Pustaka di tambah Tipe Solar Cell	
3	Bab IV. Pembahasan dan Bab V Kesimpulan dan Saran pd Dapat ISI	

Palembang, 20 - 7 - 2017
Dosen Penguji

(ZAINUDDIN IDRIS)

No. Dok. : F-PBM-22 | Tgl. Berlaku : 13 Desember 2010 | No. Rev. : 00

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Jurusan/Program Studi : .....
Judul Laporan Akhir : .....
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No	Uraian Revisi	Paraf
1	Daftar Pustaka jsn Http Jarak 1 – 2 → . . .	

Palembang, 18-07-17
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Jurusan/Program Studi : .....
Judul Laporan Akhir : .....

No	Uraian Revisi	Paraf
-	flow Chat	
-	DAFTAR pustaka	

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Dosen Penguji

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Mahasiswa berikut,

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NIM : 061430311970

Jurusan/Program Studi : T. ELEKTRO / T. LISTRIK

Judul Laporan Akhir : RANCANG BANGUN PEMANFAATAN SOLAR CELL PADA SISTEM OTOMATISASI LAMPU PENERANGAN TAMAN BERBASIS ARDUINO UNO

Telah melaksanakan revisi terhadap Laporan Akhir yang diujikan pada hari SELASA tanggal 18 bulan JULI tahun 2017. Pelaksanaan revisi terhadap Laporan Akhir tersebut telah disetujui oleh Dosen Penguji yang memberikan revisi:

No.	Komentar	Nama Dosen Penguji *)	Tanggal	Tanda Tangan
1	Selesai direvisi	Ir. ZAINUDDIN, MKES	20/7 2017	
2	Sudah direvisi	KHURHAIDA	20/07 2017	
3	Sudah direvisi	Notransa	22/7 2017	

Palembang, 20 Juli 2017

Ketua Penguji **),

(KHURHAIDA)

NIP 196409121989032002

Catatan:
*) Dosen penguji yang memberikan revisi saat ujian laporan akhir.
**) Dosen penguji yang ditugaskan sebagai Ketua Penguji saat ujian LA.
Lembaran pelaksanaan revisi ini harus dilampirkan dalam Laporan Akhir.