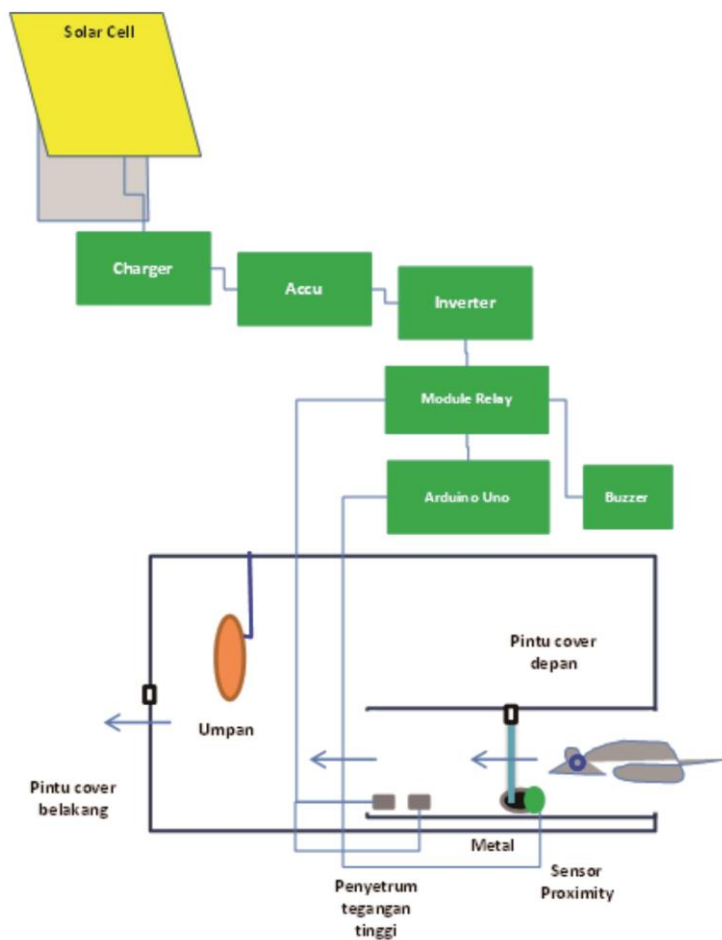


LAMPIRAN

LAMPIRAN 1

SKEMA ALAT KESELURUHAN



Skema Alat Keseluruhan			Keterangan :	
UNIVERSITAS NEGERI YOGYAKARTA	Skala :	Distj : Masduki Z	A4	NO. 1
	Digmb : Ichwan CR	Diprs : Masduki Z	15507134019	

LAMPIRAN 2

DAFTAR KOMPONEN, ALAT, BAHAN

Komponen:

1. Arduino Uno
2. Relay 2 Channel
3. Sensor Proximity
4. Buzzer 220VAC
5. Solar Cell
6. Solar Charger Control
7. Baterai (*Accu*)
8. Inverter

Alat:

1. Solder
2. Tenol
3. Gergaji Besi
4. Bor Tangan
5. Gerinda
6. Tang Kombinasi
7. Gunting
8. Cutter
9. Obeng
10. Multimeter

Bahan:

1. Akrilik
2. Plat Alumunium
3. Besi
4. Kabel
5. Mur & Baut
6. Insulock
7. Kabel NYAF
8. Isolasi Hitam

Daftar Komponen, Alat, Bahan			Keterangan :	
			A4	NO. 2
UNIVERSITAS NEGERI YOGYAKARTA	Skala :	Distj : Masduki Z	15507134019	
	Digmb : Ichwan CR	Diprs : Masduki Z		

LAMPIRAN 3

GAMBAR ALAT



Frame Alat

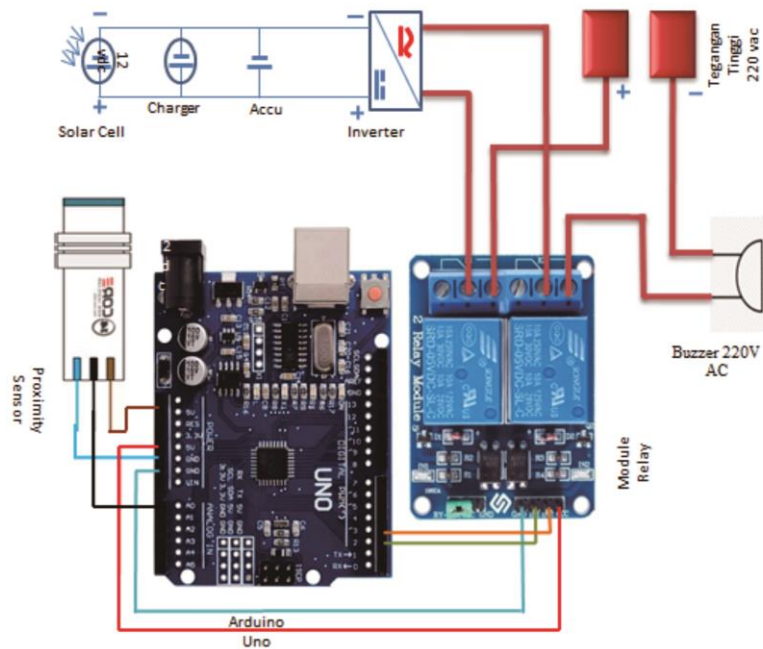


Alat Keseluruhan

Gambar Alat			Keterangan :	
			A4	NO. 3
UNIVERSITAS NEGERI YOGYAKARTA	Skala :	Distj : Masduki Z	15507134019	
	Digmb : Ichwan CR	Diprs : Masduki Z		

LAMPIRAN 4

SKEMA RANGKAIAN KESELURUHAN



Skema Rangkaian Keseluruhan			Keterangan :	
UNIVERSITAS NEGERI YOGYAKARTA	Skala :	Distj : Masduki Z	A4	NO. 4
	Digmb : Ichwan CR	Diprs : Masduki Z	15507134019	

LAMPIRAN 5

KEAMANAN (*Safety*)

Keamanan:

A. Resiko Bahaya

1. Tersengat listrik tegangan tinggi (Plat Penyetrum).
2. Menyebabkan terkejut, bahkan bisa berakibat fatal.

B. Alat Pelindung Diri (APD)

1. Gunakan sarung tangan saat dan matikan power listrik melakukan perbaikan atau perawatan.
2. Gunakan *ear plug* (alat pelindung telinga) saat buzzer bunyi.

C. Perlakuan Kerja Aman

1. Tidak boleh menyentuh plat tegangan tinggi saat masih aktif.
2. Jauhkan alat dari area basah

Keamanan (<i>Safety</i>)			Keterangan :	
UNIVERSITAS NEGERI YOGYAKARTA	Skala :	Distj : Masduki Z	A4	NO. 5
	Digmb : Ichwan CR	Diprs : Masduki Z	15507134019	

LAMPIRAN 6

LISTING PROGRAM

```
/*
TEST CODE FOR PROXIMITY SENSOR
Metal Detection with 3 wire sensor
*/

void setup() {
  pinMode (2, OUTPUT); // mendefinisikan pin 2 sebagai output (Relay IN1)
  pinMode (3, OUTPUT); // mendefinisikan pin 3 sebagai output (Relay IN2)
  Serial.begin (9600);
}

void loop() {

  int NilaiSensor = analogRead(A0);

  float Tegangan = NilaiSensor * (5.0 / 1023.0);

  if (NilaiSensor > 3) {
    digitalWrite (2, LOW);
    digitalWrite (3, LOW);
  }

  else {
    digitalWrite (2, HIGH);
    digitalWrite (3, HIGH);
  }

  Serial.println (Tegangan);
}
```

Listing Program			Keterangan :	
			A4	NO. 6
UNIVERSITAS NEGERI YOGYAKARTA	Skala :	Distj : Masduki Z	15507134019	
	Digmb : Ichwan CR	Diprs : Masduki Z		

LAMPIRAN 7

Uji Lapangan Automatic Mouse Trap

Yaitu pengujian alat untuk menangkap tikus

Lokasi pengujian : Sawah milik Pak Kasna

Alamat di Dusun Karanggayam RT 03 (Ketua RT)

Bantul, Bantul Kota, Jawa Tengah

Waktu pengujian : 15 Desember s/d 19 Desember 2018

Hasil : Hasil pengujian disajikan pada tabel berikut:

Hari Ke -	Sensor Proximity <i>Inductive</i>	RELAY	Tegangan tinggi 220 vac (penyetrum)	BUZZER	Jumlah Tikus Yang Tertangkap	Kondisi Tikus
1	Cover Terbuka	HIGH	AKTIF	ON	1	Tikus Mati
2	Cover Terbuka	HIGH	AKTIF	ON	2	Tikus Mati
3	Cover Terbuka	HIGH	AKTIF	ON	1	Tikus Mati
4	Cover Tertutup	LOW	-	OFF	-	-
5	Cover Tertutup	LOW	-	OFF	-	-

LAMPIRAN 8

DATASHEET SOLAR CELL



Solar Panel – Polycrystalline (SPM050-P) with 50 Wp

EFFICIENCY

- Low voltage-temperature coefficient ensures high-temperature operation
- Exceptional low-light performance combined with high sensitivity to light enables excellent energy delivery
- Up to 17.37% solar cell efficiency
- Up to 14.62% module efficiency

MATERIALS

- Highest quality, high-transmission tempered glass provides enhanced stiffness and impact resistance
- Advanced EVA encapsulation system with triple-layer back sheet meets the most stringent safety requirements for high-voltage operation
- A sturdy, anodized aluminum frame allows modules to be easily roof-mounted with a variety of standard mounting systems
- Ultra reliable bypass diodes prevent damage through overheating due to shaded or defective cells
- Innovative, environmentally friendly packaging method using pile-edges ensures modules arrive in perfect condition



BENEFITS

- Manufactured in an ISO 9001:2000 certified plant
- High efficiency, high safety, high reliability
- Output power tolerance of +/-5%
- 25-year limited warranty on power output, 5-year limited warranty on materials and workmanship
- Generate more energy per square meter
- Equipped weatherproof junction box, flawless operation in wet weather and marine applications
- Resilient to harsh weather conditions
- Optimal panel performance
- Long term product performance



Specifications

Cells	Polycrystalline silicon solar cells 156x156mm
Number of cells	36(4×9)
Dimensions (mm)	760 x668 x 35
Weight (kg)	6.5

Electrical Characteristics

Values at Standard Test Conditions STC (Air Mass AM1.5, Irradiance 1000W/m², Cell Temperature 25°C)

Model	SPM050-P
Max Power P _m (W)	50
Max Power Voltage V _m (V)	18.8
Max Power Current I _m (A)	2.65
Open-Circuit Voltage V _{oc} (V)	21.3
Short-Circuit Current I _{sc} (A)	2.84
Cell Efficiency (%)	13.2
Module Efficiency (%)	10.0
Maximum System Voltage (V)	DC715V
Power Tolerance (%)	±3
Series Fuse Rating (A)	10

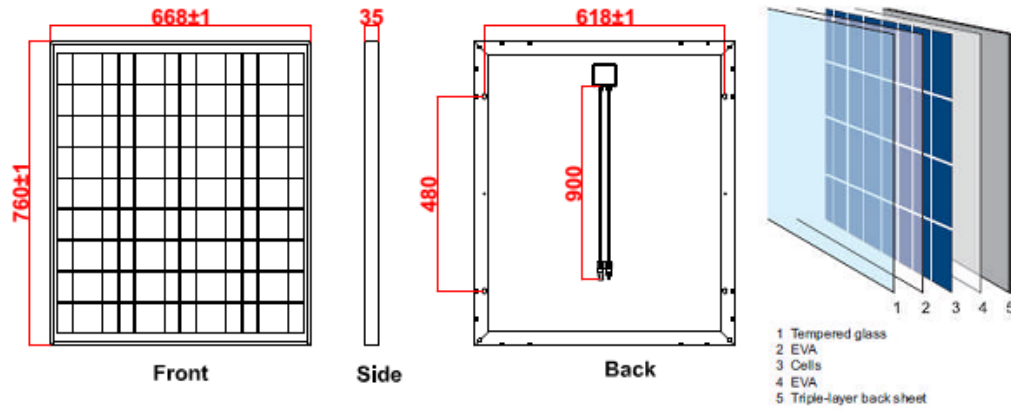
Components & Mechanical Data

Front Glass	High Transparency Tempered Glass, 3.2mm
Output Cables	4m 3*0.9mm
Connectors	MC4(UV resistance and self-locking/IP67)
Frame	Anodized aluminum alloy type 6063-T5
Encapsulation Material	EVA (0.50 ± 0.03mm thickness)
Back Foil	White TPT (0.32 ± 0.03mm thickness)
Fixing adhesive	Silicone Sealant(White)
Temperature Range(°C)	-40°C to +90°C

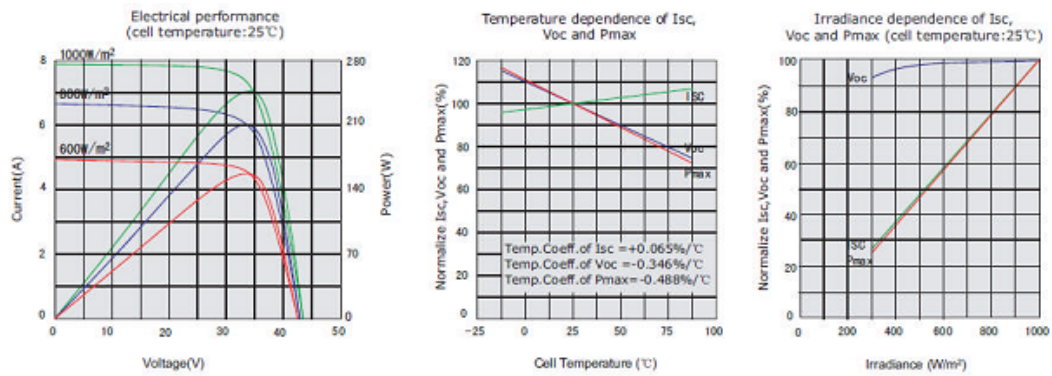
Temperature Coefficients

NOCT (°C)	47±2
Temperature Coefficient of P _m (%/°C)	-0.45±0.05
Temperature Coefficient of I _{sc} (%/°C)	0.05±0.01
Temperature Coefficient of V _{oc} (%/°C)	-0.35±0.02

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS



LAMPIRAN 9

DATASHEET BUZZER 220V AC

BUZZER 220V AC

Model:HRB-N80



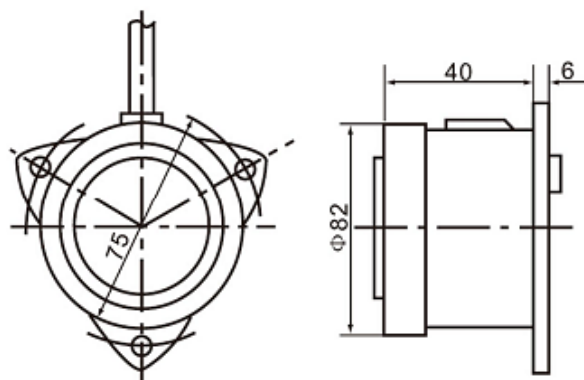
Features:

- The most popular electronic buzzer , suit for the industry field.
- High quality, and last working for a long time, no Electromagnetic Interference.
- Long life, and nice tone.
- Function: continual alarm and intermittent alarm optional.

Technical Data:

Model	Voltage	Current(A)	Frequency(Hz)	decibel	Size	Weight
HRB-N80	AC220V	30mA	50	80dB	8.4x8.2x4.9cm	97g

Shape:



Made in China

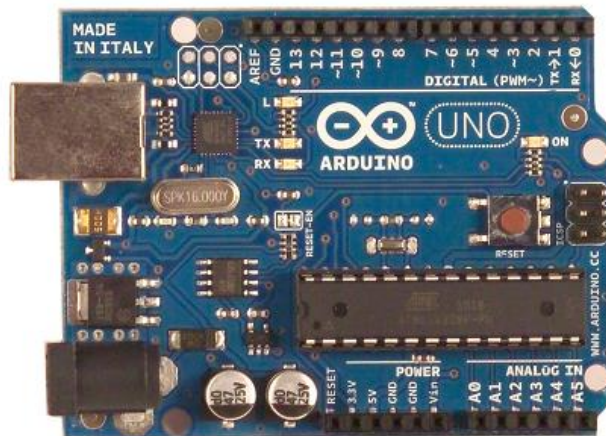
EKT
Electronics Katrangi Trading

www.ekt2.com

LAMPIRAN 10

DATASHEET ARDUINO

Arduino UNO



Product 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 crystal oscillator, 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 Atmega8U2 programmed as a USB-to-serial converter.

"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](#).

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Enviromental Policies half sqm of green via Impatto Zero®

Page 7



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Technical Specification

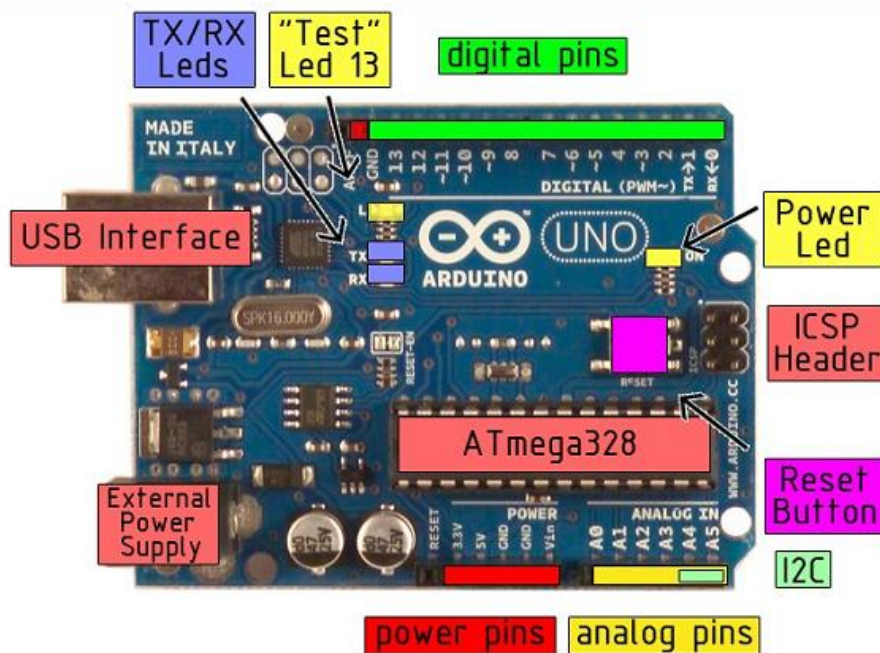


EAGLE files: [arduino-duemilanove-uno-design.zip](#) Schematic: [arduino-uno-schematic.pdf](#)

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 of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz

the board



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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.** The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.
- **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 of flash memory for storing code (of which 0.5 KB is used for the bootloader); It has also 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, which, although provided by the underlying hardware, is not currently included in the Arduino language.
- **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.



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

- **I²C: 4 (SDA) and 5 (SCL).** Support I²C (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](#).

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 ATmega8U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '8U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, an *.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 support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the [documentation](#) for details. To use the SPI communication, please see the ATmega328 datasheet.

Programming

The Arduino Uno can be programmed with the Arduino software ([download](#)). Select "Arduino Uno w/ ATmega328" 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 ATmega8U2 firmware source code is available . The ATmega8U2 is loaded with a DFU bootloader, which can be activated by connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2. 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).



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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 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. Three 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.



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How to use Arduino



Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the [Arduino programming language](#) (based on [Wiring](#)) and the Arduino development environment (based on [Processing](#)). Arduino projects can be stand-alone or they can communicate with software on running on a computer (e.g. Flash, Processing, MaxMSP).

Arduino is a cross-platform program. You'll have to follow different instructions for your personal OS. Check on the [Arduino site](#) for the latest instructions. <http://arduino.cc/en/Guide/HomePage>

Linux Install

Windows Install

Mac Install

Once you have downloaded/unzipped the arduino IDE, you can Plug the Arduino to your PC via USB cable.

Blink led

Now you're actually ready to "burn" your first program on the arduino board. To select "blink led", the physical translation of the well known programming "hello world", select

**File>Sketchbook>
Arduino-0017>Examples>
Digital>Blink**

Once you have your sketch you'll see something very close to the screenshot on the right.

In **Tools>Board** select

Now you have to go to **Tools>SerialPort** and select the right serial port, the one arduino is attached to.

```
int ledPin = 13; // LED connected to digital pin 13

// The setup() method runs once, when the sketch starts

void setup() {
  // initialize the digital pin as an output:
  pinMode(ledPin, OUTPUT);
}

// the loop() method runs over and over again,
// as long as the Arduino has power

void loop() {
  digitalWrite(ledPin, HIGH); // set the LED on
  delay(1000);                // wait for a second
  digitalWrite(ledPin, LOW);  // set the LED off
  delay(1000);                // wait for a second
}
```



Done compiling.

Press Compile button
(to check for errors)



Upload



TX RX Flashing



Blinking Led!

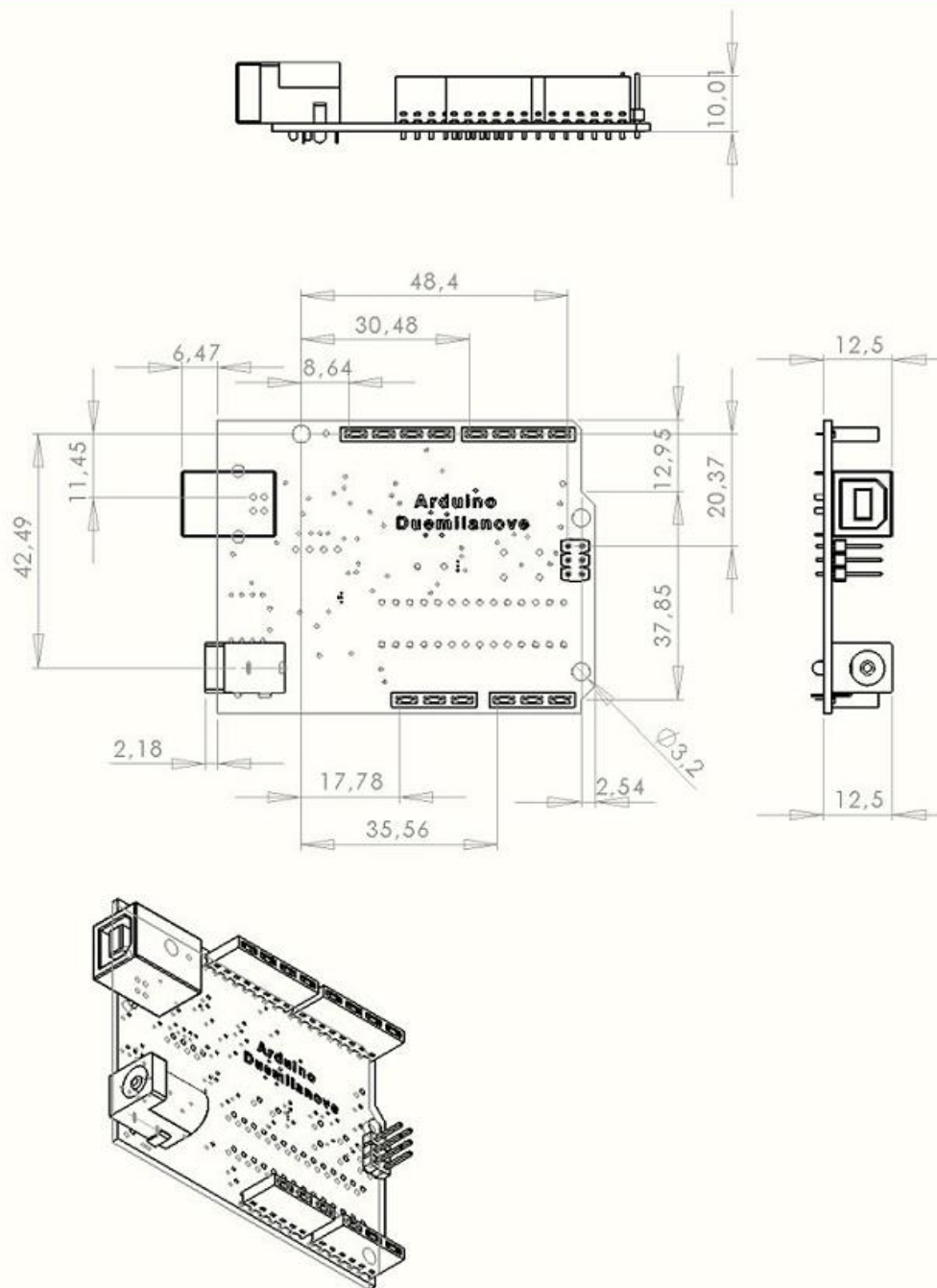


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Dimensioned Drawing



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Terms & Conditions



1. Warranties

1.1 The producer warrants that its products will conform to the Specifications. This warranty lasts for one (1) years from the date of the sale. The producer shall not be liable for any defects that are caused by neglect, misuse or mistreatment by the Customer, including improper installation or testing, or for any products that have been altered or modified in any way by a Customer. Moreover, The producer shall not be liable for any defects that result from Customer's design, specifications or instructions for such products. Testing and other quality control techniques are used to the extent the producer deems necessary.

1.2 If any products fail to conform to the warranty set forth above, the producer's sole liability shall be to replace such products. The producer's liability shall be limited to products that are determined by the producer not to conform to such warranty. If the producer elects to replace such products, the producer shall have a reasonable time to replacements. Replaced products shall be warranted for a new full warranty period.

1.3 EXCEPT AS SET FORTH ABOVE, PRODUCTS ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." THE PRODUCER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING PRODUCTS, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

1.4 Customer agrees that prior to using any systems that include the producer products, Customer will test such systems and the functionality of the products as used in such systems. The producer may provide technical, applications or design advice, quality characterization, reliability data or other services. Customer acknowledges and agrees that providing these services shall not expand or otherwise alter the producer's warranties, as set forth above, and no additional obligations or liabilities shall arise from the producer providing such services.

1.5 The Arduino™ products are not authorized for use in safety-critical applications where a failure of the product would reasonably be expected to cause severe personal injury or death. Safety-Critical Applications include, without limitation, life support devices and systems, equipment or systems for the operation of nuclear facilities and weapons systems. Arduino™ products are neither designed nor intended for use in military or aerospace applications or environments and for automotive applications or environment. Customer acknowledges and agrees that any such use of Arduino™ products which is solely at the Customer's risk, and that Customer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

1.6 Customer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products and any use of Arduino™ products in Customer's applications, notwithstanding any applications-related information or support that may be provided by the producer.

2. Indemnification

The Customer acknowledges and agrees to defend, indemnify and hold harmless the producer from and against any and all third-party losses, damages, liabilities and expenses it incurs to the extent directly caused by: (i) an actual breach by a Customer of the representation and warranties made under this terms and conditions or (ii) the gross negligence or willful misconduct by the Customer.

3. Consequential Damages Waiver

In no event the producer shall be liable to the Customer or any third parties for any special, collateral, indirect, punitive, incidental, consequential or exemplary damages in connection with or arising out of the products provided hereunder, regardless of whether the producer has been advised of the possibility of such damages. This section will survive the termination of the warranty period.

4. Changes to specifications

The producer may make changes to specifications and product descriptions at any time, without notice. The Customer must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." The producer reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The product information on the Web Site or Materials is subject to change without notice. Do not finalize a design with this information.



Environmental Policies



The producer of Arduino™ has joined the Impatto Zero® policy of LifeGate.it. For each Arduino board produced is created / looked after half squared Km of Costa Rica's forest's.



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LAMPIRAN 11

DATASHEET RELAY MODULE 2-CHANNEL


HT

Handson Technology

User Guide

2 Channel 5V Optical Isolated Relay Module

This is a LOW Level 5V 2-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.
- 2 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.

1

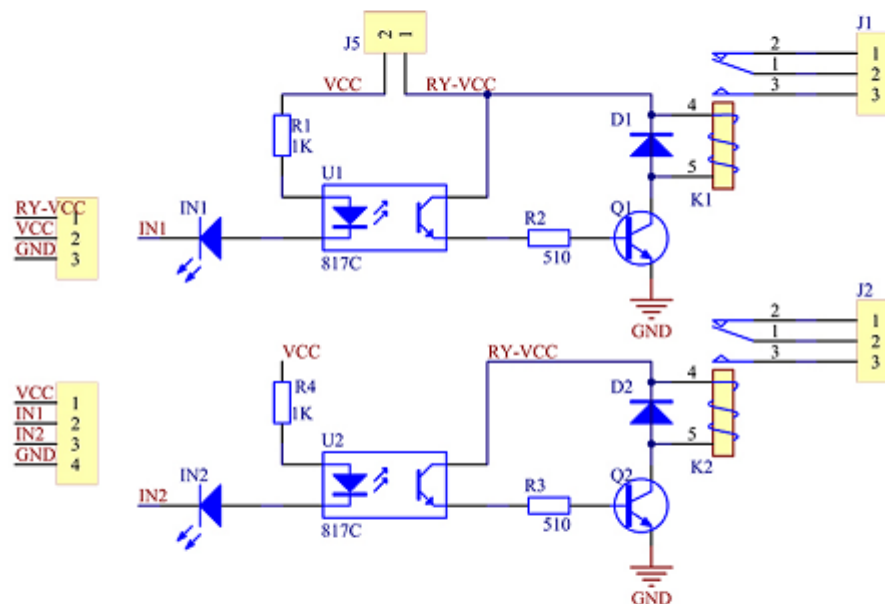
www.handsontec.com

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.

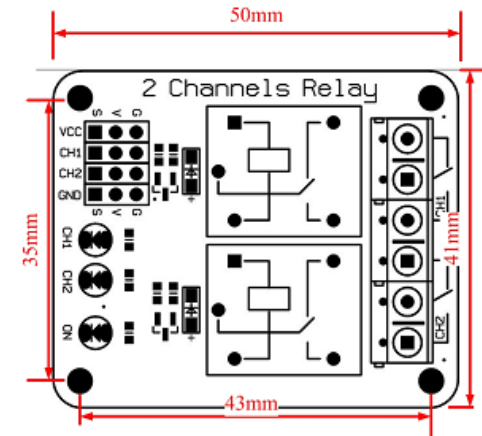


It is sometimes possible to use this relay boards with 3.3V signals, if the JD-VCC (Relay Power) is provided from a +5V supply and the VCC to JD-VCC jumper is removed. That 5V relay supply could be totally isolated from the 3.3V device, or have a common ground if opto-isolation is not needed. If used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

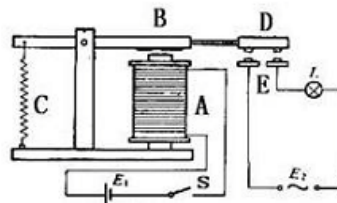
NOTE: The digital inputs from Arduino are Active LOW: The relay actuates and LED lights when the input pin is LOW, and turns off on HIGH.

Module Layout:



Operating Principle:

See the picture below: A is an electromagnet, B armature, C spring, D moving contact, and E fixed contacts. There are two fixed contacts, a normally closed one and a normally open one. When the coil is not energized, the normally open contact is the one that is off, while the normally closed one is the other that is on.



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

Output:

Each module of the relay has one NC (normally close), one NO (normally open) and one COM (Common) terminal. So there are 2 NC, 2 NO and 2 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 2-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.

LAMPIRAN 12

DATASHEET SENSOR PROXIMITY



PS-12 Inductive Proximity Switch



SAFEGUARDS AND PRECAUTIONS:



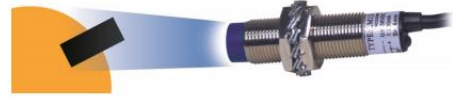
Read and follow all instructions in this instruction sheet carefully, and retain this sheet for future reference.

Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.

This instrument is not user serviceable. For technical assistance, contact the sales organization from which you purchased the product.

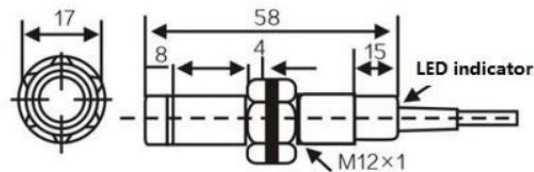
DESCRIPTION:

The PS-12 is a three wire sensor that outputs an open collector PNP pulse. The sensor operates at a 0.15 inch (4 mm) gap with a 0.45 inch (12 mm) target and has a red LED on-target indicator. The sensor is housed in a threaded metal IP67 shell and supplied with an M12 nut and 6-foot shielded cable with tinned wires.

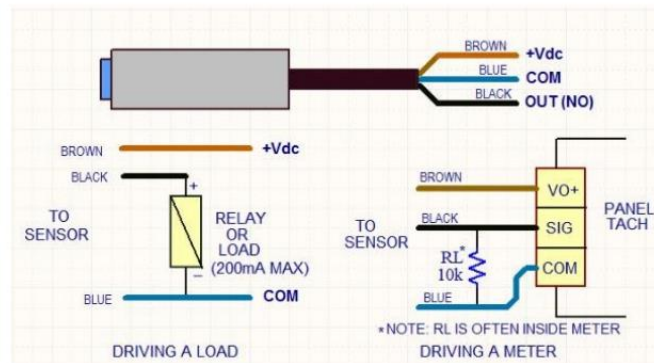


SPECIFICATIONS:

Input Voltage:	6 - 36 Vdc @ 15 mA
Output:	Open Collector PNP - Normally Open (NO)
Sensing Distance:	0.15" (4 mm) - Target should be at least = sensor diameter
Sense Indicator:	LED indicates target present
Max Speed:	24,000 RPM (400 Hz)
Operating Temp.:	-13° to +167° F [-25° to +75° C]
Cable Length:	6 feet [1.8 m]
Material:	Threaded metal
Protection:	IP67
Mechanical:	Standard Size: M12
Dimensions:	2.0" (L) x 0.48" diameter [50 x 12 mm]



CONNECTION DETAIL:

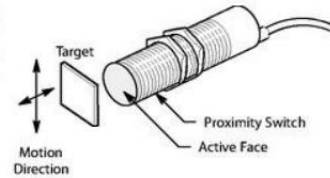


OPERATING PRINCIPLE:

Inductive proximity switches are used for non-contact detection of metallic objects. Their operating principle is based on a coil and oscillator that creates an electromagnetic field in the close surroundings of the sensing surface. The presence of a metallic object in the operating area causes a dampening of the oscillation amplitude. The rise or fall of such oscillation is identified by a threshold circuit that changes the output of the sensor. Current consumption of an inductive proximity switch decreases proportional to the metal object distance.

SETTING OPERATING DISTANCE:

To ensure stable operation at environmental extremes, the sensing distance should be set to 80% of the rated distance. The detection distance is dependent upon the size and material of the target. The PS-12 is specified for an iron target. A stainless steel target will reduce the sensing distance to 50%. Brass, Aluminum or Copper targets will reduce the sensing distance to around 40%.

**In order to comply with EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE):**

This product may contain material which could be hazardous to human health and the environment. DO NOT DISPOSE of this product as unsorted municipal waste. This product needs to be RECYCLED in accordance with local regulations, contact your local authorities for more information. This product may be returnable to your distributor for recycling - contact the distributor for details.

CE Compliant. RoHS Compliant.

Monarch Instrument's Limited Warranty applies. See www.monarchinstrument.com for details.

Warranty Registration and Extended Warranty coverage available online at www.monarchinstrument.com.