Lampiran 1 : Program Alat

Program Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID

```
#define pin_pintu1 1
#define pin_pintu2 7
#define pin_simpan 9
#define pin_ambil 10
#define spintu1 6
#define spintu2 5

#include <Keypad.h>
#include <EEPROM.h>
#include <Servo.h>

#include <Wire.h>
#include <LCD.h>
#include <LiquidCrystal_I2C.h>  //Library LCD I2C
Servo pintu1, pintu2;
#define I2C_ADDR    0x3F        //LCD (jika tidak bisa 3F ganti 27F)
#define BACKLIGHT_PIN   3
#define En_pin  2
#define Rw_pin  1
#define Rs_pin  0
#define D4_pin  4
#define D5_pin  5
#define D6_pin  6
#define D7_pin  7

LiquidCrystal_I2C lcd(I2C_ADDR, En_pin, Rw_pin, Rs_pin, D4_pin, D5_pin,
D6_pin, D7_pin);

//kita punya 4 kolom dan 4 baris pada keyboard
const byte ROWS = 4; //four rows
```

```
const byte COLS = 4; //four columns
//urutan pada keypad
char hexaKeys[ROWS][COLS] = {
  {'A', 'B', 'C', 'D'},
  {'3', '6', '9', '#'},
  {'2', '5', '8', '0'},
  {'1', '4', '7', '*'}
};

#define eeprom_pintu1 1
#define eeprom_pass1 12
#define eeprom_pintu2 23
#define eeprom_pass2 34


byte rowPins[ROWS] = {A0, A1, A2, A3}; //connect to the row pinouts of the keypad
byte colPins[COLS] = {2, 3, 4, 8}; //connect to the column pinouts of the keypad

Keypad customKeypad = Keypad( makeKeymap(hexaKeys), rowPins, colPins, ROWS, COLS);


#include <SPI.h>
#include <MFRC522.h>

#define SS_PIN 10
#define RST_PIN 9
MFRC522 rfid(SS_PIN, RST_PIN); // Instance of the class

MFRC522::MIFARE_Key key;

// Init array that will store new NUID
byte nuidPICC[4];
String id_kartu = "";
String inputan = "";
```

```
#define buka 150
#define tutup 60



void setup() {
  Serial.begin(9600);
  lcd.begin (20, 4);
  lcd.setBacklightPin(BACKLIGHT_PIN, POSITIVE);   //LCD
  lcd.setBacklight(HIGH);
  lcd.home ();
  pinMode(pin_pintu1, INPUT_PULLUP);
  pinMode(pin_pintu2, INPUT_PULLUP);
  pinMode(pin_simpan, INPUT_PULLUP);
  pinMode(pin_ambil, INPUT_PULLUP);
  pintu1.attach(spintu1);
  pintu2.attach(spintu2);

  //  while(1){
  //      pintu1.write(tutup);
  //      pintu2.write(tutup);
  //      delay(4000);
  //      pintu1.write(buka);
  //      pintu2.write(buka);
  //      delay(2000);
  //  }


  lcd.clear();
  lcd.home();
  lcd.print("Inisial Sensor");
  // put your setup code here, to run once:
  SPI.begin(); // Init SPI bus
  rfid.PCD_Init(); // Init MFRC522
//  format_eeprom();
  if (EEPROM.read(0) != 1) {
    Serial.println("eeprom formated");
```

```
  format_eeprom();
 }
 for (byte i = 0; i < 6; i++) {
  key.keyByte[i] = 0xFF;
 }

 Serial.println(F("This code scan the MIFARE Classsic NUID."));
 Serial.print(F("Using the following key:"));
 printHex(key.keyByte, MFRC522::MF_KEY_SIZE);
 //  pinMode(pin_pintu1,INPUT_PULLUP);
 //  pinMode(pin_pintu2,INPUT_PULLUP);
 //  while(1){
 //    Serial.print(digitalRead(pin_pintu1));Serial.print("
");Serial.println(digitalRead(pin_pintu2));
 //    delay(300);
 //  }



 //  while(1){
 //    baca_keypad();
 //    baca_kartu();
 //  }
 lcd.print("Tutup Kedua Pintu");
 //  while(digitalRead(pin_pintu1)==0 && digitalRead(pin_pintu2) ==0){
 //
 //  }
 pintu1.write(tutup);
 pintu2.write(tutup);

 lcd.clear();
 lcd.home();
 lcd.print("SELAMAT DATANG");


}
```

```
void loop() {
  char customKey = customKeypad.getKey();
  //ini untuk menampung semua inputan;
  if (customKey) {
    //inputan += customKey;
    Serial.print(customKey);
    if (customKey == 'A') {
      simpan();
    } else if (customKey == 'B') {
      ambil();
    }
    //Serial.println(inputan);
  }

  if (digitalRead(pin_pintu1) == 0) {
    pintu1.write(tutup);
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("PINTU 1 TERTUTUP");

  }

  if (digitalRead(pin_pintu2) == 0) {
    pintu2.write(tutup);
    lcd.clear();
    lcd.setCursor(0, 1);
    lcd.print("PINTU 2 TERTUTUP");
  }
}

void simpan() {
  if (EEPROM.read(eeprom_pintu1) == 0xFF) {
    String id = baca_kartu();
    lcd.setCursor(0,1);
    lcd.print(id);
    inputan = "";
    //lcd.clear();
```

```
  lcd.setCursor(0, 0);
  lcd.print("Input Password  ");

  while (inputan.indexOf("#") == -1) {
    baca_keypad();
    lcd.setCursor(0,2);
    lcd.print(inputan);
  }
  isi_loker(id, inputan);
  pintu1.write(buka);

  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Loker 1 Terbuka");
  delay(1000);
  while (digitalRead(pin_pintu1) == 0);
 } else if (EEPROM.read(eeprom_pintu2) == 0xFF) {
  String id = baca_kartu();
  inputan = "";
  lcd.clear();
  lcd.setCursor(0,1);
  lcd.print(id);
  lcd.setCursor(0, 0);
  lcd.print("Input Password");
  while (inputan.indexOf("#") == -1) {
    baca_keypad();
  }
  isi_loker(id, inputan);
  pintu2.write(buka);

  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Loker 2 Terbuka");
  delay(1000);
  while (digitalRead(pin_pintu2) == 0);
 } else {
  lcd.clear();
```

```
    lcd.setCursor(0, 0);
    lcd.print("ID Penuh");
    delay(1000);
  }
}



void ambil() {
  String id = baca_kartu();
  lcd.setCursor(0,1);
    lcd.print(id);

  if (id == baca_eeprom(eeprom_pintu1)) {
    inputan = "";
    //lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Input Password");
    while (inputan.indexOf("#") == -1) {
      baca_keypad();
      lcd.setCursor(0,2);
      lcd.print(inputan);
    }
    Serial.println(baca_eeprom(eeprom_pass1));
    if (inputan == "123#" ) {
      hapus_eeprom(eeprom_pintu1);
      hapus_eeprom(eeprom_pass1);

      pintu1.write(buka);

      lcd.clear();
      lcd.setCursor(0, 0);
      lcd.print("Loker 1 Terbuka");
    } else {
      lcd.clear();
      lcd.setCursor(0, 0);
      lcd.print("Password Salah");
```

```
    }
    delay(1000);
  } else if (id = baca_eeprom(eeprom_pintu2)) {
    inputan = "";
//    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Input Password");
    while (inputan.indexOf("#") == -1) {
      baca_keypad();
      lcd.setCursor(0,2);
      lcd.print(inputan);
    }
    if (inputan == "456#" ) {
      hapus_eeprom(eeprom_pintu2);
      hapus_eeprom(eeprom_pass2);
      pintu2.write(buka);

      lcd.clear();
      lcd.setCursor(0, 0);
      lcd.print("Loker 2 Terbuka");
      delay(1000);
    } else {
      lcd.clear();
      lcd.setCursor(0, 0);
      lcd.print("Password Salah");
    }

  } else {
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Kartu Anda Salah ");
    delay(1000);
  }
}

String baca_kartu() {
  lcd.clear();
```

```
lcd.setCursor(0, 0);
lcd.print("Letakkan Kartu");
bool belom = 1;

while (belom) {
  // put your main code here, to run repeatedly:

  if ( rfid.PICC_IsNewCardPresent()) {
    if ( rfid.PICC_ReadCardSerial()) {
      Serial.print(F("PICC type: "));
      MFRC522::PICC_Type piccType = rfid.PICC_GetType(rfid.uid.sak);
      Serial.println(rfid.PICC_GetTypeName(piccType));

      // Check is the PICC of Classic MIFARE type
      if (piccType != MFRC522::PICC_TYPE_MIFARE_MINI &&
          piccType != MFRC522::PICC_TYPE_MIFARE_1K &&
          piccType != MFRC522::PICC_TYPE_MIFARE_4K) {
        Serial.println(F("Your tag is not of type MIFARE Classic."));
        //return "";
      } else {
        for (byte i = 0; i < 4; i++) {
          nuidPICC[i] = rfid.uid.uidByte[i];
        }

        Serial.println(F("The NUID tag is:"));
        Serial.print(F("In hex: "));
        printHex(rfid.uid.uidByte, rfid.uid.size);
        Serial.println();
        Serial.print(F("In dec: "));
        id_kartu = "";
        printDec(rfid.uid.uidByte, rfid.uid.size);
        Serial.println();
        Serial.print("id_kartu = "); Serial.println(id_kartu );
        belom = 0;
        break;
      }
```

```
      // Store NUID into nuidPICC array

    }

  }
  //return "";

  // Verify if the NUID has been readed
  //return "";



  // Halt PICC
  rfid.PICC_HaltA();

  // Stop encryption on PCD
  rfid.PCD_StopCrypto1();

 }

 return id_kartu;
}

void baca_keypad() {
 char customKey = customKeypad.getKey();
 //ini untuk menampung semua inputan;
 if (customKey) {
  inputan += customKey;
  Serial.print(customKey);
  //Serial.println(inputan);
 }
}
void printHex(byte *buffer, byte bufferSize) {
 for (byte i = 0; i < bufferSize; i++) {
  Serial.print(buffer[i] < 0x10 ? " 0" : " ");
  Serial.print(buffer[i], HEX);
 }
```

```
}

/**
 * Helper routine to dump a byte array as dec values to Serial.
 */
void printDec(byte *buffer, byte bufferSize) {
  for (byte i = 0; i < bufferSize; i++) {
    Serial.print(buffer[i] < 0x10 ? " 0" : " ");
    Serial.print(buffer[i], DEC);
    id_kartu += String(buffer[i]);
  }
}

bool isi_loker(String id, String pass) {

  if (baca_eeprom(eeprom_pintu1).length() == 0 ) {
    tulis_eeprom(eeprom_pintu1, id);
    tulis_eeprom(eeprom_pass1, pass);

    return true;
  } else if (baca_eeprom(eeprom_pintu2).length() == 0 ) {
    tulis_eeprom(eeprom_pintu2, id);
    tulis_eeprom(eeprom_pass2, pass);

    return true;
  } else {
    return false;
  }
}

String baca_eeprom(int no) {
  String kalimat = "";

  for (int i = 0 ; i < 10; i++) {
    byte a = EEPROM.read(i + no);
    if (a != 0xFF) {
      kalimat += (char)a;
```

```
    }
  }

  return kalimat;
}

void tulis_eeprom(int no, String isi) {

  for (int i = 0 ; i < isi.length(); i++) {
    EEPROM.write(i + no, isi.charAt(i));
  }


}

void hapus_eeprom(int no) {

  for (int i = 0 ; i < 10; i++) {
    EEPROM.write(i + no, 0xFF);
  }

}

void format_eeprom() {
  EEPROM.write(0, 1);

  for (int i = 0 ; i < 50; i++) {
    EEPROM.write(i + 1, 0xFF);
  }
}
```

Lampiran 2 : Prosedur Pemakaian Alat

Prosedur Pemakaian Alat

Berikut merupakan prosedur pemakaian alat dari **Rancang Bangun Sistem Pengunci Loker Otomatis Dengan Kendali Akses Menggunakan RFID,** yaitu sebagai berikut :

1. Sebelum menggunakan alat, pastikan alat dalam keadaan baik;
2. Sambungkan adaptor ke terminal yang aktif;
3. Tunggu beberapa detik hingga proses rangkaian selesai;
4. Jika proses selesai, maka LCD akan menyala dan menampilkan keadaan terakhir loker;
5. Tekan tombol A pada keypad apabila ingin mengambil barang dari dalam loker, dan tekan tombol B pada keypad apabila ingin mengembalikkan barang ke dalam loker;
6. Setelah *User* menekan tombol A atau B, maka LCD akan memberi arahan dengan tampilan ‘Letakkan Kartu’, maka kita harus meletakkan kartu RFID ke RFID *Reader* yang ada pada loker, dan biarkan RFID *Reader* membaca kartu tersebut;
7. Apabila katu RFID sudah terbaca maka LCD akan memberi arahan kembali dengan tampilan ‘*Input Password*’, maka *User* diminta untuk memasukkan *password* dari loker tersebut, (Untuk itu, *password* telah ditentukan sebelumnya, yaitu 123# untuk loker 1, dan 456# untuke loker B);
8. Jika *password* telah dimasukkan, maka secara otomatis pintu loker akan terbuka;
9. Namun jika *User* salah memasukkan *password*, maka LCD akan memberitahukan bahwa *password* yang dimasukkan salah, bila terjadi hal demikian maka kita harus mengulang prosesnya kembali dari no. 5;

10. Apabila kita telah selesai menggunakan loker, maka kita hanya perlu menutup pintu loker tersebut, dan sedikit menekan pintunya agar mengenai *switch* yang telah dipasang, dan secara otomatis pintu loker akan tertutup.

Lampiran 3 : Rancang Bangun Alat

Berikut merupakan tampilan hasil akhir alat dari **Rancang Bangun Sistem Pengunci Loker Otomatis Dengan Kendali Akses Menggunakan RFID :**


LOKER
1
LOKER
2


RANCANG BANGUN SISTEM PENGUNCI LOKER OTOMATIS
DENGANKENDALI AKSES MENGGUNAKAN RFID
POLITEKNIK NEGERI SRIWIJAYA
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LOKER
1
LOKER
2

AIAA OC Rocketry (Revision 3 April 27, 2014 - http://aiaaocrocketry.org)

ARDUINO UNO Revision 3 BOARD

The Arduino Uno is one of the most common and widely used Arduino processor boards. There are a wide variety of shields (plug in boards adding functionality). It is relatively inexpensive (about $25 - $35). The latest version as of this writing (3/2014) is Revision 3 (r3):

- Revision 2 added a pull-down resistor to the 8U2 HWB line, making it easier to put into DFU (Device Firmware Update) mode
- Revision 3 added
  - SDA and SCL pins are now brought out to the header near the AREF pin (upper left on picture). SDA and SCL are for the I2C interface
  - IOREF pin (middle lower on picture that allows shields to adapt to the voltage provided
  - Another pin not connected reserved for future use

The board can be powered from the USB connector (usually up to 500ma for all electronics including shield), or from the2.1mm barrel jack using a separate power supply when you cannot connect the board to the PC's USB port.

Links:

- Arduino web site: http://www.arduino.cc/
- Arduino Uno overview and image source: http://arduino.cc/en/Main/arduinoBoardUno#.UxNpBk2YZuG
- DFU Mode (Device Firmware update) explanation: http://arduino.cc/en/Hacking/DFUProgramming8U2#.UxNqXE2YZuE
- Arduino Uno schematic: http://arduino.cc/en/uploads/Main/Arduino_Uno_Rev3-schematic.pdf
- Arduino Uno Eagle PCB Files: http://arduino.cc/en/uploads/Main/arduino_Uno_Rev3-02-TH.zip
- Eagle PCB PCB design software (use Licesnse = "Run as Freeware"): https://www.cadsoftusa.com/download-eagle/
- Hardware Index – past and present boards: http://arduino.cc/en/Main/Boards#.UxNq9U2YZuE
- Specifications comparison chart: http://arduino.cc/en/Products.Compare#.UxOJGk2YZuF
- Board comparison chart: http://arduino.cc/en/Products.Compare#.UxN6oE2YZuE
- Sources
  - MP3Car: http://store.mp3car.com/SearchResults.asp?Search=arduino
  - Sparkfun: https://www.sparkfun.com/
  - Adafruit: http://www.adafruit.com/category/17
  - Amazon: http://www.amazon.com/s/ref=nb_sb_noss_1?url=search-alias%3Daps&field-keywords=Arduino
  - Pololu: http://www.pololu.com/search?query=Arduino

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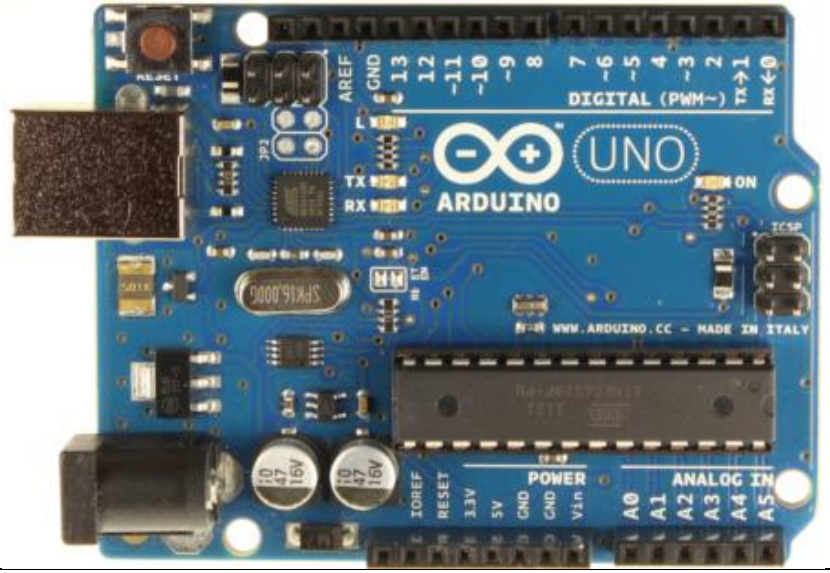
ARDUINO UNO Revision 3 Specifications



- Microcontroller: ATmega328
- Operating Voltage: 5V
- Uno Board Recommended Input Voltage: 7 – 12 V
- Uno Board Input Voltage Limits: 6 – 20 V
- Digital I/O Pins: 14 total – 6 of which can be PWM
- Analog Input Pins: 6
- Maximum DC Current per I/O pin at 5VDC: 40ma
- Maximum DC Current per I/I pinat 3.3 VDC: 50ma
- Flash Memory: 32KB (0.5KB used by bootloader)
- SRAM Memory: 2KB
- EEPROM: 1KB
- Clock Speed: 16 MHz

Links:

- Arduino specifications and image page: http://arduino.cc/en/Main/arduinoBoardUno#.UxOOLk2YZuH

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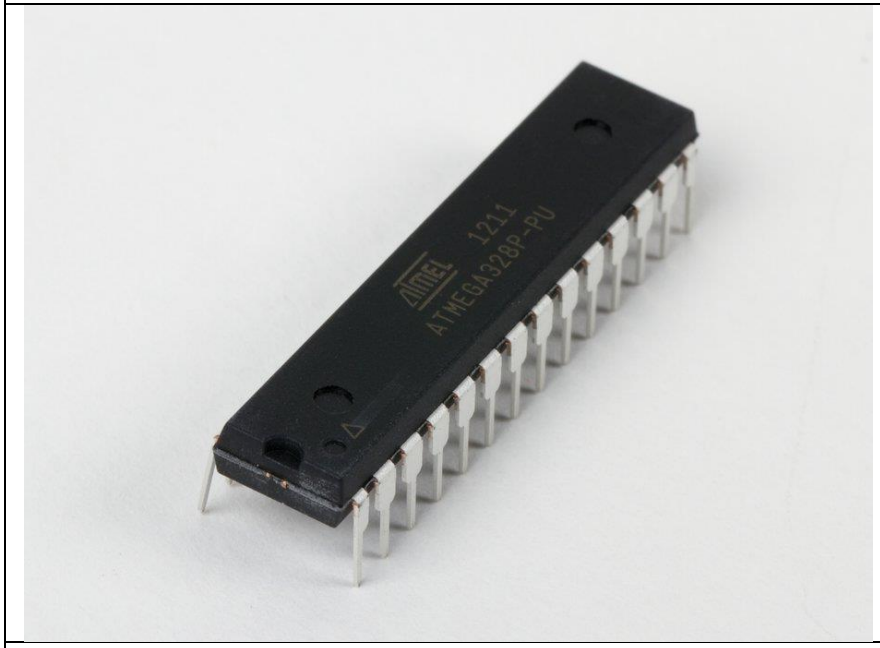
ARDUINO UNO Revision 3 Processor Peripherals (Atmel ATmega 328)



- Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
- One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
- Real Time Counter with Separate Oscillator
- Six PWM channes
- Six channel 10 bit ADC including temperature measurement
- Programmable Serial USART
- Master/Slave SPI Serial Interface
- Byte-oriented 2 wire Serial Interface (Philips I2C compatible)
- Programmable Watchdog Timer with Separate On-chip Oscillator
- On-chip Analog Comparator

Links:

- Source of above diagram: http://tekkpinoy.com/wp-content/uploads/2013/10/1.jpg
- AT Mega 328 datasheet: http://www.atmel.com/Images/doc8161.pdf

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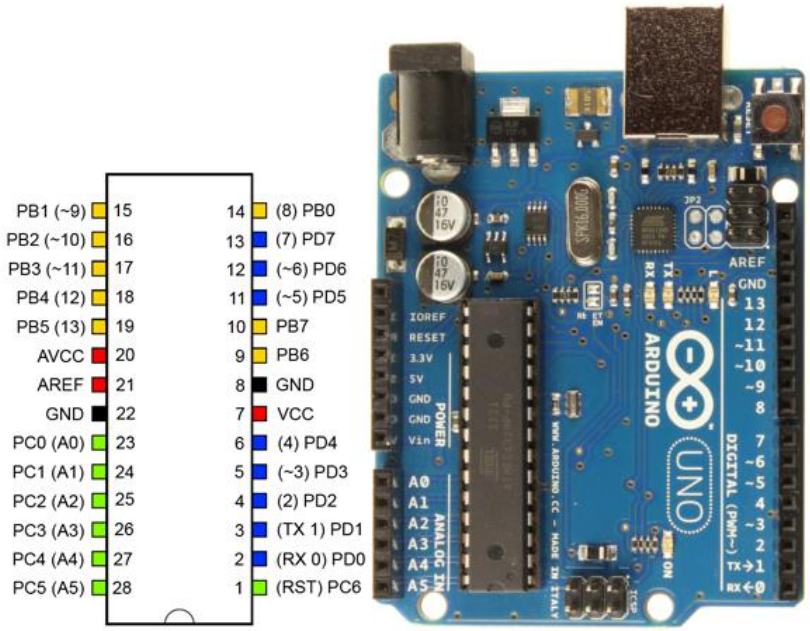
ARDUINO UNO Revision 3 and ATmega328 processor



The Arduino board makes it very easy to use the ATmega328 processor by providing easy access to most of the pins via the headers, In addition, it provides:

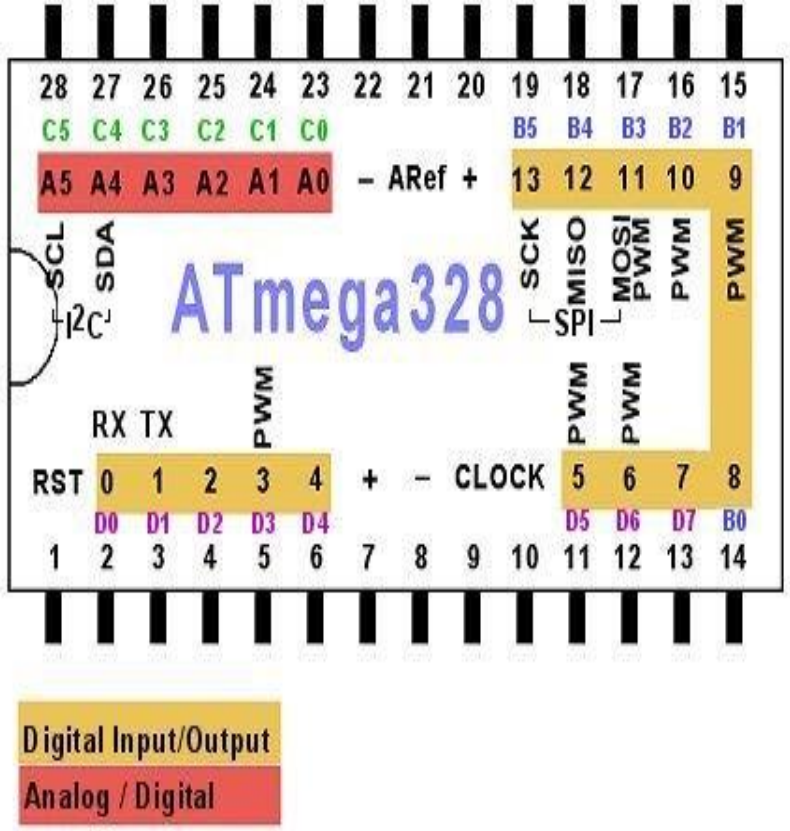
- 5 VDC regulated power from the 6 – 20 VDC input jack
- 3.3 VDC regulated power available for other electronics
- The crystal oscillator
- A reset switch
- USB access to the serial port
- Headers for connection and for shields

Links:

- Arduino specifications and image page: http://arduino.cc/en/Main/arduinoBoardUno#.UxOOLk2YZuH
- ATmega328 processor image modified from image found at: http://www.protostack.com/microcontrollers/atmega328-pu-atmel-8-bit-32k-avr-microcontroller

AIAA OC Rocketry (Revision 3 April 27, 2014 - http://aiaaocrocketry.org)

ARDUINO UNO Revision 3 Processor Pinout (Atmel ATmega 328) – Commonly Used



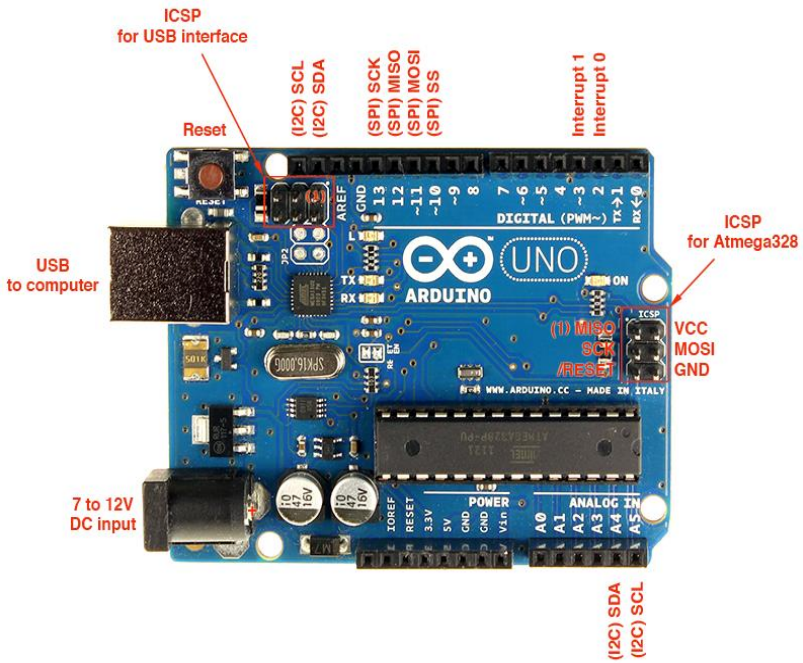
Pin Definition

- PORT B (PB0 – PB7) is an 8 bit bidirectional I/O port with internal pull-ups. Processor pins 14 – 17 bring PB0 to PB5 out
  - PB0 – PB5 are also interrupts 0-5 respectively
  - PB1 can also be used as a PWM output
  - PB2 can also be SPI Bus Master Slave Select (*SS) or PWM output
  - PB3 can also be or SPI Bus Master Out/Slave In (MOSI) or PWM output
  - PB4 can also be SPI Bus Master In/Slave Out (MISO)
  - PB5 can also be SPI Bus Master Clock Input (SCK)
  - PB6 and PB7 are brought out on Processor pins 9 and 10 for the crystal clock oscillator
- PORT C (PC0 – PC5) is a 7 bit bidirectional I/O port with internal pull-up resistors. Processor pins 23 – 28 bring PC0 to PC5 out.
  - PC0 – PC5 are also interrupts 8-13 respectively
  - PC0 – PC5 can also be used as A/D inputs
  - PC4 and PC5 can also be used as SDA and SCL for I2C
  - PC6 is brought out on processor pin 1 as reset
- PORT D (D0 – D7) is an 8 bit bidirectional I/O port with internal pull-ups. Processor pins 2 – 6 and 11 – 13 bring all pins out
  - PD0 can also be USART Input (RXD)
  - PD1 can also be USART Output (TXD)
  - PD3 can also be used as a PWM output
  - PD5 can also be used as a PWM output
  - PD6 can also be used as a PWM output

Links:

- Source of above diagram: http://www.hobbytronics.co.uk/arduino-atmega328-pinout
- AT Mega 328 datasheet: http://www.atmel.com/Images/doc8161.pdf

ARDUINO UNO Revision 3 Pinout (Uno PCB) – Commonly Used Features are printed on Silkscreen



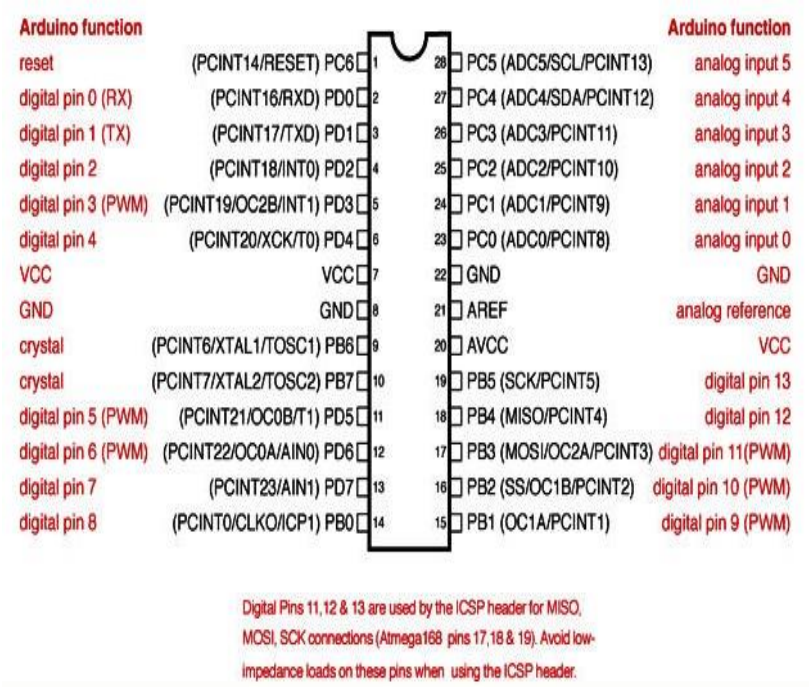
The Arduino Uno pinout is printed in the silkscreen on the top of the part. While this pinout is a good start, it does not explain the complete story – but it does give a good beginning. At first you use mainly the pins in the female headers at the edge of the board (top and bottom in the photo), plus USB and maybe power

- Tx and Rx are serial UART pins used for RS-232 and USB communications
- I2C is another serial communications method using a bidirectional data line (SDA) and a clock line (SCL)
- SPI is another serial communications method using one line for the master to transmit (MOSI – Master Out Slave In), another for the master to receive (MISO), and a third as a clock (SCK)
- A/D in Analogue to Digital this input converts an analogue voltage in to a digital representation
- PWM (Pulse Width Modulator) is used to create a square wave with a specific duty cycle (high time vs low time)
- ICSP is the In Circuit Serial Programming – another way to program the processor
- Vcc is the voltage supplied to the processor (+5VDC regulated from the higher input voltage)
- 3.3VDC is a regulated voltage (from the higher input voltage) for peripherals needing that voltage – 50ma maximum
- IOREF provides a voltage reference so shields can select the proper power source
- AREF is a reference INPUT voltage used by the A/Ds
- GND is the ground reference
- RESET resets the processor (and some peripherals)

Links:

- Source of above diagram: http://www.adafruit.com/blog/2012/05/25/handy-arduino-r3-pinout-diagram/
- Description of pin usage: http://www.gammon.com.au/forum/?id=11473
- Arduino Uno Pin Mapping: http://arduino.cc/en/Hacking/PinMapping168#.UxOJik2YZuE
- Description of Arduino Serial: http://arduino.cc/en/reference/serial#.UxOMKk2YZuE
- Description of the Arduino SPI functions and library: http://arduino.cc/en/Reference/SPI#.UxOPLk2YZuE
- Description of Arduino A/D: http://arduino.cc/en/Tutorial/AnalogInputPins#.UxOM7k2YZuE
- Description of Arduino PWM: http://arduino.cc/en/Tutorial/PWM#.UxOLz02YZuE
- Tutorial on ISP: http://arduino.cc/en/Tutorial/ArduinoISP#.UxOUSk2YZuE
- Tutorial on the AREF pin: http://tronixstuff.com/2013/12/12/arduino-tutorials-chapter-22-aref-pin/

ARDUINO UNO Revision 3 Processor Pinout (Atmel ATmega 328) – Other functions



Pin Definition

- PORT B pins, in addition to digital I/O have other uses
  - PB0 can also be the divided system clock output (CLKO) or Timer/Counter 1 Input Capture (ICP1)
  - PB1 can also be Timer/Counter1 Output Compare Match A (OC1A) out
  - PB2 can also be Timer/Counter1 Output Compare Match B (OC1B)
  - PB3 can also be Timer/Counter2 Output Compare Match A out(OC2A)
- Port D pins, in addition to digital I/O have other uses
  - PD3 is also Timer/Counter2 Output Compare Match B Output (OC2B)
  - PD4 is also Timer/Counter0 External Counter Input (T0) or USART External Clock Input/Output (XCK)
  - PD5 is also Timer/Counter0 Ouoput Compare Match B Output (OC0B) and Timer/Counter 1 External Counter Input
  - PD6 can also be Analog Comparator Positive In (AIN0)
  - PD7 can also be Analog Comparator Negative In (AIN1)

Links:

- Source of above diagram: http://nearbus.net/wiki/index.php?title=Atmega_328_Pinout
- AT Mega 328 datasheet: http://www.atmel.com/Images/doc8161.pdf

NOTE: A single diagram showing all features of the Arduino Uno and the Atmel ATMega328 processor is shown in Appendix A

APPENDIX A

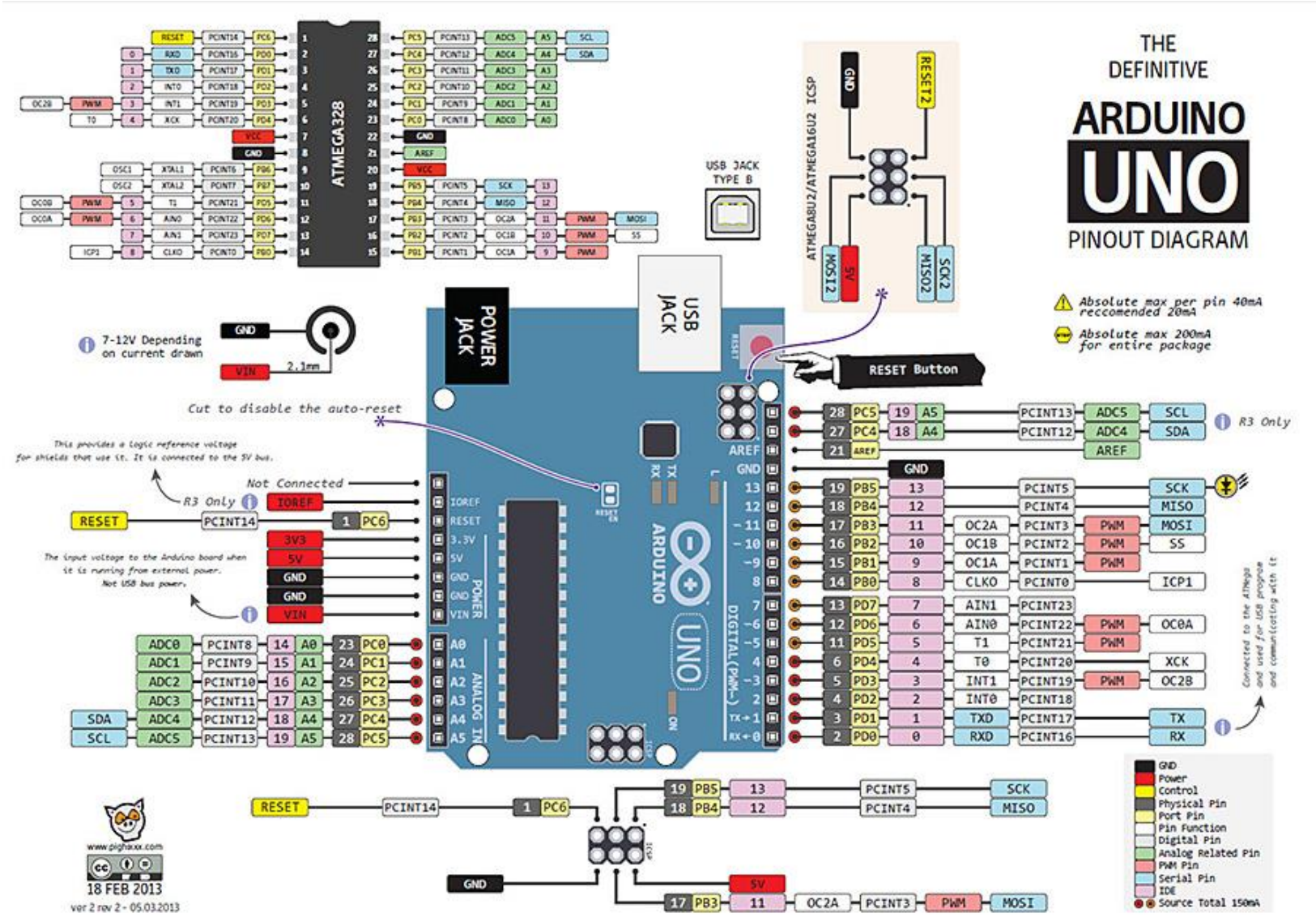


Diagram from: http://arduino-info.wikispaces.com/file/view/ArduinoUNO-900.jpg/421496636/ArduinoUNO-900.jpg

APPENDIX B

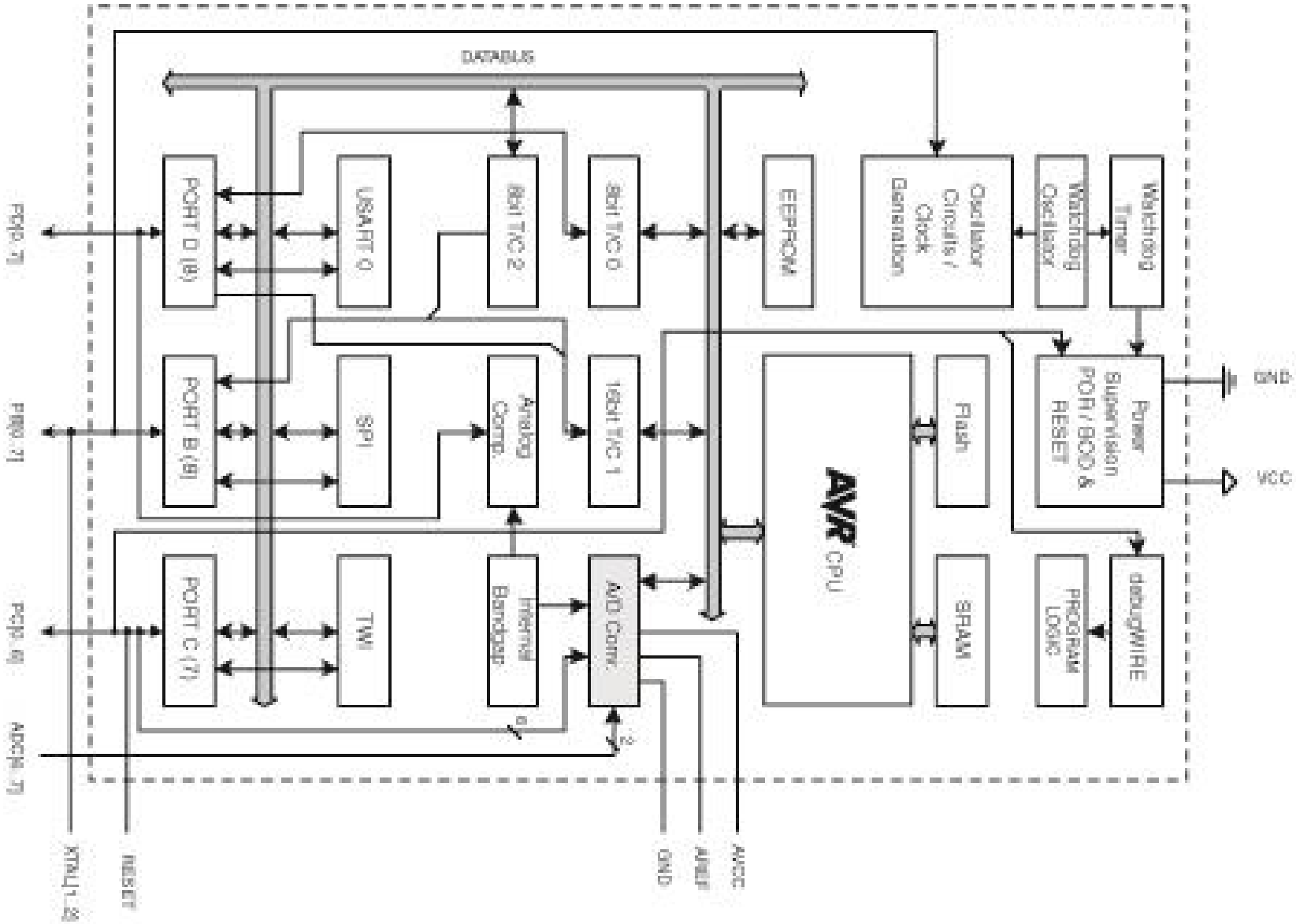


Diagram from document at: http://www.atmel.com/Images/doc8161.pdf

AIAA OC Rocketry (Revision 3 April 27, 2014 - http://aiaaocrocketry.org)

APPENDIX C

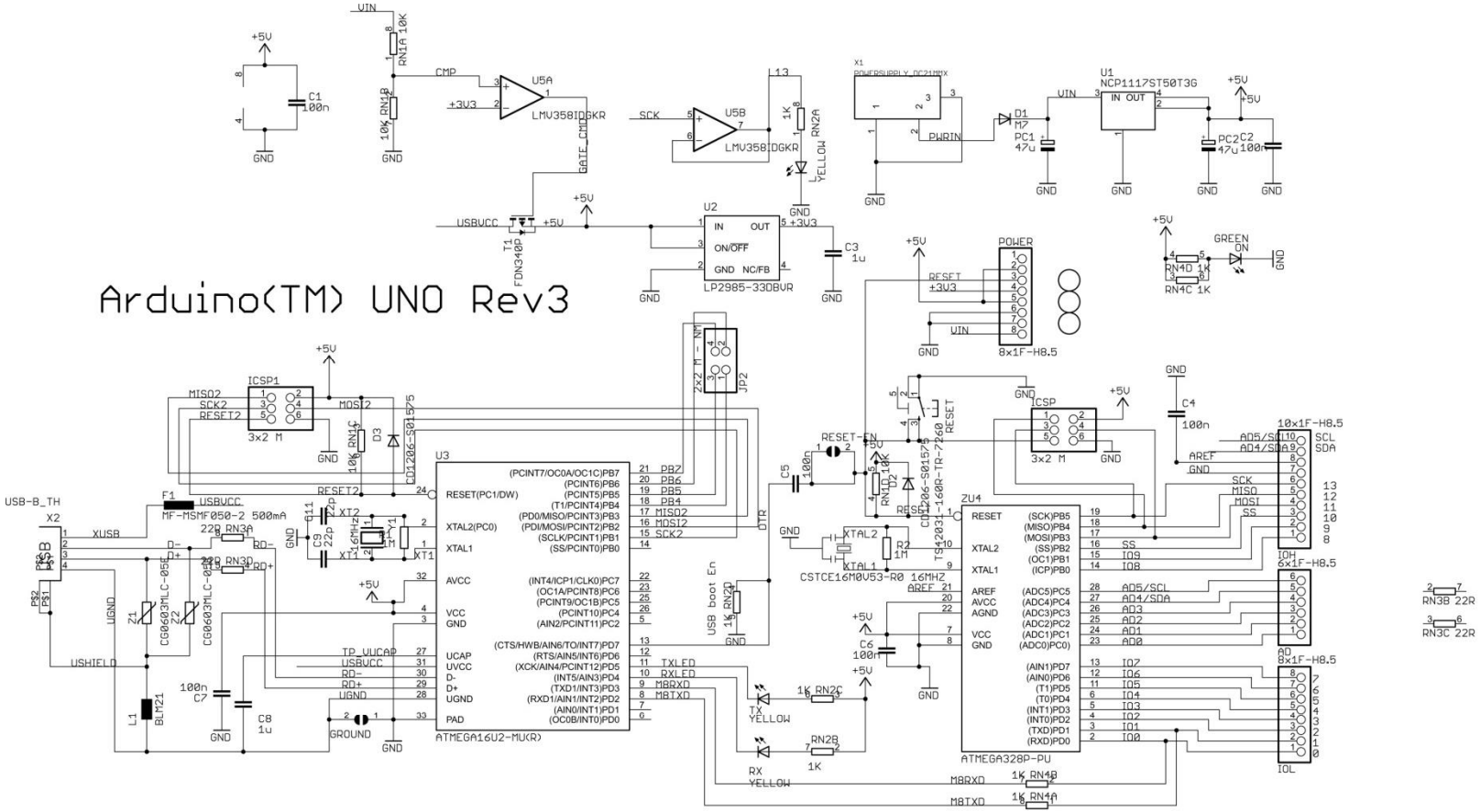
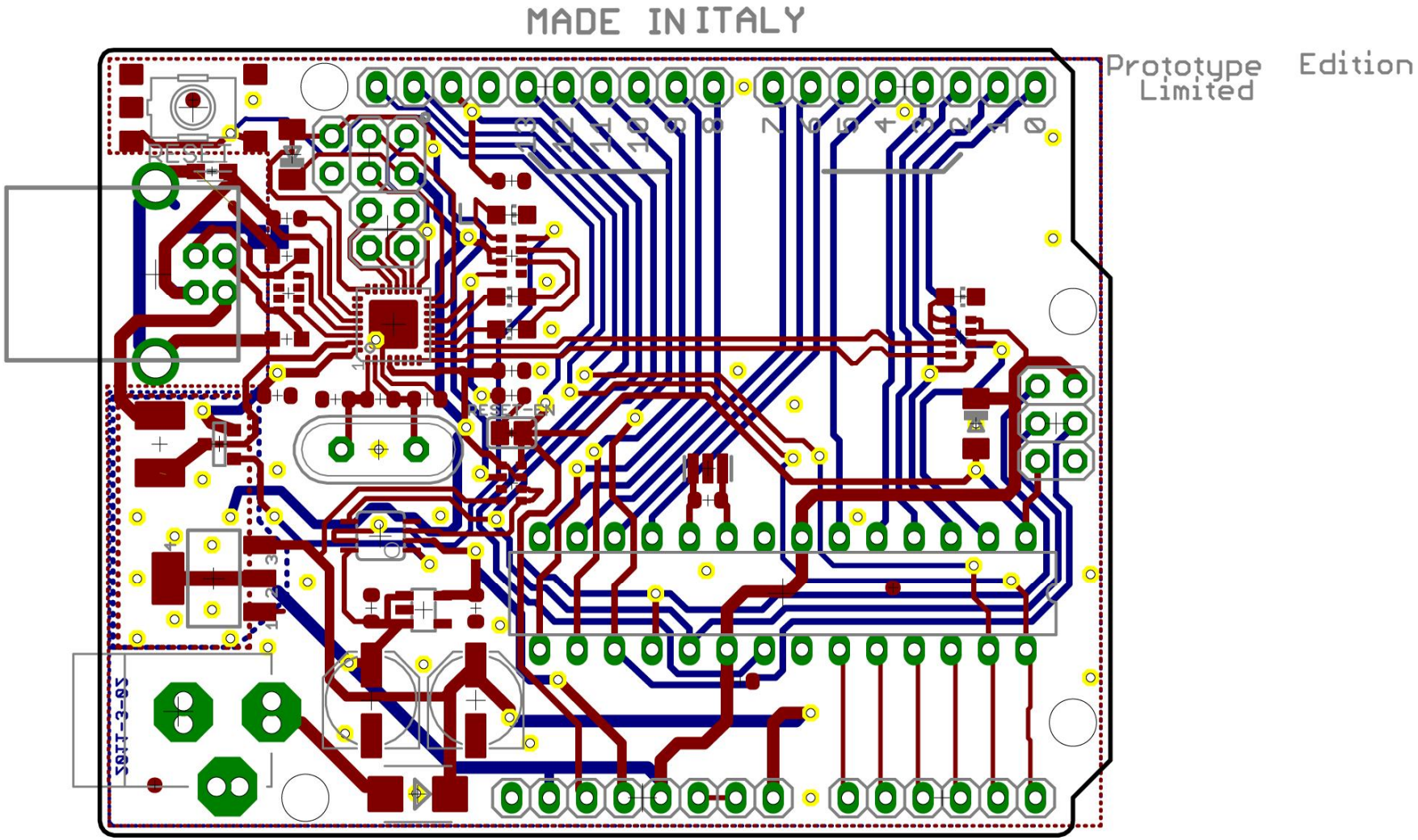


Diagram from document at: http://arduino.cc/en/uploads/Main/Arduino_Uno_Rev3-schematic.pdf

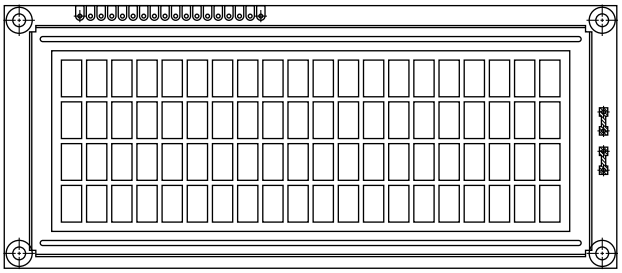
APPENDIX D



From arduino_Uno_Rev3-02-TH.zip file at http://arduino.cc/en/Main/ArduinoBoardUno#.Uxk9qk2YYpA

Eagle PCB software: Eagle PCB PCB design software (use Licesnse = “Run as Freeware”): https://www.cadsoftusa.com/download-eagle/

20 x 4 Character LCD



FEATURES

- Type: Character
- Display format: 20 x 4 characters
- Built-in controller: ST 7066 (or equivalent)
- Duty cycle: 1/16
- 5 x 8 dots includes cursor
- + 5 V power supply (also available for + 3 V)
- LED can be driven by pin 1, pin 2, pin 15, pin 16 or A and K
- N.V. optional for + 3 V power supply
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	146.0 x 62.5	mm
Viewing Area	123.5 x 43.0	
Dot Size	0.92 x 1.10	
Dot Pitch	0.98 x 1.16	
Mounting Hole	139.0 x 55.5	
Character Size	4.84 x 9.22	

ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	V_{DD} to V_{SS}	- 0.3	-	7.0	V
Input Voltage	V_I	- 0.3	-	V_{DD}	

Note

- V_{SS} = 0 V, V_{DD} = 5.0 V

ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	V_{DD}	V_{DD} = + 5 V	4.7	5.0	5.3	V
		V_{DD} = + 3 V	2.7	3.0	5.3	
Supply Current	I_{DD}	V_{DD} = + 5 V	-	8.0	10.0	mA
Recommended LC Driving Voltage for Normal Temperature Version Module	V_{DD} to V_0	- 20 °C	5.0	5.1	5.7	V
		0 °C	4.6	4.8	5.2	
		25 °C	4.1	4.5	4.7	
		50 °C	3.9	4.2	4.5	
		70 °C	3.7	3.9	4.3	
LED Forward Voltage	V_F	25 °C	-	4.2	4.6	V
LED Forward Current	I_F	25 °C	-	540	1080	mA
EL Power Supply Current	I_{EL}	V_{EL} = 110 V_{AC}, 400 Hz	-	-	5.0	mA

OPTIONS

PROCESS COLOR						BACKLIGHT			
TN	STN Gray	STN Yellow	STN Blue	FSTN B&W	STN Color	None	LED	EL	CCFL
x	x	x	x	x		x	x	x	

For detailed information, please see the “Product Numbering System” document.

DISPLAY CHARACTER ADDRESS CODE

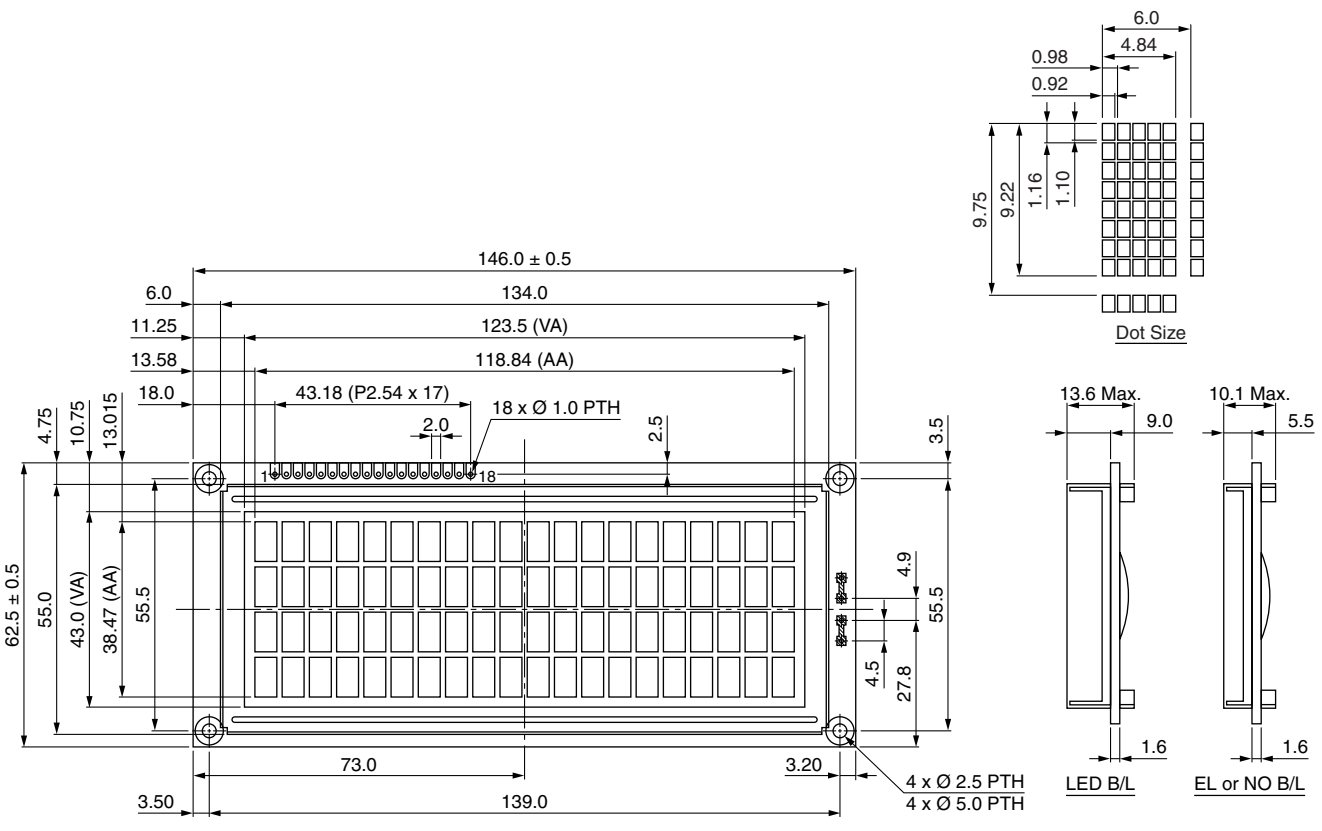
Display Position

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DD RAM Address	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
DD RAM Address	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53
DD RAM Address	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
DD RAM Address	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67

INTERFACE PIN FUNCTION

PIN NO.	SYMBOL	FUNCTION
1	V_{SS}	Ground
2	V_{DD}	+ 3 V or + 5 V
3	V_0	Contrast adjustment
4	RS	H/L register select signal
5	R/$\overline{W}$	H/L read/write signal
6	E	H → L enable signal
7	DB0	H/L data bus line
8	DB1	H/L data bus line
9	DB2	H/L data bus line
10	DB3	H/L data bus line
11	DB4	H/L data bus line
12	DB5	H/L data bus line
13	DB6	H/L data bus line
14	DB7	H/L data bus line
15	A	Power supply for LED (4.2 V)
16	K	Power supply for B/L (0 V)
17	NC/V_{EE}	NC or negative voltage output
18	NC	NC connection

DIMENSIONS in millimeters



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Keyes RFID RC522 Development Kit

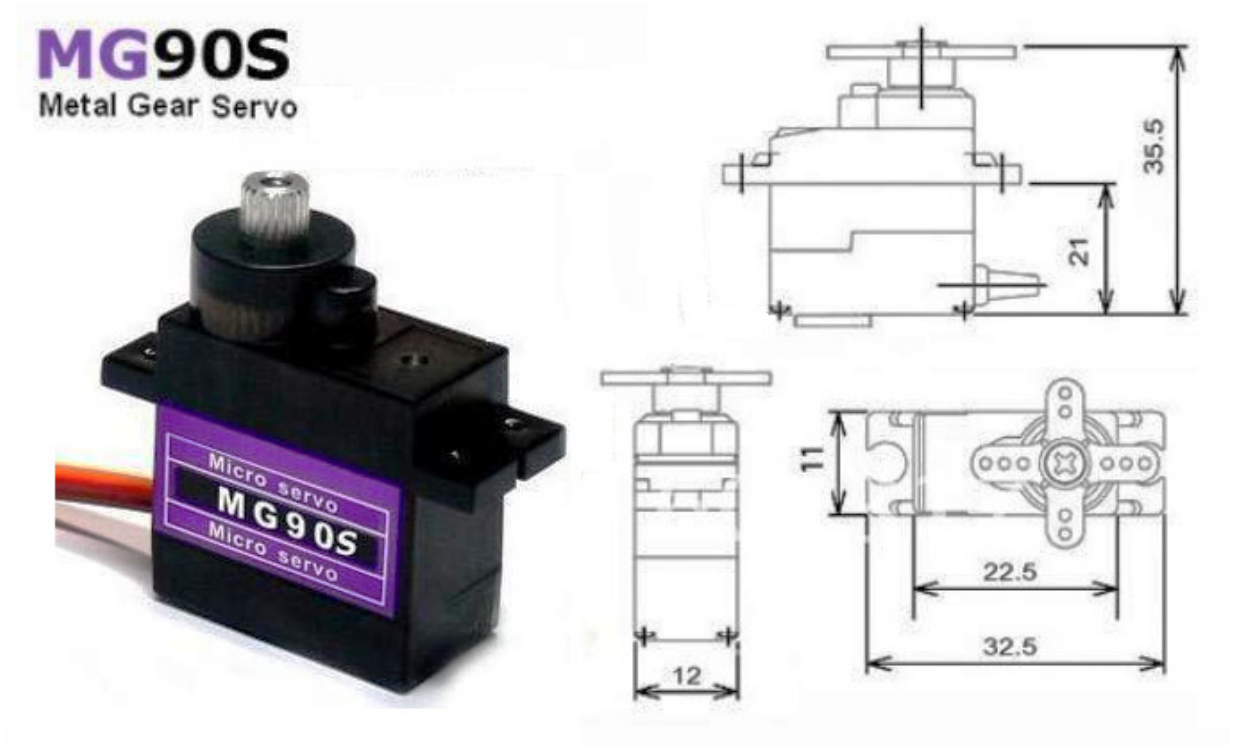
DESCRIPTION:

Keyes RFID RC522 Development Kit is a low cost and easy to use module suitable for equipment and advanced applications development that needs RFID application. RFID stands for Radio-Frequency Identification. The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less.

The module uses NXP's MFRC522 which is a highly integrated reader/writer IC for contactless communication at 13.56MHz. The MFRC522 reader supports ISO/IEC 14443 A/MIFARE mode. The MFRC522's internal transmitter is able to drive a reader/writer antenna designed to communicate with ISO/IEC 14443 A/MIFARE cards and transponders without additional active circuitry. The receiver module provides a robust and efficient implementation for demodulating and decoding signals from ISO/IEC 14443 A/MIFARE compatible cards and transponders. The digital module manages the complete ISO/IEC 14443 A-framing and error detection (parity and CRC) functionality.

SPECIFICATIONS:

- Module Name: MFRC522
- Working current: 13—26mA/ DC 3.3V
- Standby current: 10-13mA/ DC 3.3V
- Working frequency: 13.56MHz
- Card reading distance: 0-50mm (RFID card), 0-30mm (RFID Key)
- Protocol: SPI
- Data communication Speed: Maximum 10Mbit/s
- Card types supported: Mifare1 S20, Mifare1 S50, Mifare1 S70
- Dimension: 40mm×60mm
- Working temperature: -25—80 degree
- Max SPI speed: 10Mbit/s



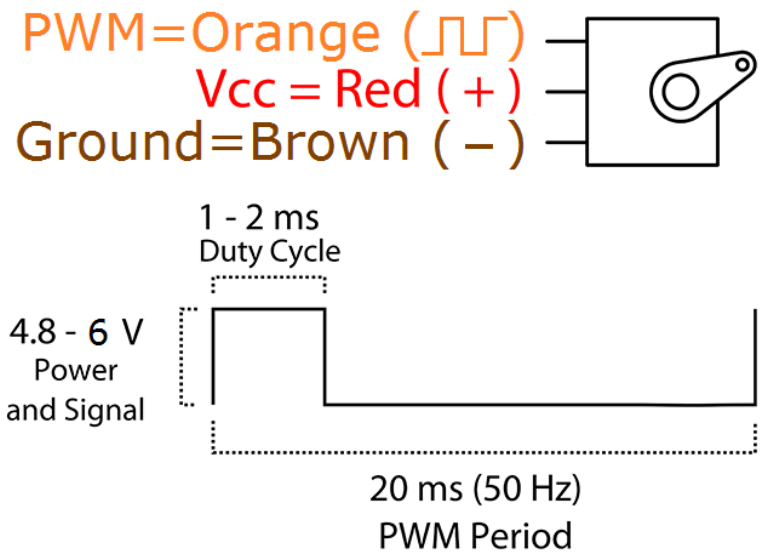
MG90S servo, Metal gear with one bearing

Tiny and lightweight with high output power, this tiny servo is perfect for RC Airplane, Helicopter, Quadcopter or Robot. This servo has *metal gears* for added strength and durability.

Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but *smaller*. You can use any servo code, hardware or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with a 3 horns (arms) and hardware.

Specifications

- Weight: 13.4 g
- Dimension: 22.5 x 12 x 35.5 mm approx.
- Stall torque: 1.8 kgf·cm (4.8V), 2.2 kgf·cm (6 V)
- Operating speed: 0.1 s/60 degree (4.8 V), 0.08 s/60 degree (6 V)
- Operating voltage: 4.8 V - 6.0 V
- Dead band width: 5 µs



Position "0" (1.5 ms pulse) is middle, "90" (~2 ms pulse) is all the way to the right, "-90" (~1 ms pulse) is all the way to the left.

PERNYATAAN KEASLIAN

Saya yang bertanda tangan di bawah ini :

Nama	: Vania Clarissa Damayanti
NIM	: 061430331193
Program Studi	: Teknik Telekomunikasi
Jurusan	: Teknik Elektro

Menyatakan dengan sesungguhnya bahwa Laporan Akhir yang telah saya buat ini dengan judul "Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID" adalah benar hasil karya saya sendiri dan bukan merupakan duplikasi, serta tidak mengutip sebagian atau seluruhnya dari karya orang lain, kecuali yang telah disebutkan sumbernya.

Palembang, Juli 2017

Penulis

Vania Clarissa Damayanti

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Kami yang bertanda tangan di bawah ini,

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NIM	:	061430331193
Jurusan	:	Teknik Elektro
Program Studi	:	Teknik Telekomunikasi

Pihak Kedua

Nama	:	Irawan Hadi, S.T., M.Kom.
NIP	:	196511051990031002
Jurusan	:	Teknik Elektro
Program Studi	:	Teknik Telekomunikasi

Pada hari ini Senin, tanggal 6 Maret 2017 telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari ..Selasa..... pukul ..09:00.., tempat di Politeknik Negeri Sriwijaya.

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

Palembang, Maret 2017,

Pihak Pertama,

(Vania Clarissa Damayanti)
NIM 061430331193

Pihak Kedua,

(Irawan Hadi, S.T., M.Kom.)
NIP 196511051990031002

Mengetahui,
Ketua Jurusan

(Yudi Wijanarko, S.T., M.T.)
NIP 196705111992031003

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Kami yang bertanda tangan di bawah ini,

Pihak Pertama

Nama	:	Vania Clarissa Damayanti
NIM	:	061430331193
Jurusan	:	Teknik Elektro
Program Studi	:	Teknik Telekomunikasi

Pihak Kedua

Nama	:	Hj. Adewasti, S.T., M.Kom.
NIP	:	197201142001122001
Jurusan	:	Teknik Elektro
Program Studi	:	Teknik Telekomunikasi

Pada hari ini Selasa, tanggal 06 Maret 2017 telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari ..Selasa, Rabu... pukul ...09:00..., tempat di Politeknik Negeri Sriwijaya.

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

Palembang, Maret 2017,

Pihak Pertama,

(Vania Clarissa Damayanti)
NIM 061430331193

Pihak Kedua,

(Hj. Adewasti, S.T., M.Kom.)
NIP 197201142001122001

Mengetahui,
Ketua Jurusan,

(Yudi Wijanarko, S.T., M.T.)
NIP 196705111992031003

PROGRESS KEMAJUAN LAPORAN AKHIR MAHASISWA/I PROGRAM D.III
PROGRAM STUDI TEKNIK TELEKOMUNIKASI JURUSAN TEKNIK ELEKTRO
POLITEKNIK NEGERI SRIWIJAYA THN AKADEMIK 2017

NAMA HAMASISWA/I : **Vania Clarissa Damayanti**
NIM : **0614 3033 1193**
KELAS : **6 TC**
PEMBIMBING 1 : **Irawan Hadi, S.T., M.Kom**
PEMBIMBING 2 : **Hj. Adewasti, S.T., M.Kom**
JUDUL LA : **Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID**

NO	TGL PELAPORAN	URAIAN KEGIATAN	PENGESAHAN		(%) KEGIATAN
			PEMB.1	PEMB.2	
1	Jumat, 07/2017/07	Perbaikan Data Ubuk + Kesimpulan	Z		75%
		Siap ujian	Z		100%
2	13-07-2017	ACC MENGIKUTI UJIAN AKHIR			100 %

Mengetahui,
Ketua Prodi D.III Tek. Telekomunikasi

Ciksadan, S.T., M.Kom
NIP 196809071993031003

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Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id

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Nama	:	Vania Clarissa Damayanti
NIM	:	061430331193
Jurusan/Program Studi	:	Teknik Elektro/Teknik Telekomunikasi
Judul Laporan Akhir	:	Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID
Pembimbing II	:	Irawan Hadi, S.T., M.Kom

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	18/4 2017	Acc judul dan Alat	
2.	14/6 2017	Revisi Bab I & II	
3.	22/6 2017	Acc Bab I, II	
4.		Revisi Bab III	
5.	3/7 2017	Acc Bab III	
6.	7	Revisi Bab IV, V	
7.	4/7 2017	Acc Bab IV	

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	4/7 2017	ACC Bab IV	
9.	5/7 2017	Lengkapi semua daftar, abstrak, Lampiran.	
10.	/7	Revisi daftar pustaka, Lampirkan semua.	
11.	10/7 2017	ACC Laporan dan PPT	
12.	13/7 2017	Siap Sidang	

Palembang, Juni 2017,

Ketua Program Studi,

(Ciksadan, S.T., M. Kom)
NIP 196809071993031003

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.

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Lembar : 1

Nama : Vania Clarissa Damayanti
NIM : 061430331193
Jurusan/Program Studi : Teknik Elektro/Teknik Telekomunikasi
Judul Laporan Akhir : Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID
Pembimbing II : Hj. Adewasti, S.T., M.Kom

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	06/06 2017	* PENGAJUAN PROPOSAL ACC.	
2.	14-06-2017	BAB I : MANFAAT, BOLD, PEM-BATASAN MASALAH	
3.	15-06-2017	BAB II : TGL AKSES, SUMBER.	
4.	21-06-2017	BAB I : ACC BAB II : ACC BAB III : PANGKAL (CALIBRI) HURUF BESAR	
5.		PROGRAM DILAMPIRKAN DI LAMPIRAN PENULISAN BAB IV : BUAT ANALISA PER DATA TABEL	
6.		PENGUJIAN, TAMBAHKAN GBR. POSISI MOTOR SERVO BAB V : ACC	
7.		LENGKAPI SEMUA	

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	22-05-2017	BAB III : FOTO BARU BAB IV : ACC	
9.		BAB V : ACC LENGKAPI : ABSTRAK, KATA PENGANTAR	
10.	13-07-2017	ACC MENGIKUTI UJIAN LA	
11.	18-07-2017	PENGESAHAN ALAT	
12.			

Palembang, Juni 2017,

Ketua Program Studi,

(Ciksadan, S.T., M. Kom)
NIP 196809071993031003

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.
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REKOMENDASI UJIAN LAPORAN AKHIR (LA)

Pembimbing Laporan Akhir memberikan rekomendasi kepada :

Nama	:	Vania Clarissa Damayanti
NIM	:	061430331193
Jurusan/Program Studi	:	Teknik Elektro / DIII Teknik Telekomunikasi
JudulLaporan	:	Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID

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

Palembang, Juli 2017,

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Judul Laporan Akhir	:	Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID

No	Uraian Revisi	Paraf
	Tidak Ada Revisi	

Palembang, Juli 2017
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Jurusan/Program Studi	:	Teknik Elektro / D3 Teknik Telekomunikasi
Judul Laporan Akhir	:	Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID

No	Uraian Revisi	Paraf
	Sudah di revisi	

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Judul Laporan Akhir : **Rancang Bangun Sistem Pengunci Loker Otomatis dengan Kendali Akses Menggunakan RFID**

Telah melaksanakan revisi terhadap Laporan Akhir yang diujikan pada hari Kamis, tanggal 20 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.	Acc	Irawan Hadi, S.T., M.Kom NIP. 196511051990031002	28/7-17	
2.	Judul direvisi	H. Ir. Ibnu Ziad, M.T NIP. 196005161990031001	28/7-2017	
3.	Acc	Eka Susanti, S.T., M.Kom NIP. 197812172000122001	26/7/17	
4.	Ok	Rosita Febriani, S.T., M.Kom NIP. 197902012003122003	26/7/17	

Palembang, Juli 2017
Ketua Penguji **),

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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.