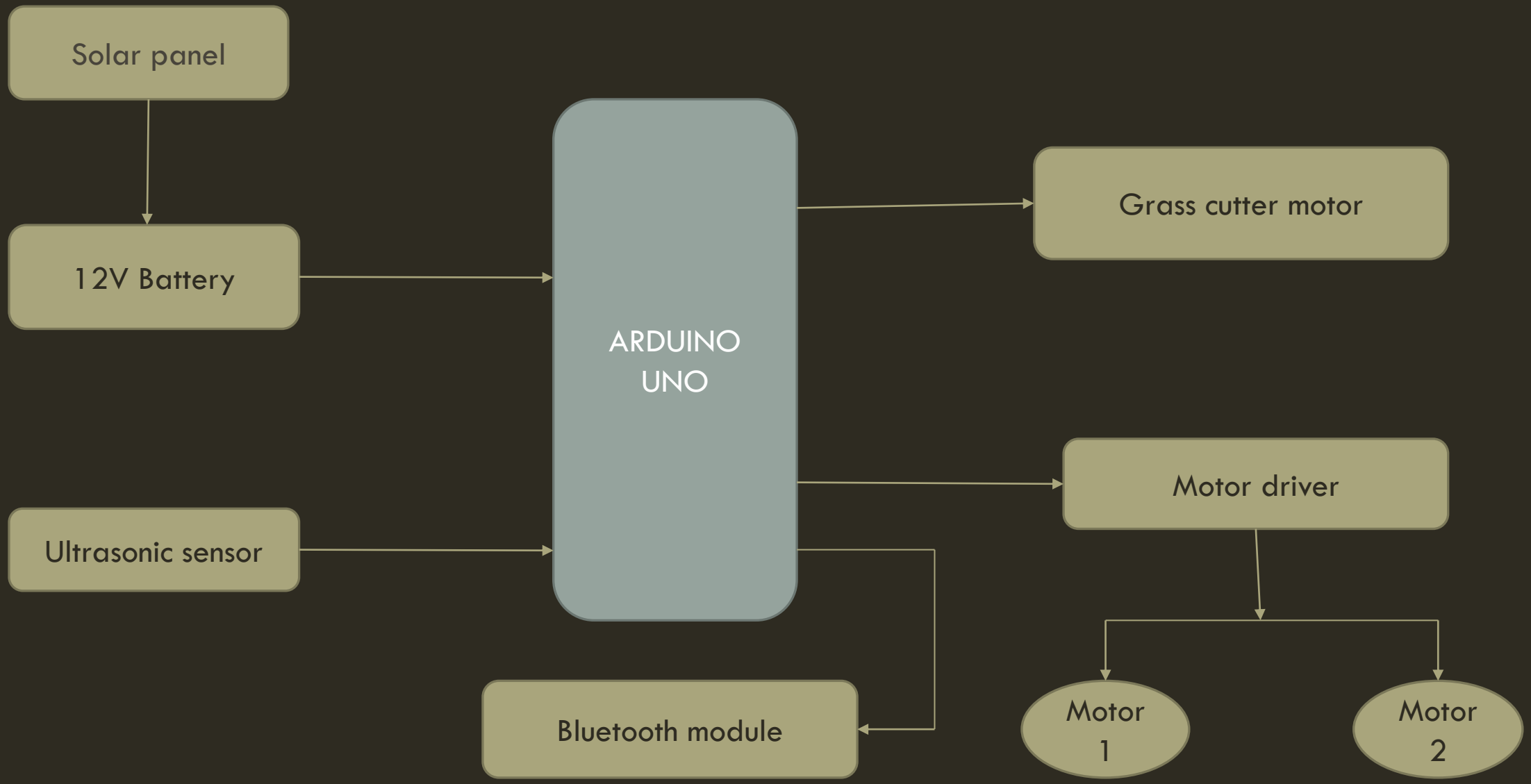
SOLAR POWERED AUTOMATIC LAWN CUTTER

Ty mini project by swaliha sanadi(3166),aishwarya shinde(3170)

BLOCK DIAGRAM:



COMPONENTS

HARDWARE

ARDDUINO UNO

L293D Motor Driver

IRFZ44N

3W Solar Panel

HC SR04 Ultrasonic Sensor

HT12E

HT12D

434 MHz RF Transmitter and Reciever

12v Lead Acid Battery

5V Regulated Power Supply

10 RPM DC Gear Motor

25000 RPM DC Motor

software

Programming IDE : Atmel Studio 7

Programming Language :Embadded C

Compiler : AVR GCC

ADVANTAGES

SOLAR ENERGY IS RENEWABLE FREE SOURCE OF ENERGY THAT IS SUSTAINABLE AND TOTALLY INEXHAUSTIBLE AND ALSO NON POLLUTING .

HERE WITH HELP OF THIS SOLAR PANEL WE SAVED THE ENERGY

IT IS AUTOMATIC. DUE TO THIS MAN POWER IS ALSO REDUCED

IT IS COST EFFECTIVE

APPLICATION

IT IS HELPFUL FOR THE BUSY PEOPLE WHO REALLY DON'T HAVE MUCH TIME TO MAINTAIN THE GARDEN.

WITH THIS MACHINE OLD AND HANDICAPE PEOPLE CAN ALSO DO GARDENING.

EASY TO HANDLE AND PORTABLE .

WORK EFFICIENCY IS MORE.

STUDY OF COMPONENTS IN AUTOMATIC SOLAR GRASS CUTTER

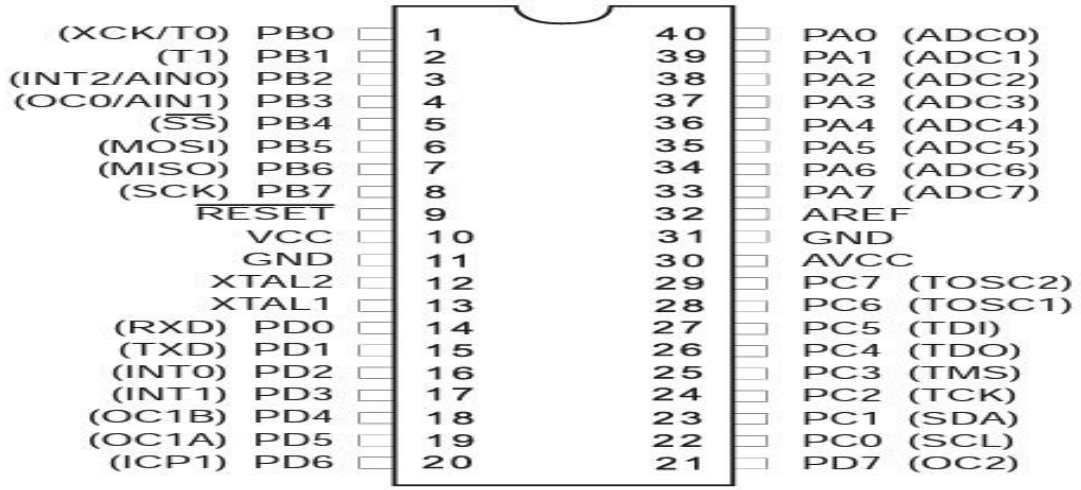
ARDUINO UNO

- 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 pins : 40 mA
- DC current for 3.3 V 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

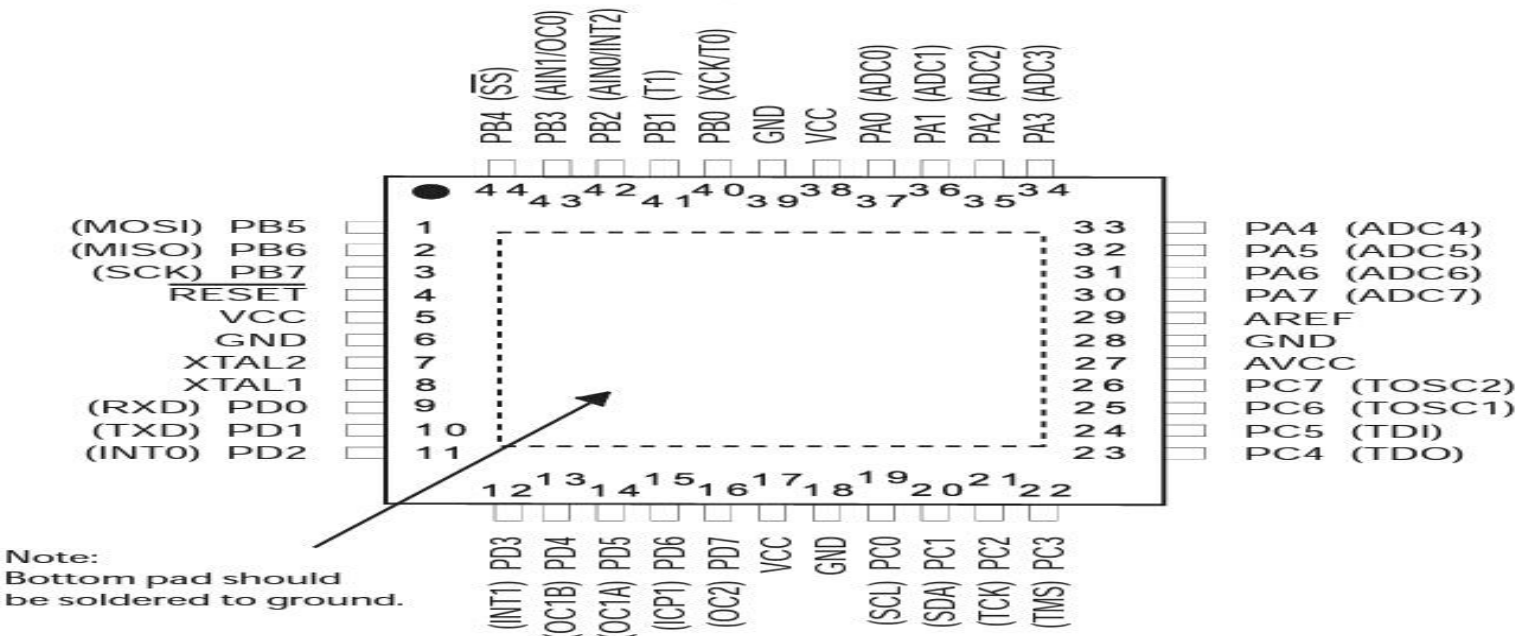
❖Peripheral features of ATmega:

- ❖Two 8-bit timer or counter with separate Prescalers and compare modes
- ❖One 16-bit timer or counter with separate Prescalers ,compare mode and capture mode
- ❖Real time counter with separate oscillator
- ❖4 PWM channels
- ❖8 channel,10 bit ADC
- ❖Programmable serial USART
- ❖Master or slave SPI serial interface
- ❖On chip Analog comparator
- ❖Programmable watchdog timer with separate on chip oscillator
- ❖I/O and packages:
- ❖32 Programmable I/O lines
- ❖40 pin PDIP,44 lead TQFP and 44-pad QFN/MLF
- ❖Operating voltages:
- ❖2.7-5.5V for ATmega21A
- ❖Speed grades:
- ❖0-16 MHz for ATmega32A

PDIP



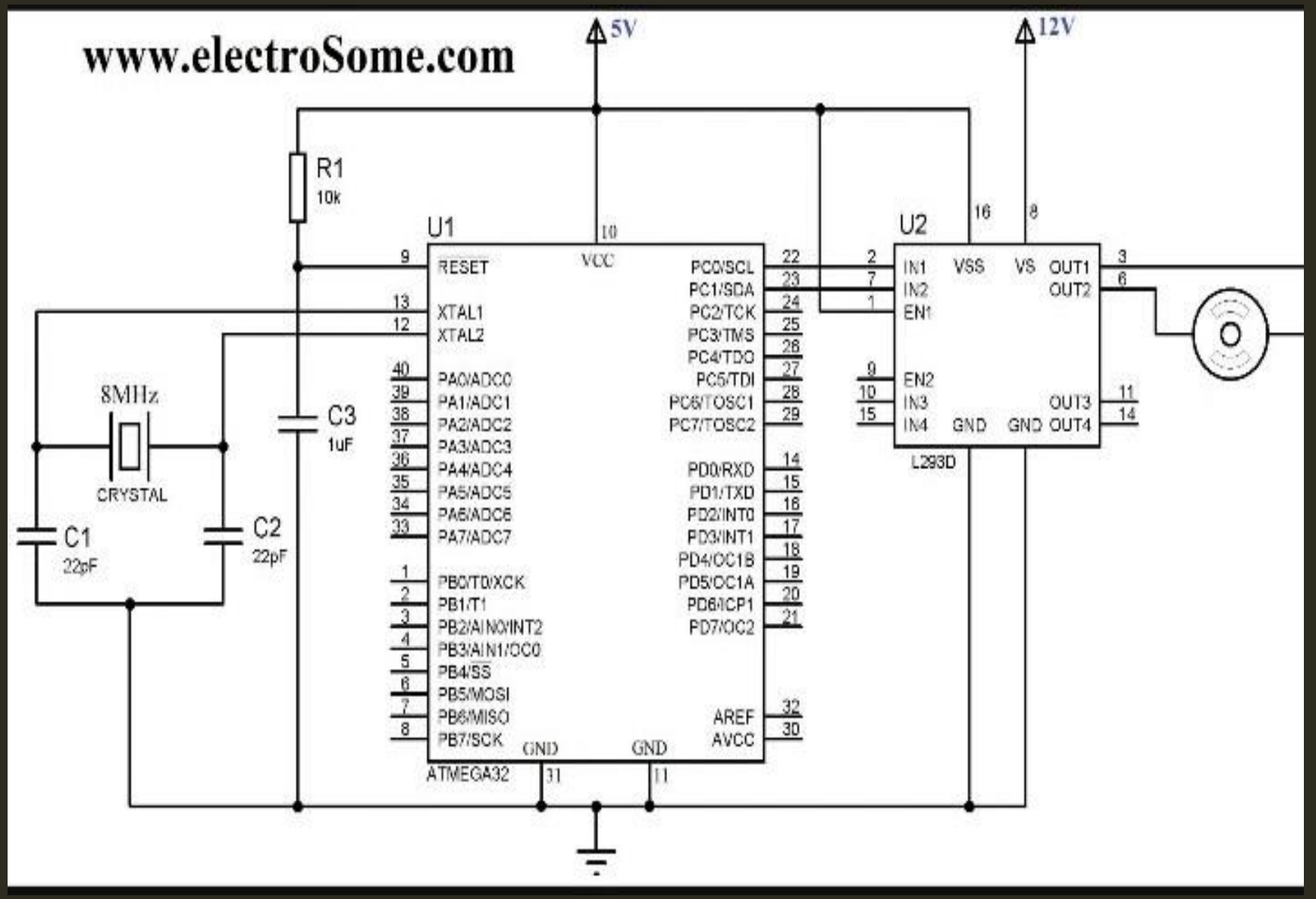
TQFP/MLF



Note:
Bottom pad should
be soldered to ground.

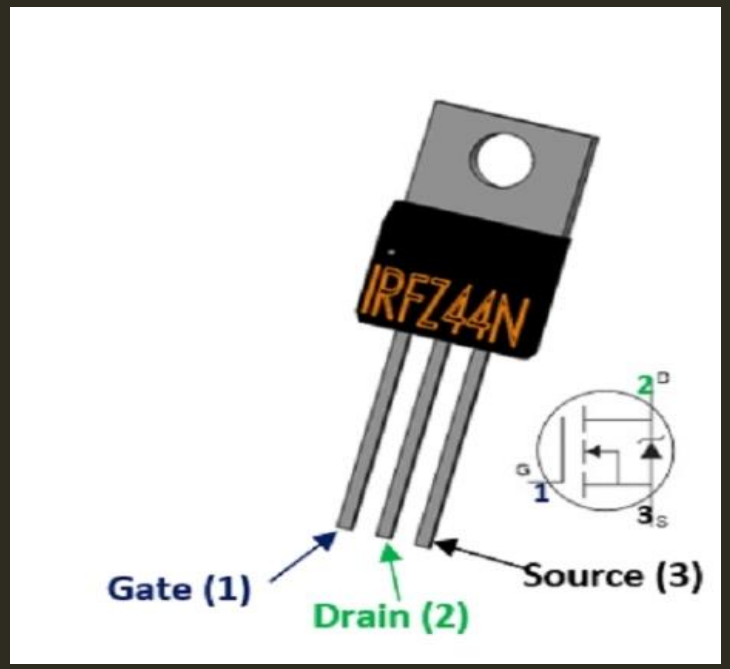
L293D MOTOR DRIVER

- Microcontroller cant supply the current required for the working of DC motor . Atmega32A microcontroller can source or sink current up to 40 mA but a DC motor needs current very much more than that
- The negative voltage is created due to the back emf of the motor may affect the proper functioning of the mc
- The operating voltage of the DC motor may be much higher than the operating voltage of mc
- To solve this problem we H bridge and L293D it is batter to use readymade Ics such as L293D instade of making our own H bridge ,which simplifies our project
- L293D can provide up to 600mA current
- Voltage range 4.2 to 36 V
- L293D contains 4 half H bridge drivers and they are enabled in pairs
- 1.2 A peak output current per channel
- Enable facility
- Over temperature protection
- Logical 0 input voltage up to 1.5V (high noise immunity)
- Internal clamp diodes


www.electroSome.com
5V
12V
R1
10k
U1
ATMEGA32
RESET
XTAL1
XTAL2
VCC
GND
GND
PA0/ADC0
PA1/ADC1
PA2/ADC2
PA3/ADC3
PA4/ADC4
PA5/ADC5
PA6/ADC6
PA7/ADC7
PB0/T0/XCK
PB1/T1
PB2/AIN0/INT2
PB3/AIN1/OC0
PB4/SS
PB5/MOSI
PB6/MISO
PB7/SCK
PC0/SCL
PC1/SDA
PC2/TCK
PC3/TMS
PC4/TDO
PC5/TDI
PC6/TOSC1
PC7/TOSC2
PD0/RXD
PD1/TXD
PD2/INT0
PD3/INT1
PD4/OC1B
PD5/OC1A
PD6/ICP1
PD7/OC2
AREF
AVCC
8MHz
CRYSTAL
C1
22pF
C2
22pF
C3
1uF
U2
L293D
IN1
IN2
EN1
EN2
IN3
IN4
VSS
VS
GND
GND
OUT1
OUT2
OUT3
OUT4

IRFZ44N (RECTIFIER)

- Rectifier is used for converting AC to DC power supply and for powering applienances
- Advanced process technology
- Ultra low on-resistance
- Dynamic dv/dt rating
- 175c operating temperature
- Fast switching
- Fully avalanche rated
- Continuous drain current is 49A at 25c
- Pulsed drain current is 160A
- Available in To-220 package



- Irfz44n is also a N –channel MOSFET having low threshold voltage at 4 volt at which the MOSFET will start conducting hence it is commonly used with microcontrollers to drive with 5V
- Applications: 1) switching high power devices

  2)control speed of motors

  3)LED dimmers or flashers

  4)high speed switching applications

  5)converters or inverters circuits

SOLAR PANEL

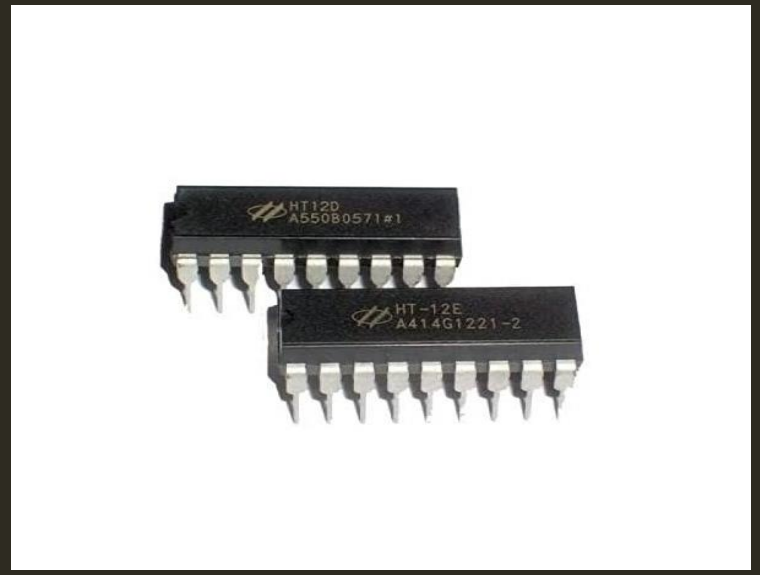
- Maximum Power : 3W
- Maximum Power voltage : 8.97 V
- Maximum Power current: 0.34 A
- Open circuit voltage : 11.12V
- Short circuit current: 0.37A
- Panel dimensions: 21.5x20.3x3.2cm,540g
- Current and power is produced at the output of solar panel and it is proportional to intensity of sun
- Solar panel produces direct current (generally in the range 200 to 500V)
- A typical silicon solar cell generates between 0.5 to 0.6 V. The output current varies
- Depending on size of the cell in general typical commercially-available silicon cell produces a current between 28 to 35 milliamp per square cm
- Formula for calculating solar panels power output :
  solar panel watts x average hours of sunlight x 75%=daily watt hours

ULTRA SONIC SENSOR (HC SR04)

- This sensor uses a technique called ECHO which is something we get when sound reflects back after striking with the surface
- Ultra sonic sensor(HC SR04) provides an output signal proportional to distance based on the echo
- 5V supply, 0V ground
- Trigger pulse input , Echo pulse output
- Working voltage: DC 5V
- Working current: 15mA
- Working frequency: 40Hz
- Range : 2cm to 4m
- Measuring angle: 15 degree
- Trigger input signal: 10microsec TTL pulse
- Echo output signal: input TTL lever signal and the range in proportion

HT12E AND HT12D

- HT12E is an encoder IC for remote control system
- HT12D is an decoder IC for remote control system
- They are commonly used for radio frequency applications
- By using the paired HT12E encoder and HT12D decoder we can easily transmit and receive 12 bits of parallel data serially
- 12 parallel data is divided into 8 address bits and 4 data bits . By using these address pins we can provide 8 bit security code for data transmission and multiple receivers may be addressed using the same transmitter
- Operating voltage :2.4 V to 12 V
- Low power and high noise immunity CMOS technology
- Low stand by current
- Capable of decoding 12 bits of information
- Binary address setting
- Received codes are checked 3 times
- Built in oscillator needs only 5% resistor
- Valid transmission indicator
- Easy interface with an RF or an infrared transmission medium
- Minimal external componenets



434MHZ RF TRANSMITTER AND RECEIVER

- In general wireless system designer has two overriding constraints : it must operate over a certain distance and transfer a certain amount of information within a data rate
- Direct modules are very small in dimensions
- The transmitter draws no power when transmitting logic is zero while fully supressing the carrier frequency thus consume significantly low power in battery operation
- When logic one is sent carrier is fully on to about 4.5 mA with 3 V power supply
- The data is sent serially from the transmitter which is received by the tuned receiver
- Transmitter and receiver are duly interfaced to two microcontrollers for data transfer
- Features : 1)receiver frequency 433MHz

  2)receiver typical frequency 105Dbm

  3)receiver supply current 3.5mA

  4)low power consumption

  5)receiver operating voltage 5V

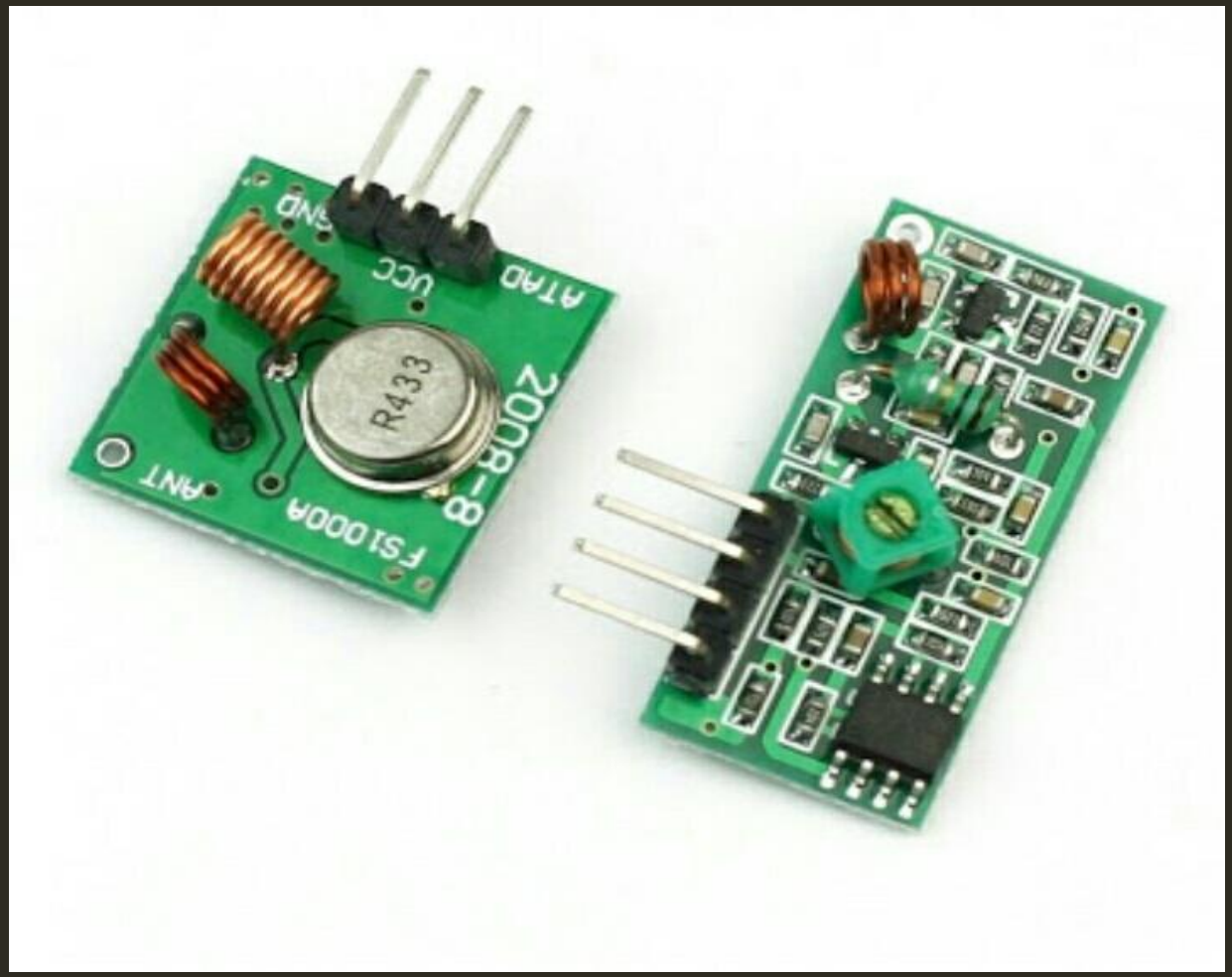
  6)transmitter frequency range 433.92MHz

  7)transmitter supply voltage 3V to 6V

  8)transmitter output power 4V to 12V

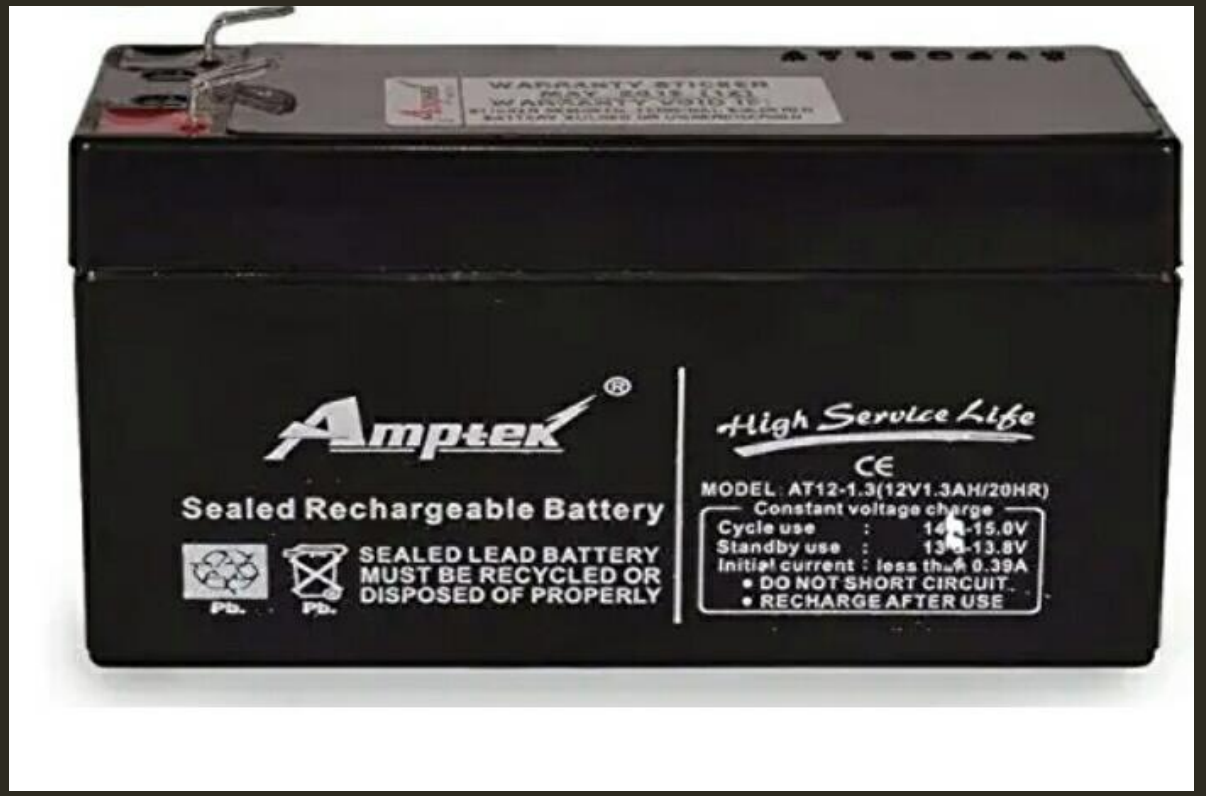
APPLICATIONS:

- 1)wireless security system
- 2)car alarm system
- 3)remote controls
- 4)sensor reporting
- 5)automation systems



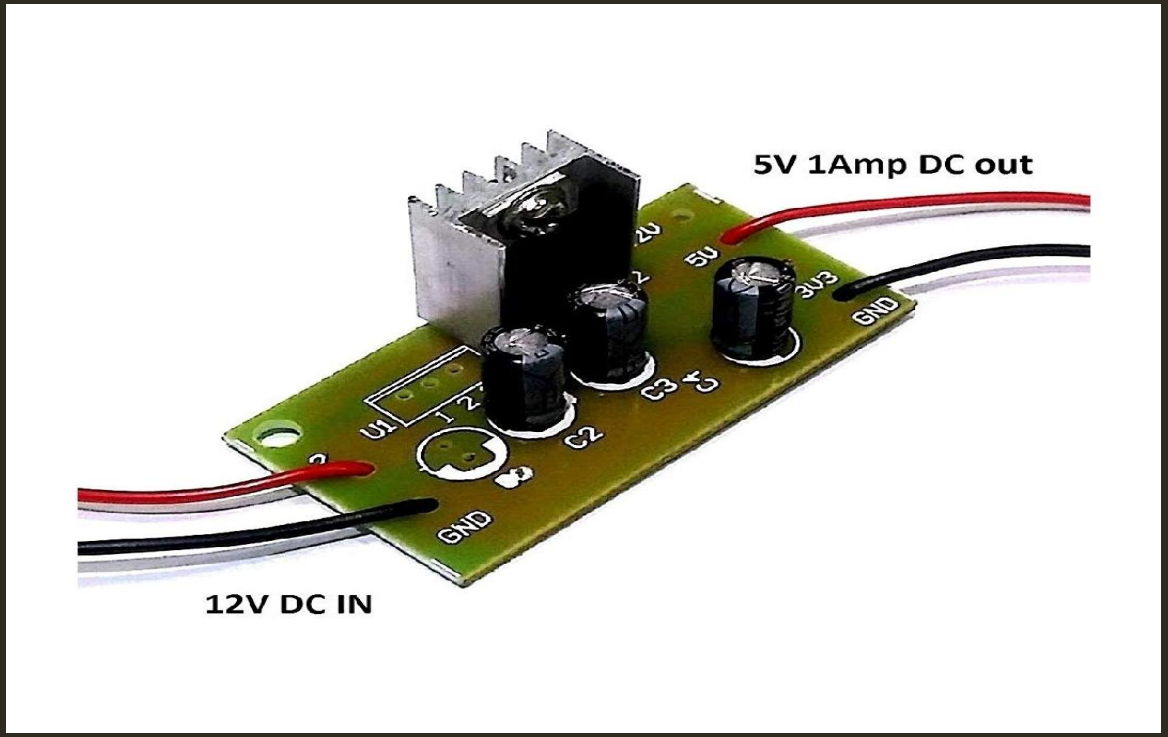
12V LEAD ACID BATTERY

- A rechargeable 12V lead acid battery is suitable for high cyclic and stand by applications
- Constructed in sealed ,rectangular high impact plastic case
- Used in electronic weighing scales
- Used in toys
- Used in medical equipments
- Used in electronic test equipments
- Used in communication equipments



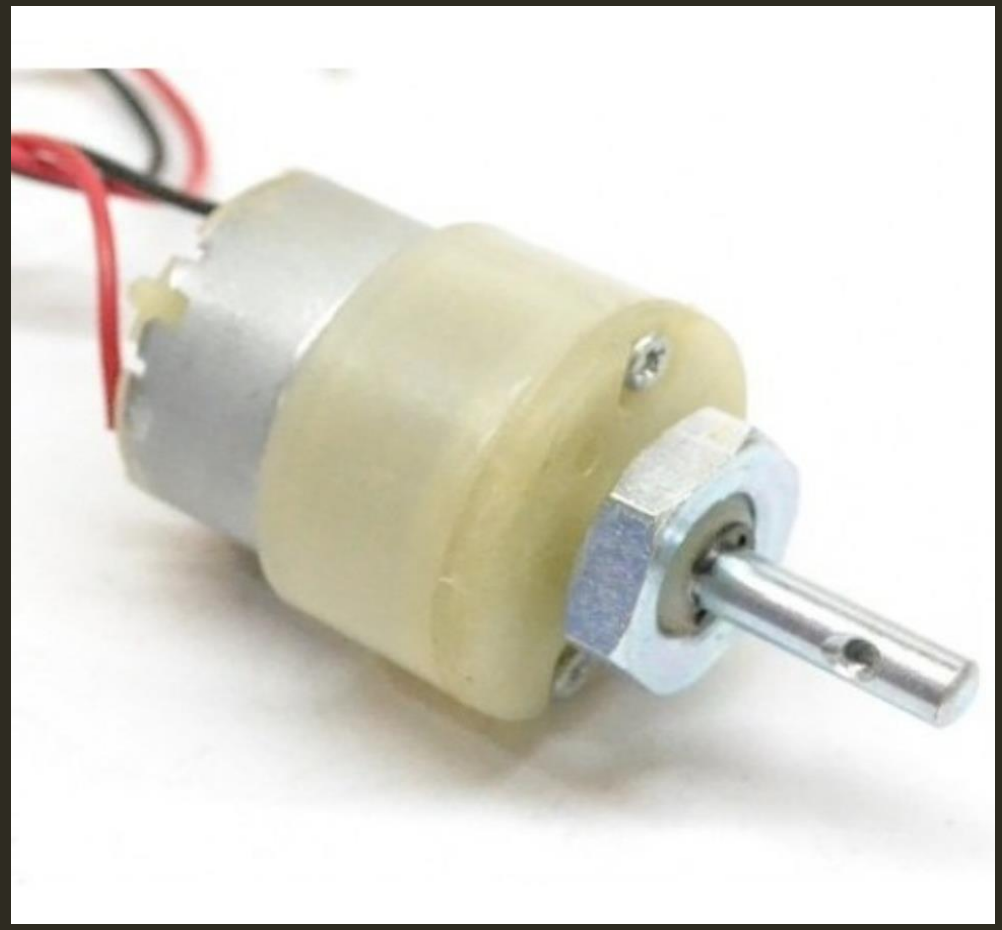
5V REGULATED POWER SUPPLY

- Best suitable for Arduino, node MCU microcontroller module ,mini audio players ,home automation, wireless control module, 5V relay board ,solar mobile charger
- 1A load capacity built with heat sink to increase the efficiency and life
- Input voltage: 7.5 to 35V ,output voltage: 5V with 5% tolerance
- Wattage: 5W



10 RPM DC GEAR MOTOR

- 10 RPM
- Operating voltage: 12 DC
- Gear box: attached plastic gear box
- Torque : 7 kg-cm
- No-load current : 60 mA max
- Load current 30mA max
- Shaft diameter 6mm with internal hole



25000 RPM DC MOTOR

- 25000 RPM
- Voltage : 12V
- 3mm diameter shaft

THANK YOU!!!