

Lecture 3

Sensor Types

2017.03.08 - FMI

Github link

<https://goo.gl/UmJu1g>

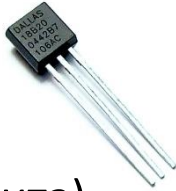
Environmental Sensors

Сензори за Околната среда

- Температура

- DS18B20

- Точност: $\pm 0.5^{\circ}$
 - Резолуция: 0.06 (12 бита)
 - Протокол: 1-Wire
 - Повече от 10 сензора на един пин
 - $-20^{\circ} : 80^{\circ}$
 - 3 лв



- Температура/Влага/Налягане

- BME280

- Точност: $\pm 0.5^{\circ}$
 - Резолуция: 0.01 (14 бита)
 - Протокол: I2C
 - 2 Сензор на шина
 - $-25^{\circ} : 125^{\circ}$
 - 9 лв



- Температура/Влага

- SI7021

- Точност: $\pm 0.3^{\circ}$
 - Резолуция: 0.01 (14 бита)
 - Протокол: I2C
 - 1 Сензор на шина
 - $-25^{\circ} : 125^{\circ}$
 - 5 лв



- Температура

- PT100

- Протокол: Съпротивление
 - $-20^{\circ} : 500^{\circ}$
 - 2 лв



Сензори за Околната среда

Въглероден Диоксид

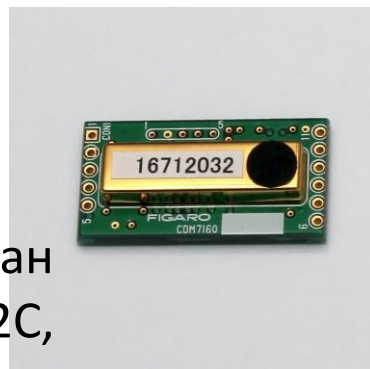
- MQ135

- Тип: Електро химичен
- Консумация: 150 ма
- Точност: +/- 30%
- Протокол: Съпротивление
- Цена: 5 лв



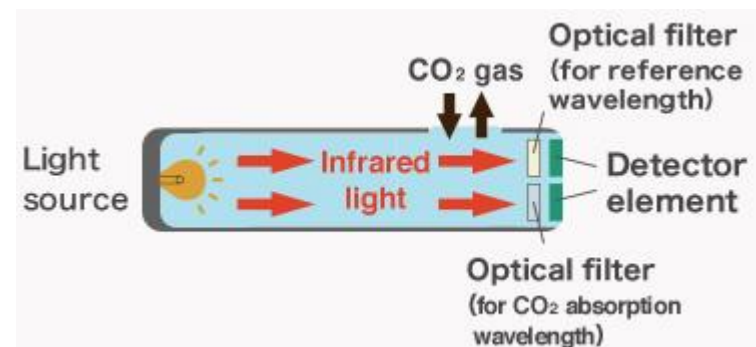
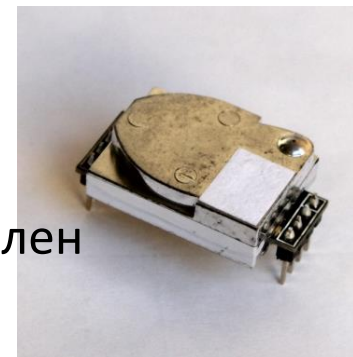
- Figaro CDM7160

- Тип: NDIR
- Консумация: 8 ма
- Точност: +/- 4%
- Фабрично калибриран
- Протокол: Сериен, I2C, PWM
- Цена: 100 лв



- Cubic CM1106

- Тип: NDIR
- Консумация: 60 ма
- Точност: +/- 5%
- Калибрация от околнен въздух
- Протокол: Сериен
- Цена: 60 лв



Сензори за Околната среда

Прах

- Sharp gp2y1010au0f

- Тип: Оптичен
- Прокъл: сложен
- Цена: 5 лв



- Cubic PM2005

- Тип: Лазерен
- Протокол: I2C
- Цена: 80 лв



- DSM510a

- Тип: Оптичен
- Протокол: ?
- Цена: 15лв



Сензори за Околната среда

MQ Series

- Long preheat
- High power consumption
- Dependency to Temperature/Humidity



Semiconductor sensor for Flammable gas, Plastic or Metal cover	
Model	Target Gas
MQ-2	General combustible gas
MQ-3	Alcohol
 MQ-4	Natural gas, Methane
MQ-5	LPG, Natural gas, Coal gas
MQ-6	LPG, Propane
 MQ-7	Carbon Monoxide (CO)
MQ-8	Hydrogen
MQ-9	CO and Combustible gas
MQ216	Natural gas\Coal gas
MQ306A	LPG, Propane
MQ309A	Carbon Monoxide (CO), Flammable Gas
MQ303A	Alcohol
MQ131	Ozone O3
MQ135	Air Quality Control (NH3,Benzene,Alcohol,smoke)
Semiconductor sensor for Toxic gas	
MQ136	Sulfureted Hydrogen (H2S)
MQ137	Ammonia (NH3)
MQ138	VOC (Mellow, Benzene, Aldehyde, Ketone, Ester)

Сензори за Светлина

- BH1750

- 1-120,000 LUX
- I2C
- 3 лв

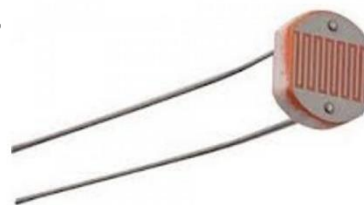


- TSL2561

- 0.1 – 60,000 Lux
- + IR Light
- I2C
- 4 лв

- LDR (Light Dependent Resistor)

- ??? LUX
- Resistive Voltage Divider
- 0.2 лв



- Ultra Violet Light
- InfraRed – (remote control)
- Color Sensor (RGB)

Accelerometer/Gyroscope/Magnetometer

- MPU6050 – 6 DOF (Degrees Of Freedom)

- Accelerometer / Gyroscope

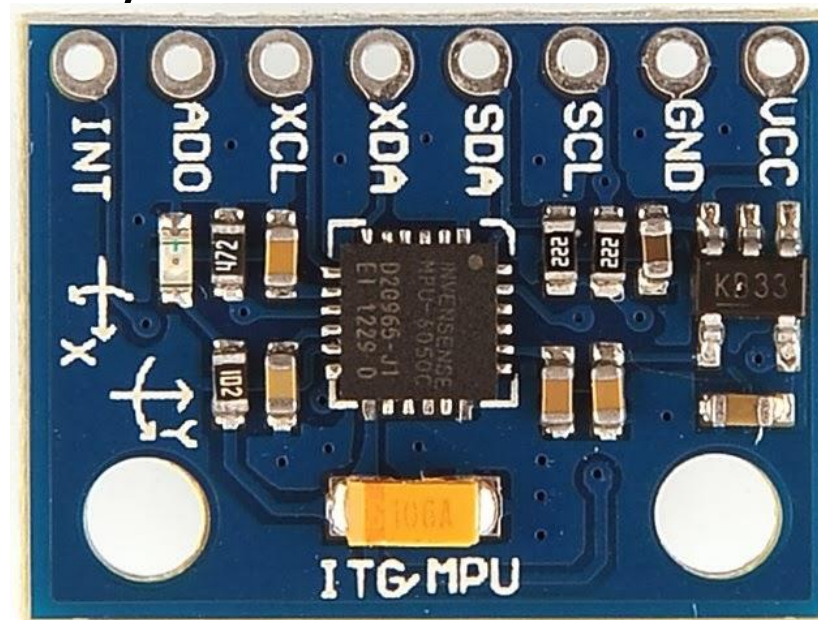
- MPU-9250 9-DOF – 9 DOF

- + Magnetometer / Compass

- Communication

- SPI
 - Internal DSP (Digital Signal Processor)

- Info: How do accelerometers work



<https://diyhacking.com/arduino-mpu-6050-imu-sensor-tutorial/>

Движение

- PIR Sensor (2 лв)



- Omron D6T (60 лв)
 - 1x8 или 4x4

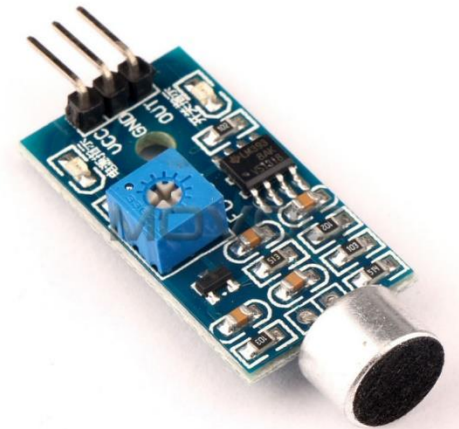


Разстояние / Звук

- HC-SR04
 - ультразвук

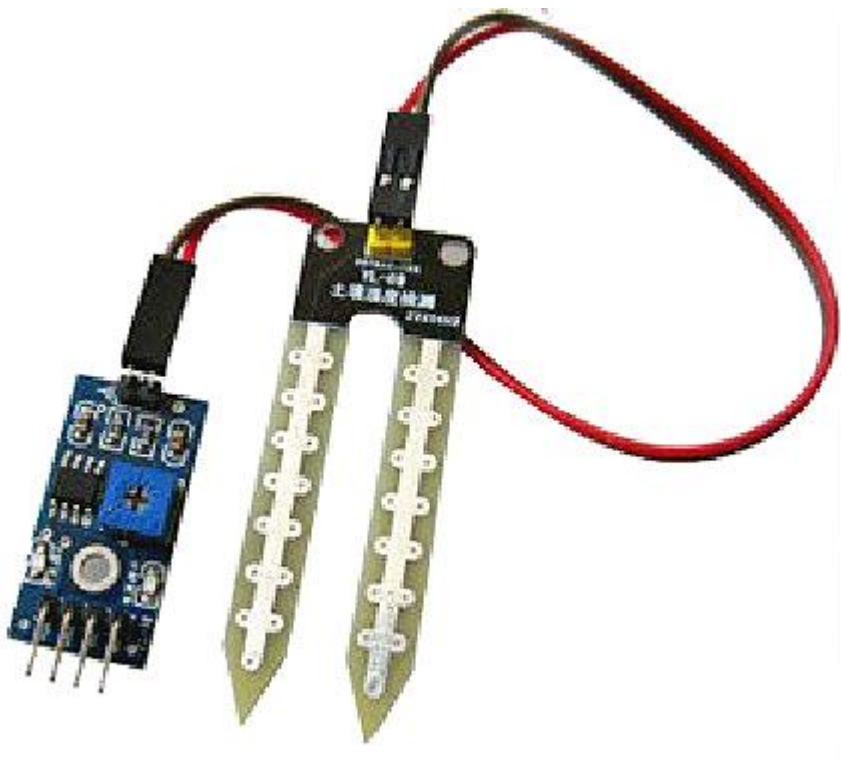


- Voice Recognition
- Noise Sensor
 - звук



Влага в почвата

Soil Moisture Sensor (2 лв)

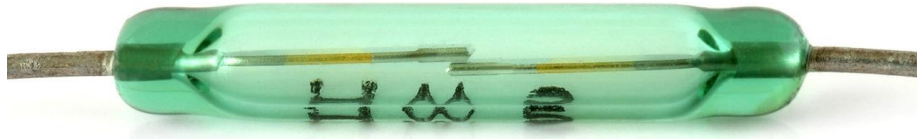


Xiaomi MI Plant (20 лв)

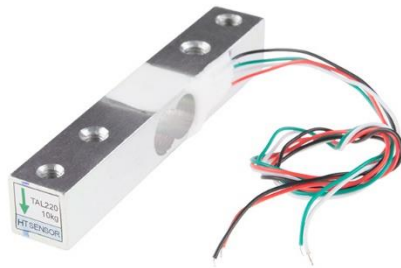


Други

- Reed Switch (Magnetic Switch)



- Load Cell (Тегло)



- Gesture Sensor (APDS9960)
 - UP, DOWN, LEFT, RIGHT, FAR, NEAR

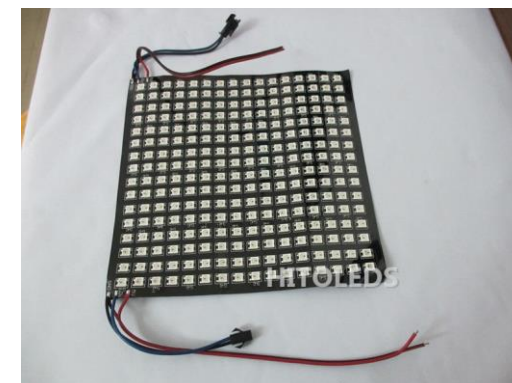
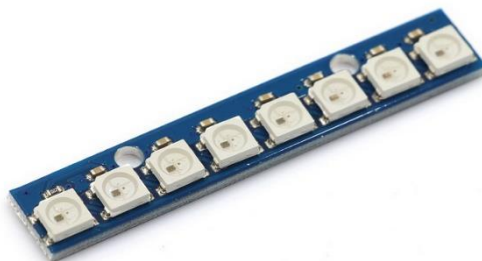


Други

- Светкавици
- Радиация (Гайгер-Мюлерови тръби)
- Камери
- Термо Камери
- Напрежение, Ток
- Heart Rate Sensor
- Line Follower
- GPS
- RFID / NFC
- Wind Meter

Светодиоди

- Светодиоди (1 цвят) (0.1 лв)
 - Консумация: 0-20 ма
 - Резистор: 100-1000 ома
- RGB (WS2812b) (0.2лв / bit)
 - Консумация: 0-60 ма
 - 1 пин може да управлява 500 + лед-а
 - 4, 8, 16, 256 bit, LED Strip



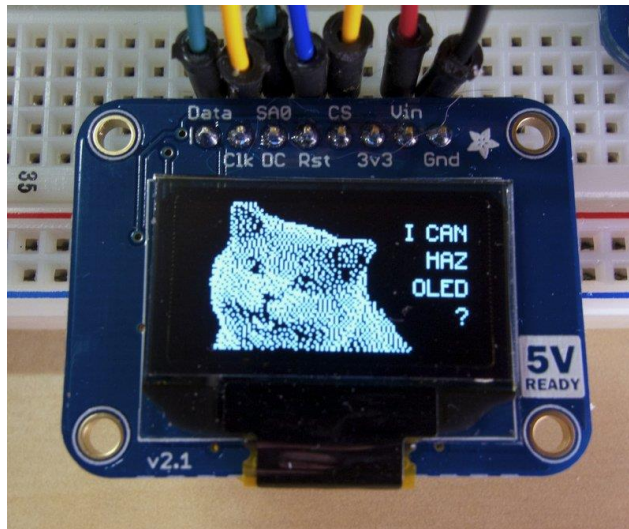
Character Display

- LCD Display
 - 1x8, 2x10, 2x16, 2x20, 4x40
 - Protocol I2C or Paralell
 - Backlight on/off
 - Only Characters / no Graphics
 - 2x20 (i2c) - ~5 лв



OLED B/W

- Protocol: I2C or SPI
- Types: 128x64, 128x32, 64x32
- Black/White, Black/Blue, Black/Yellow/Blue
- Цена: 10 лв



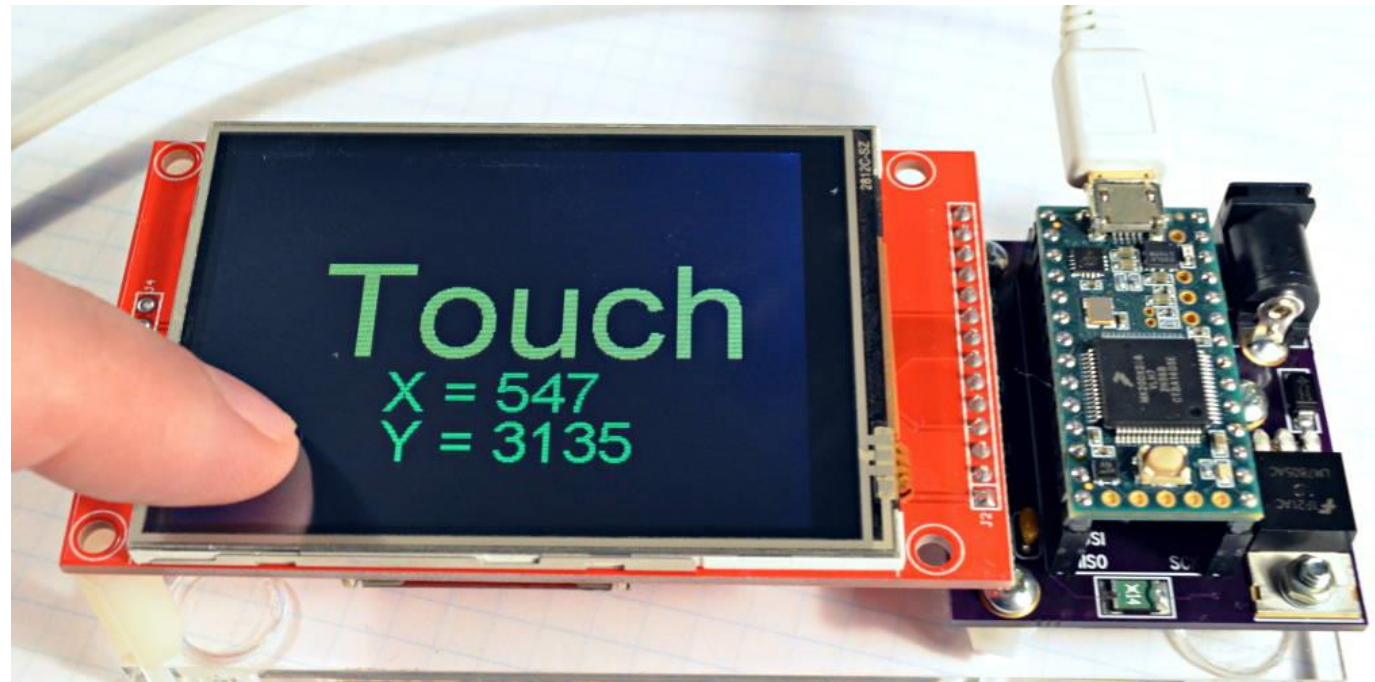
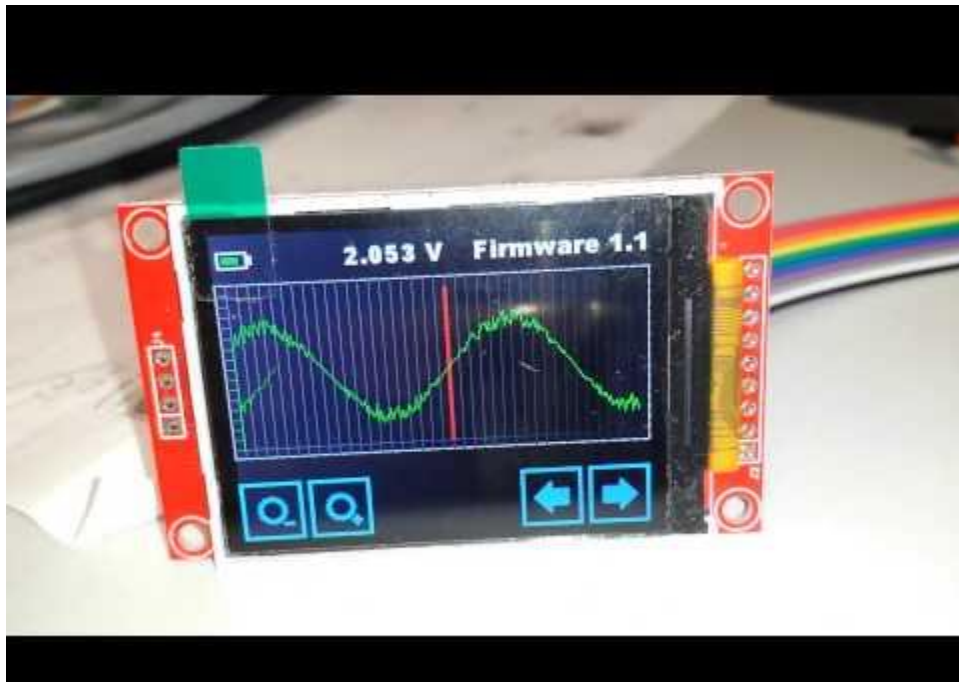
Nokia 5110

- Resolution: 84x84
- Low Power
- Custom Driver



Display TFT / Small / ILI9341 / 2.2" – 3.2"

- 320x240 resolution
- 15/16 bit color
- SPI (5+ wires communication)
- Resistive Touch support (on some models)
- Цена: 10-20 лв



Nextion Displays

- Protocol: Custom 2 wires
- Size: 2.4" (20\$) – 7.0" (80\$)
- IDE for visual design
- Compatible with Arduino / ESP8266
- Integrated 48 Mhz – 108Mhz processor



Nextion 4

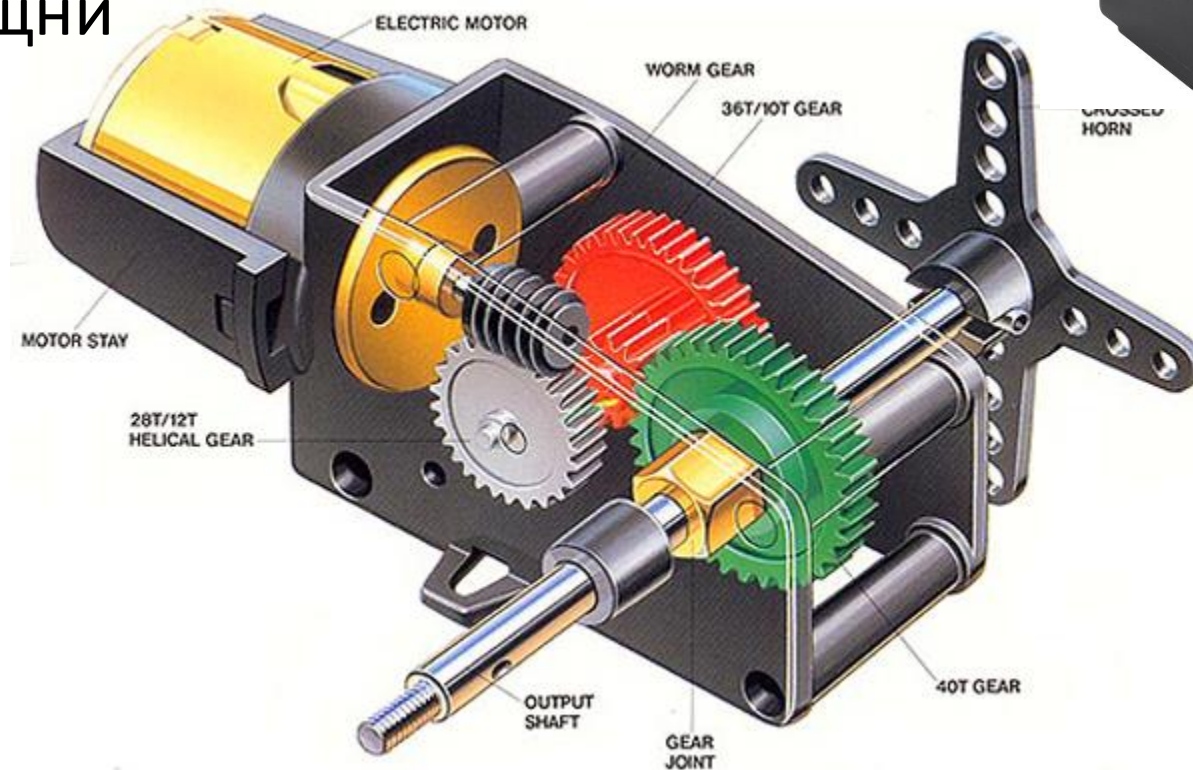
Актуатори / Бутони

- Бутони
- Превключватели
- Сензорни бутони
- Takt Switch, Push Button



Серво

- +/- 90/180/360 градуса
- Връща се пак на 0, само
- Различно мощни



Stepper Motor

- Stepper
 - Може да се контролира колко точно стъпки да се завърти, например 10 градуса, 20, 30, не се връща сам обратно
 - Stepper moto driver



DC Motor

- Controlled by PWM and ESC (Electronic Speed Control)

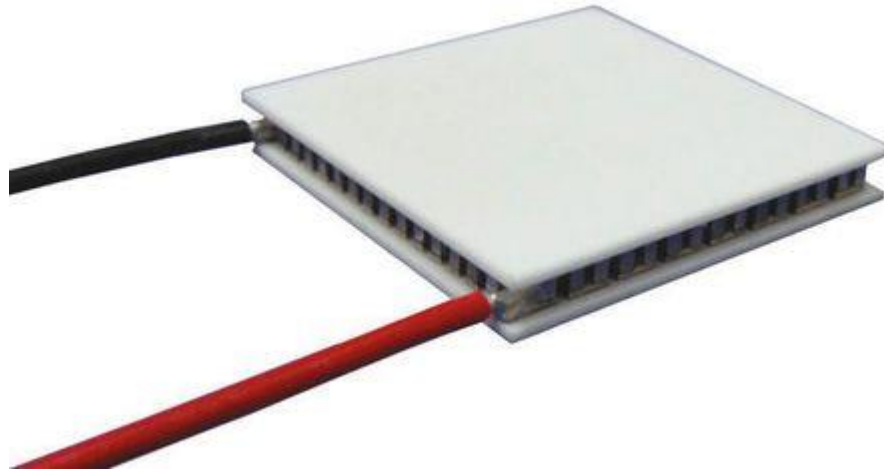


Linear Actuator



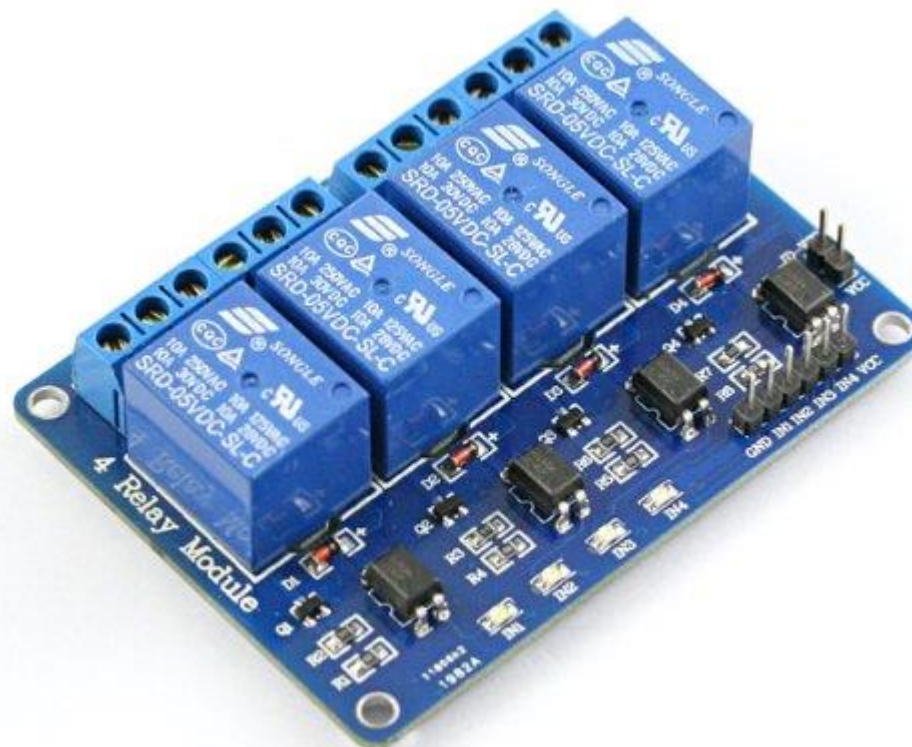
Peltier Module

- Може се стопля или охлажда



Релета

- Контролира се с 5/12v, и може да превключва 220v Ас/DC



Others

- Electronic Locks
- Electromagnets
- Solenoids
- Pumps
- Valves