Embedded Computer Design

(DISEÑO DE COMPUTADORES EMPOTRADOS)

Course 2017/18

Introduction to Sensors

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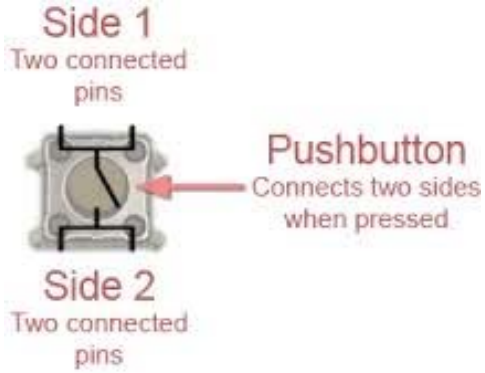
Computer Engineering Degree

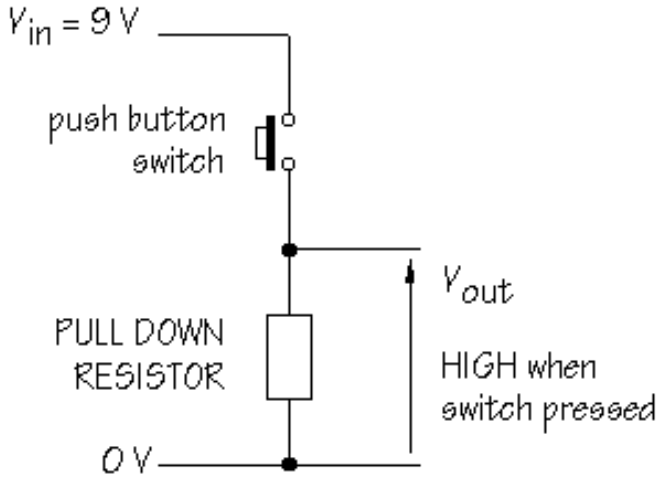
Introduction to Sensors

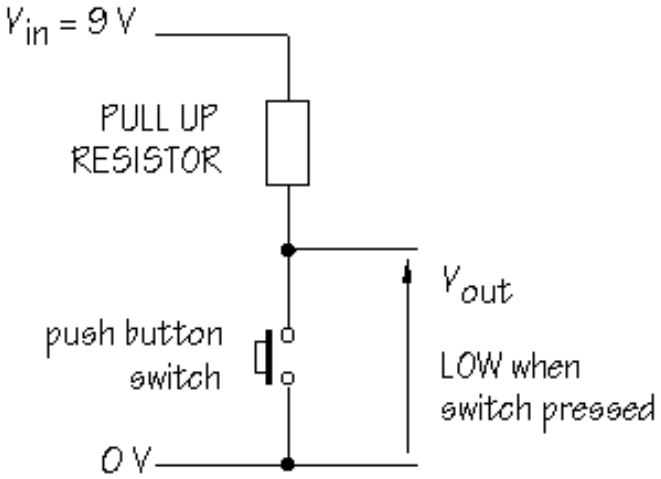
- Web pages
- https://www.cooking-hacks.com/shop/sensors
- http://tienda.bricogeek.com/23-sensores
- http://ro-botica.com/tienda/Sensores/
- http://www.electronicaembajadores.com/Subfamilias/Index/37/SS/sensores

Introduction to Sensors

- Push Button Switch - 12mm Square.

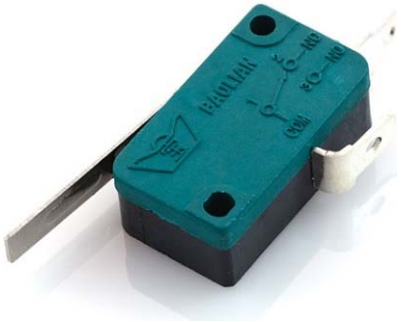


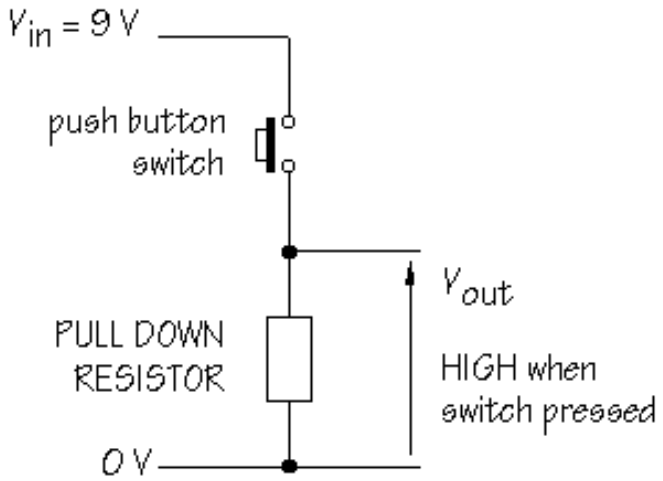


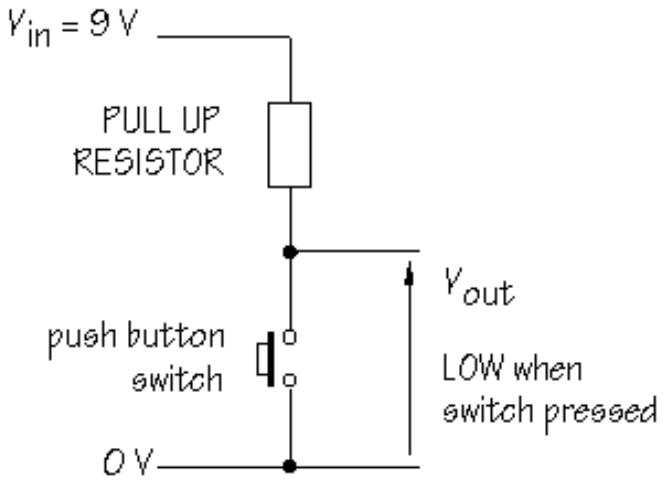


Introduction to Sensors

- Microswitch - 2 Terminal.
  - This is a simple 2-terminal microswitch, with a 36mm actuator. This switch has a great 'clicky' sound to it, and a nice tactile feel.
  - Features:
    - Max 3A 125/240VAC
    - 2 mounting holes

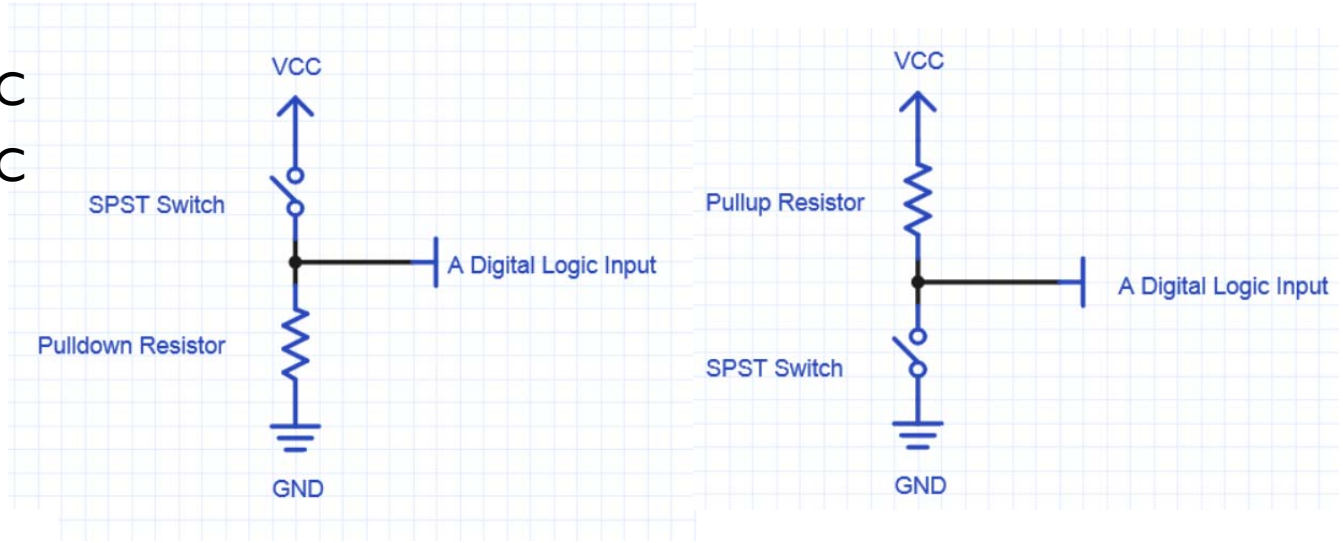


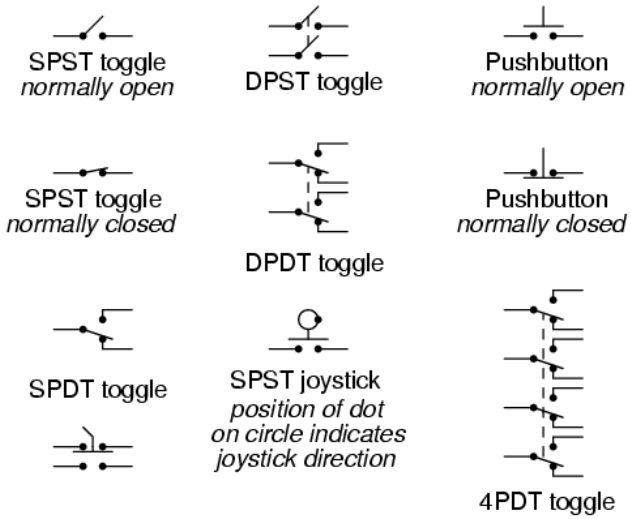




Introduction to Sensors

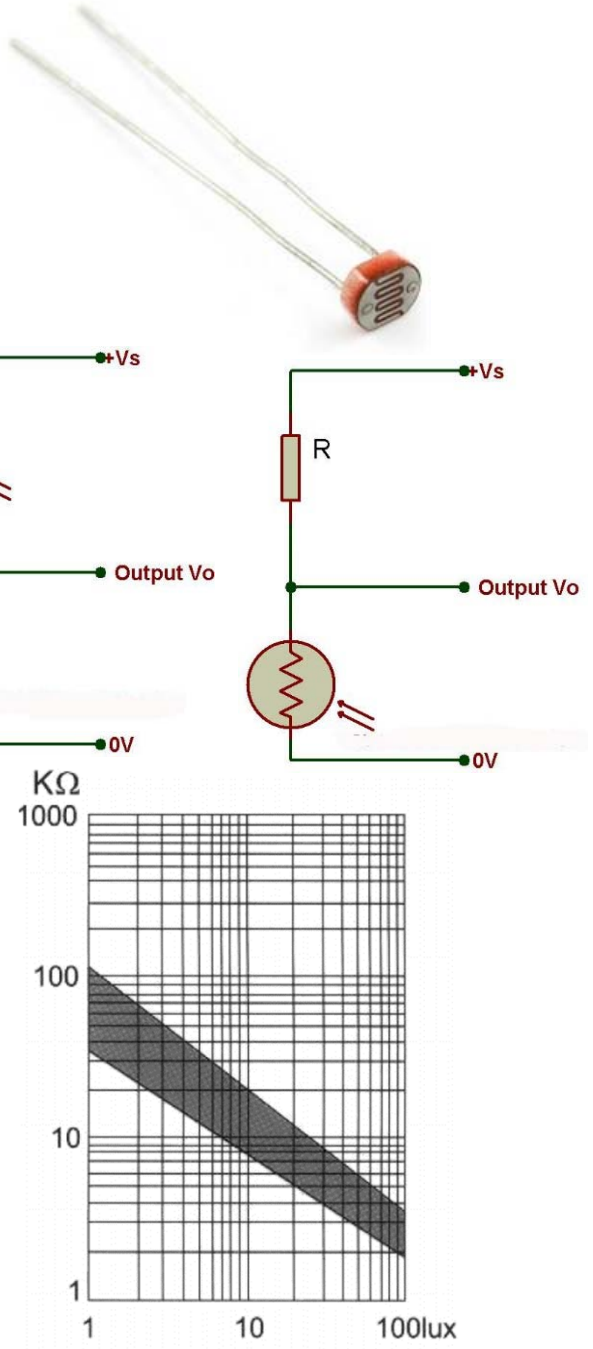
- Toggle Switch 2A for power.
  - Features:
  - 5 A - 125 VAC
  - 2 A - 250 VAC





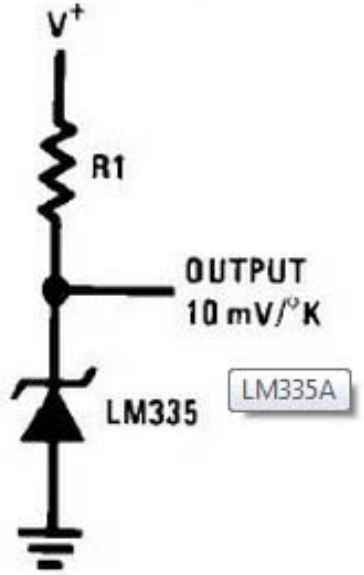
Introduction to Sensors

- LDR Sensor.
  - It stands for Light Dependent Resistor or Photoresistor, which is a passive electronic component, basically a resistor which has a resistance that varies depending of the light intensity.
  - Features:
    - Light Resistance at 10Lux (at 25℃) 8～20KΩ
    - Dark Resistance at 0 Lux 1.0MΩ(min)
    - Spectral Response peak (at 25℃) 540nm
    - Ambient Temperature Range: - 30～+70℃
    - Pin spacing: 4mm
    - Long Pin: 31mm
    - http://www.sparkfun.com/datasheets/Sensors/Imaging/SEN-09088-datasheet.pdf



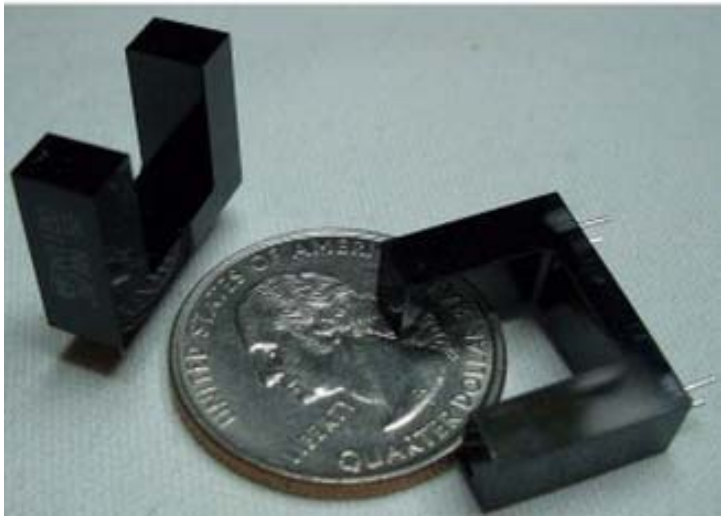
Introduction to Sensors

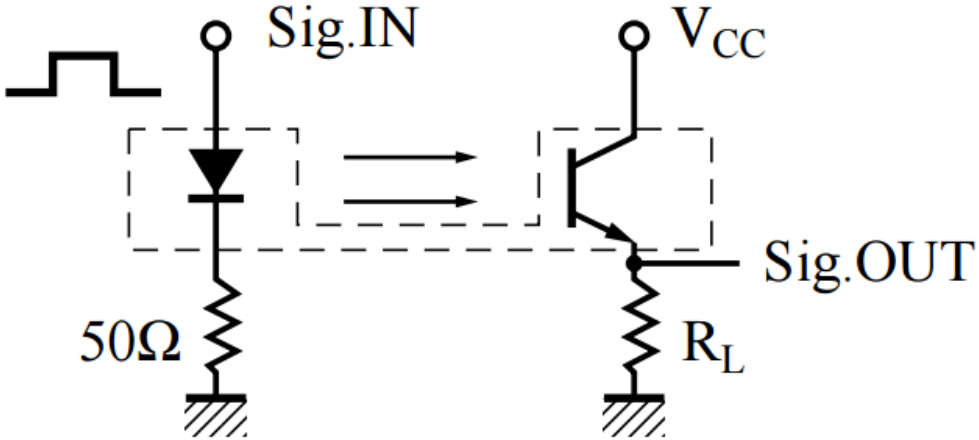
- Low Voltage Temperature Sensors TMP35/36/37
  - FEATURES
    - Low voltage operation (2.7 V to 5.5 V)
    - Calibrated directly in °C
    - 10 mV/°C scale factor
    - Specified −40°C to +125°C, operation to +150°C
    - http://dlnmh9ip6v2uc.cloudfront.net/datasheets/Sensors/Temp/TMP35_36_37.pdf



Introduction to Sensors

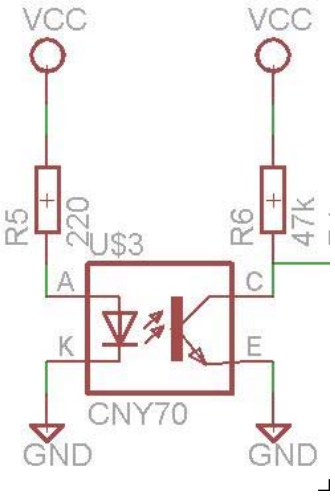
- Photo Interrupter.
  - This sensor is composed of an infrared emitter on one upright and a shielded infrared detector on the other. By emitting a beam of infrared light from one upright to the other, the sensor can detect when an object passes between the uprights, breaking the beam. Used for many applications including optical limit switches, pellet dispensing, general object detection, etc.
  - http://www.sparkfun.com/datasheets/Components/CNZ1120.pdf





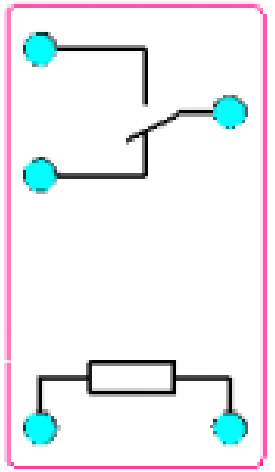
Introduction to Sensors

- Reflective Optical Sensor with Transistor Output
  - The CNY70 has a compact construction where the emitting light source and the detector are arranged in the same direction to sense the presence of an object by using the reflective IR beam from the object.
  - FEATURES
    - • Dimensions (L x W x H in mm): 7 x 7 x 6
    - • Peak operating distance: < 0.5 mm
    - • Operating range within > 20 % relative collector current: 0 mm to 5 mm
    - • Typical output current under test: IC = 1 mA
    - • Emitter wavelength: 950 nm
    - • http://www.vishay.com/docs/83751/cny70.pdf



Introduction to Sensors

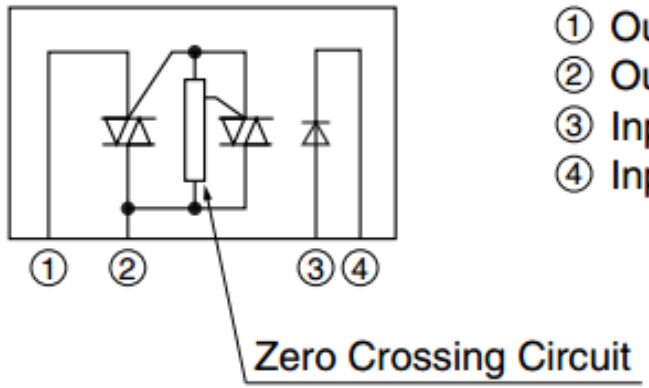
- Relay SPDT Sealed.
  - These are high quality Single Pole - Double Throw (SPDT) sealed relays. Use them to switch high voltage, and/or high current devices.
  - This relay's coil is rated up to 12V, with a minimum switching voltage of 5V. The contacts are rated up to 5A (@250VAC, 30VDC).
  - Features:
  - 5V DC SPDT Relay
  - Rated up to 5A
  - Fully SealedFEATURES
  - 5A switching capability
  - SPDT configuration
  - Power consumption of 200mW
  - Standard PCB layout



- http://www.sparkfun.com/datasheets/Components/General/JZC-11F-05VDC-1Z%20EN.pdf

Introduction to Sensors

- Solid State Relay
  - An IC that acts like a mechanical relay. They allow you to control high-voltage AC loads from lower voltage DC control circuitry. They can be switched by a much lower voltage and at a much lower current than most mechanical relays.
  - http://dlnmh9ip6v2uc.cloudfront.net/datasheets/Components/General%20IC/S108,208T02%20Series.pdf



Introduction to Sensors

- Reed Switch.
  - This is a small device called a reed switch. When the device is exposed to a magnetic field, the two ferrous materials inside the switch pull together and the switch closes. When the magnetic field is removed, the reeds separate and the switch opens. This makes for a great non-contact switch. This switch can carry up to 1.2A.
    - http://www.sparkfun.com/datasheets/Components/Buttons/MDSR-4.pdf

Introduction to Sensors

- Ultrasonic Distance Sensor.
  - Non-contact distance measurements from about 2 cm to 3 meters. The sensor works by transmitting an ultrasonic (well above human hearing range) burst and providing an output pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width, the distance to target can easily be calculated.

- Features
  - Range: 2 cm to 3 m (0.8 in to 3.3 yd)
  - Burst indicator LED shows sensor activity
  - TTL or 3.3 V CMOS microcontrollers
  - Bidirectional TTL pulse interface on a single I/O pin can communicate with 5 V Input trigger: positive TTL pulse, 2 µs min, 5 µs typ.
  - Echo pulse: positive TTL pulse, 115 µs minimum to 18.5 ms maximum. http://www.pololu.com/file/download/PING_documentation.pdf?file_id=0J214

Introduction to Sensors

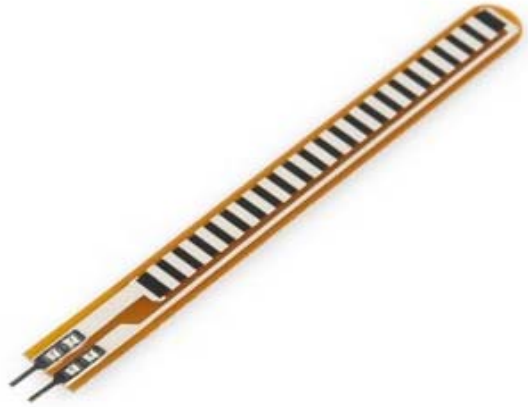
- Infrared Proximity Sensor. Sharp.GP2Y0A21Y
  - Infrared proximity sensor made by Sharp. Part # GP2Y0A21YK has an analog output that varies from 3.1V at 10cm to 0.4V at 80cm. The sensor has a Japanese Solderless Terminal (JST) Connector. We recommend purchasing the related pigtail below or soldering wires directly to the back of the module.
  - http://www.sparkfun.com/datasheets/Components/GP2Y0A21YK.pdf

Introduction to Sensors

- Force Sensing Resistors.
  - Force Sensing Resistors (FSR) are a polymer thick film (PTF) device which exhibits a decrease in resistance with an increase in the force applied to the active surface. Its force sensitivity is optimized for use in human touch control of electronic devices. FSRs are not a load cell or strain gauge, though they have similar properties. FSRs are not suitable for precision measurements.
    - http://www.sparkfun.com/datasheets/Sensors/Pressure/fsrguide.pdf

Introduction to Sensors

- Flex Sensor.
  - A simple flex sensor 2.2" in length. As the sensor is flexed, the resistance across the sensor increases. The resistance of the flex sensor changes when the metal pads are on the outside of the bend (text on inside of bend).
  - http://www.sparkfun.com/datasheets/Sensors/Flex/flex22.pdf



Introduction to Sensors

- Thumb analog Joystick.
  - Directional movements are simply two potentiometers - one for each axis. Pots are ~10k each. This joystick also has a select button that is actuated when the joystick is pressed down.

Introduction to Sensors

- Electret Microphone
  - A small electret microphone with a 100x opamp to amplify the sounds of voice, door knocks, etc loud enough to be picked up by a microcontroller's Analog to Digital converter.
  - https://www.sparkfun.com/datasheets/BreakoutBoards/Amplified-Mic-Electret-v14.pdf
  - http://focus.ti.com/lit/ds/symlink/opa344.pdf

Introduction to Sensors

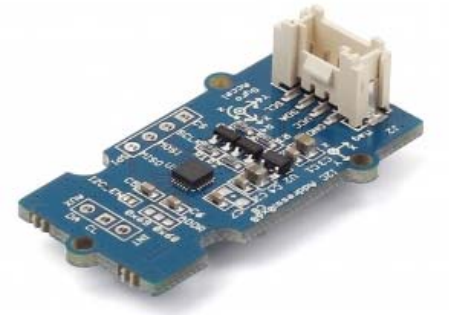
- PIR Motion Sensor
  - Power it up and wait 1-2 seconds for the sensor to get a snapshot of the still room. If anything moves after that period, the 'alarm' pin will go low.
  - This unit works great from 5 to 12V .You can also install a jumper wire past the 5V regulator on board to make this unit work at 3.3V. Sensor uses 1.6mA@3.3V.
  - The alarm pin is an open collector meaning you will need a pull up resistor on the alarm pin. The open drain setup allows multiple motion sensors to be connected on a single input pin. If any of the motion sensors go off, the input pin will be pulled low..
    - http://www.sparkfun.com/datasheets/Sensors/Proximity/SE-10.pdf

Introduction to Sensors

- JPEG Color Camera TTL Interface
- An infrared camera with serial port. It can capture high resolution pictures and transport them over TTL serial. And it can do it in the dark, thanks to infrared LEDs. The infrared feature even has a built-in light sensor, so as soon as the ambient light gets low enough, it will automatically turn on the infrared LEDs for night vision.
- Features:
  - Dimensions: 45.6x30x28mm
  - VGA/QVGA/160*120 resolution
  - Support capture JPEG from serial port
  - Default baud rate of serial port is 38400
  - DC 3.3V or 5V power supply
  - Current consumption: 80-100mA…..
    - http://www.adafruit.com/datasheets/VC0706%20Digital%20Video%20Processor%20Datasheet.pdf

Introduction to Sensors

- Grove - IMU 9DOF v2.0
  - it is a high performance 9-axis motion tracking module, which is base on MPU-9250. It has features three 16-bit ADC for digitizing the gyroscope outputs and three 16-bit ADCs for digitizing the accelerometer outputs and three 16-bit ADCs for digitizing the magnetometer outputs.
    - I2C/SPI interface
    - 400kHz Fast Mode I2C for communicating with all registers
    - Digital-output 3-Axis angular rate sensors (gyroscopes) with a user-programmable full-scale range of ±250, ±500, ±1000, and ±2000°/sec
    - Digital-output 3-Axis accelerometer with a programmable full scale range of ±2g, ±4g, ±8g and ±16g
    - Digital-output 3-Axis accelerometer with a full scale measurement range is ±4800μT
  - http://www.seeedstudio.com/wiki/Grove_-_IMU_9DOF_v2.0



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