System Application - Sensor

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Outline

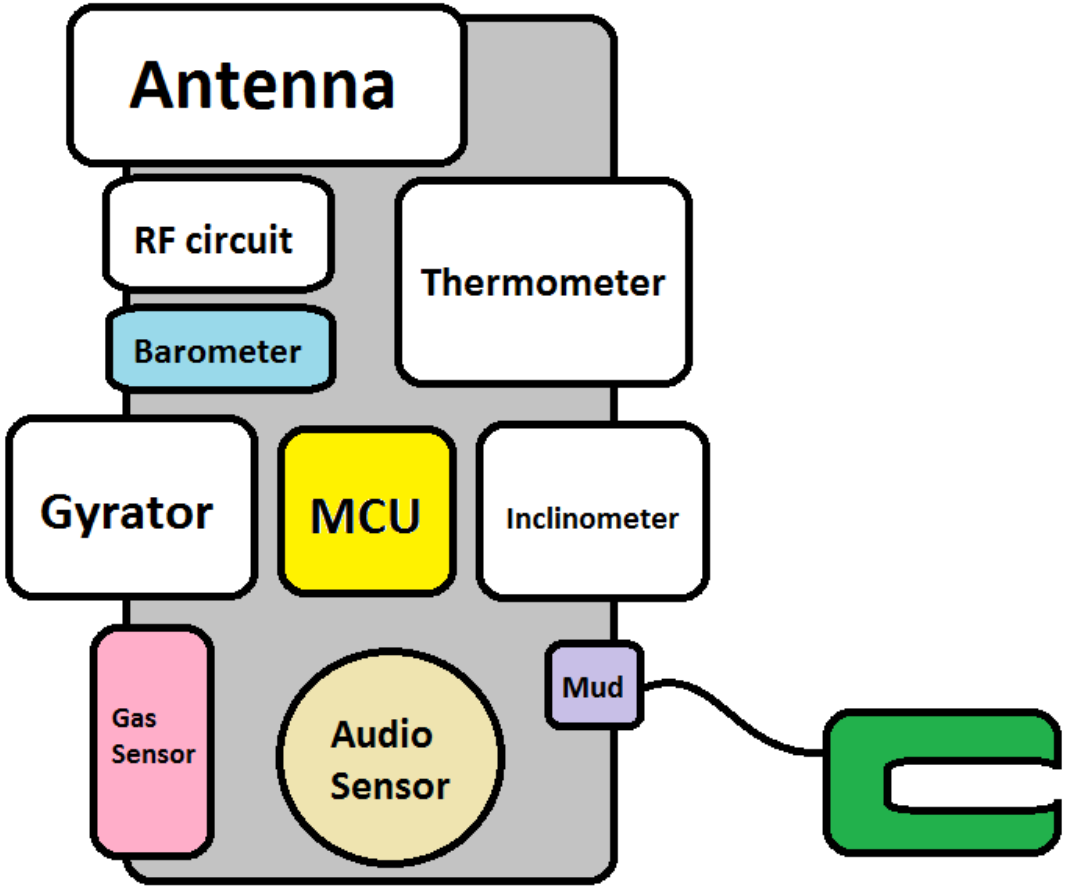
1. Origin
2. Sensor Series
3. Future Work

Origin

Motivated by google modular phone, we started designing modulus wireless sensory system for specialized function or customized usage.

Origin

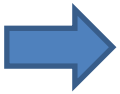
The Modulus Sensory System is built like:

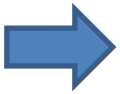


Sensor Interface

We applied two interface adapted for modulus sensory system.

1. USB to UART
2. USB to I-square-C

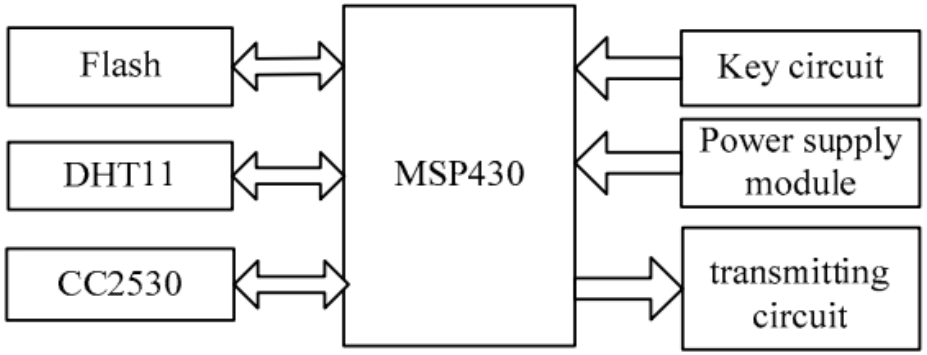


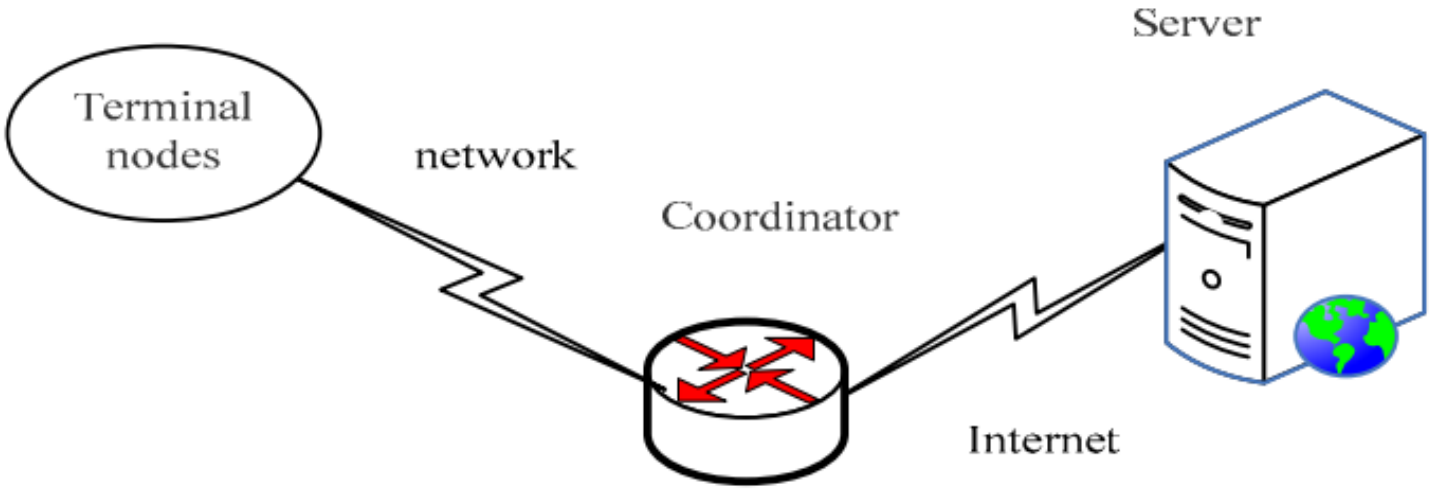


Wireless Cluster

The full cluster consists of:

1. Terminal nodes
2. Coordinator: Data transfer center
3. Server: Data collection and reservation

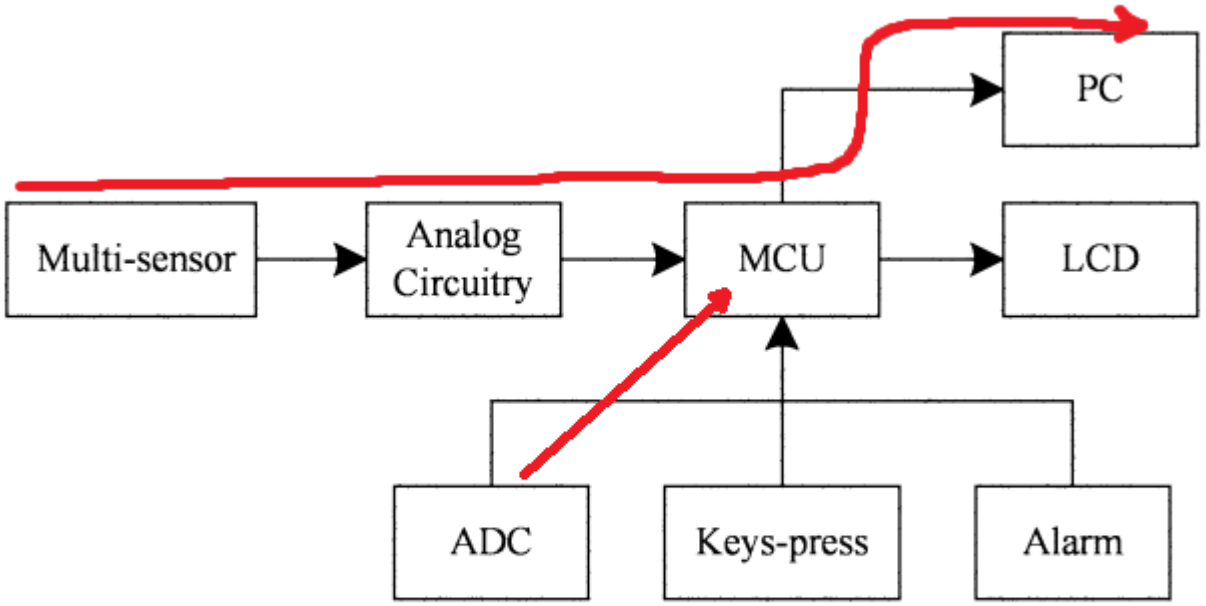




Sensory System

The modulus sensory system uses MSP430 MCU for sensor monitoring and controlling.

When sensor collects data, the MCU stores and processes it. Then, the data transfer into PC or LCD for showing.



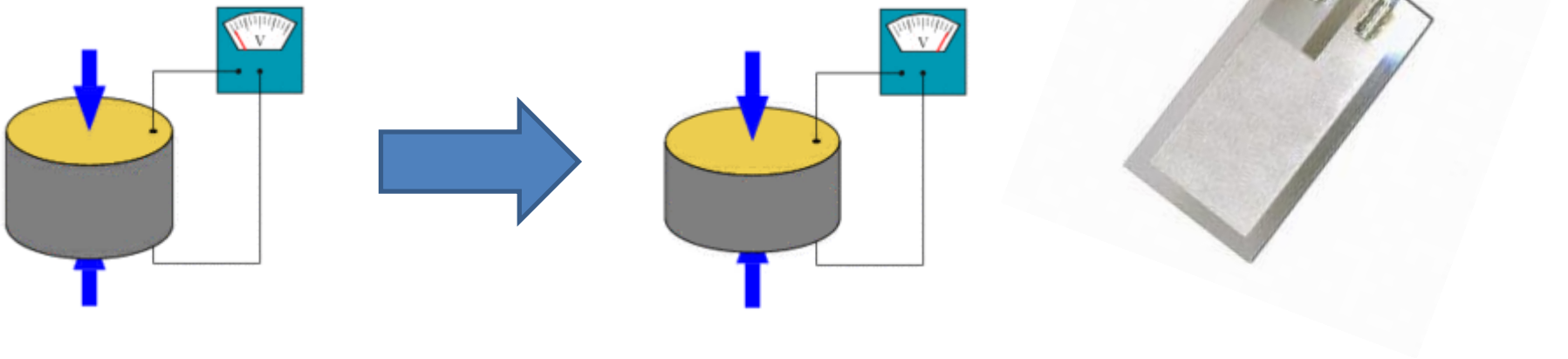
System Configuration

Sensory Series for RFVLSI

1. Pressure/Force Sensor: Fuji pressure measurement film, LDT-028K, DLPP7MO
2. Vibration Sensor: SW-18020P
3. Accelerometer/Compass/Magnetic Sensor : AIS1200PS, HMC5883L
4. Audio Sensor: MP34DT01
5. Humidity/Moisture Sensor: Si7020-A10, HH10D, HIH4030
6. Temperature Sensor: DHT11(22), STS21, LM74
7. Barometer: MLP115A1
8. MP Motion Sensor: AMN2,3,4 series
9. Gas (CO) Sensor: Hanwei MQ-7
10. Dust Sensor: GP2Y1010AU0F
11. UV Sensor: ML8511, MNNQ15
12. Alcohol(-OH) Sensor: BAR8001

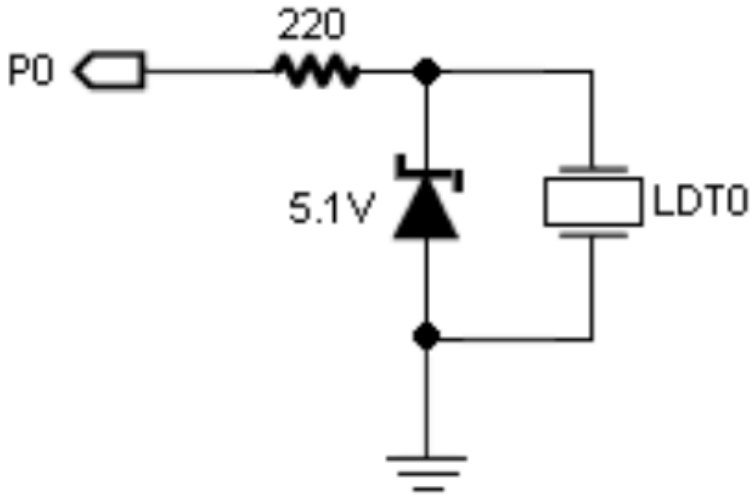
Piezoelectric

Piezoelectric is the electric charge that accumulates in certain solid materials such as crystals, certain ceramics, and biological matter such as bone, DNA and various proteins in response to applied mechanical stress.



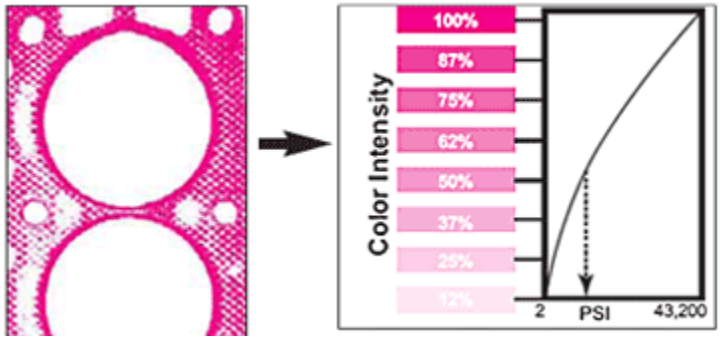
LDT-028K

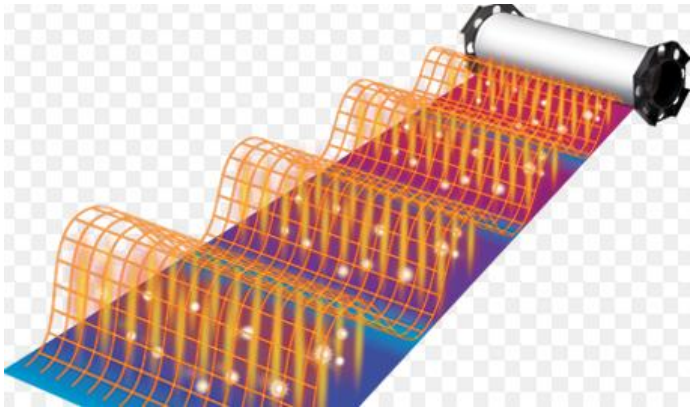
When the sensor is bent or displaced from its neutral axis, the strain within the piezo film generates voltage, up to 70 V voltages. A microcontroller can detect this voltage,
making the Vibra Tab useful as an inexpensive switch or vibration sensor.



Fuji pressure measurement film

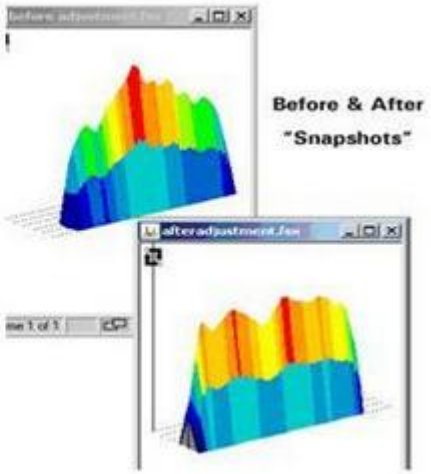
Pre-scale film is used to measure contact pressures. The film structure consists of micro-encapsulated color forming and developing material. When pressure is applied to the film, a red color impression is formed in varying density according to the amount of pressure and pressure distribution

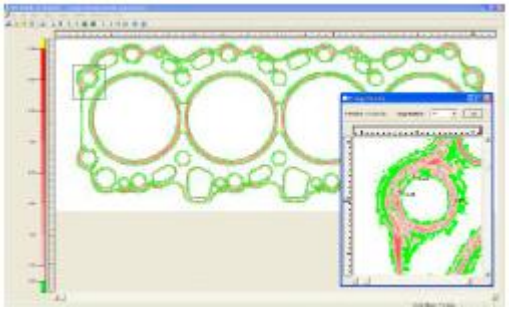


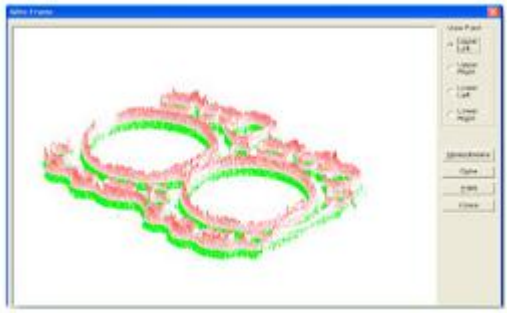


Fuji pressure measurement film

Colorized Pre-scale is digitized using a scanner and converted into numerical data by software. Various pressure analyses can be conducted. The FPD-8010E software converts pre-scale pressure values into numerical data and is a pressure mapping analysis system that allows various methods of analysis. In order to make pre-scale data even more useful, it will meet your requirements for converting to numerical data, saving data and performing data analysis. Click on any of the images below for a large picture.





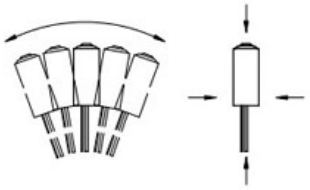


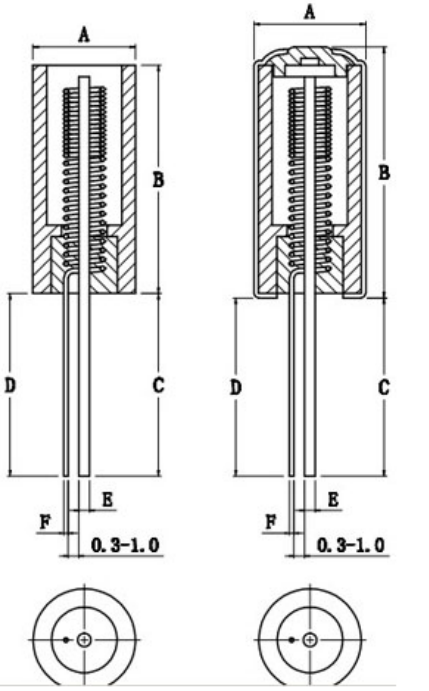
SW-18020P

SW-18020P series are spring type, no directional vibration sensor trigger switch, any angle can trigger. Switch is open circuit OFF-state, when it is static, when external force to touch and corresponding vibration, or movement speed achieve adequate (partial) centrifugal force, conductive pick feet will produce instant conductivity is instant ON-state, when external force disappear, switch back to open circuit OFF-state.

Model	A	B	C	D	E	F	Sensitivity	Encapsulation
SW-18015	⌀4.5	10	8	*	S0.5	⌀0.15	High sensitivity	Unsealed
SW-18015P	⌀4.8	11	8	*	S0.5	⌀0.15	High sensitivity	Sealed
SW-18020	⌀4.5	10	8	*	S0.5	⌀0.20	standard	Unsealed
SW-18020P	⌀4.8	11	8	*	S0.5	⌀0.20	standard	Sealed
SW-18025	⌀4.5	10	8	*	S0.5	⌀0.25	dull	Unsealed
SW-18025P	⌀4.8	11	8	*	S0.5	⌀0.25	dull	Sealed
SW-18030	⌀4.5	10	8	*	S0.5	⌀0.30	duller	Unsealed
SW-18030P	⌀4.8	11	8	*	S0.5	⌀0.30	duller	Sealed

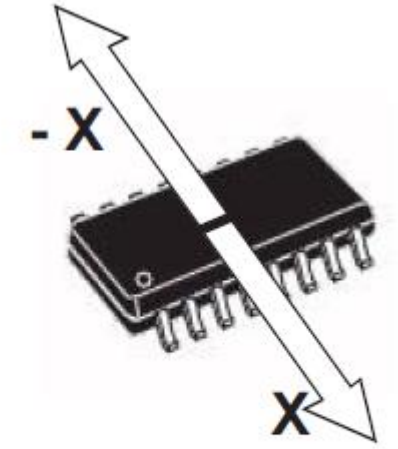
*Specification "D" size for 8-13mm, can according to the customer requirement.



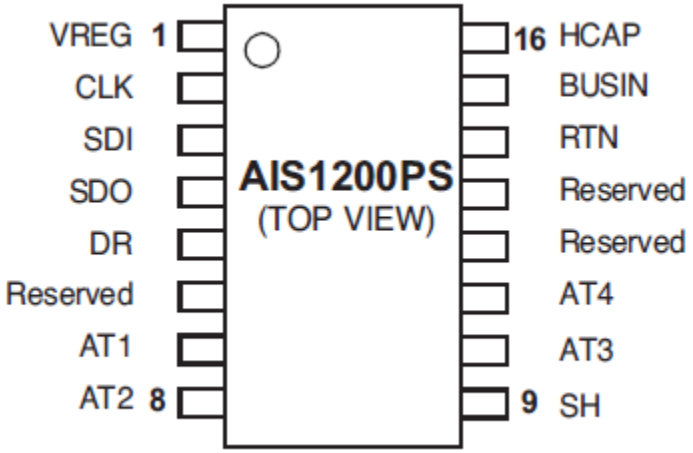


AIS1200PS

The AIS1200PS is a peripheral acceleration sensor with a single-axis sensing element and an IC interface able to provide acceleration information to a master control unit through a coded protocol 125 kbps. The sensing element, capable of detecting the acceleration, is manufactured using a dedicated process developed by ST to produce inertial sensors and actuators in silicon.

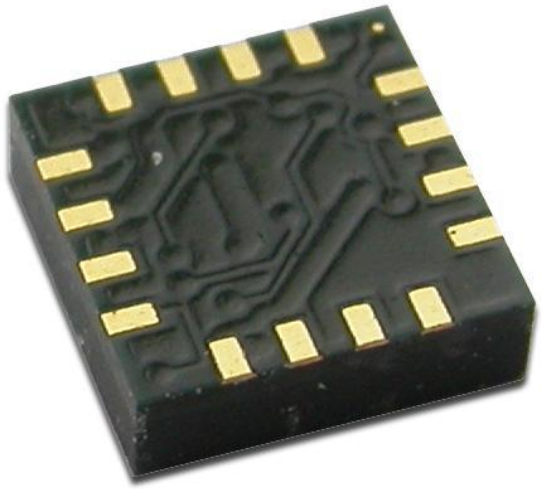


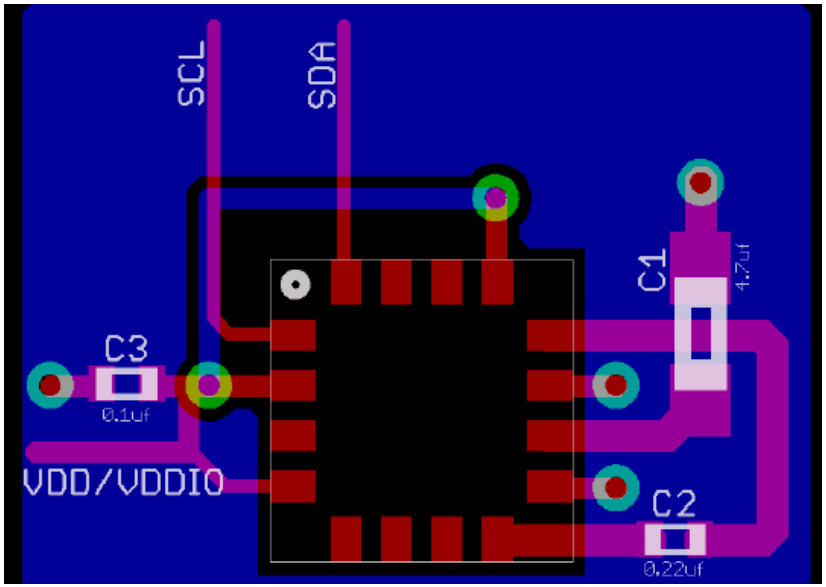
DIRECTION OF THE DETECTABLE ACCELERATIONS



HMC5883L

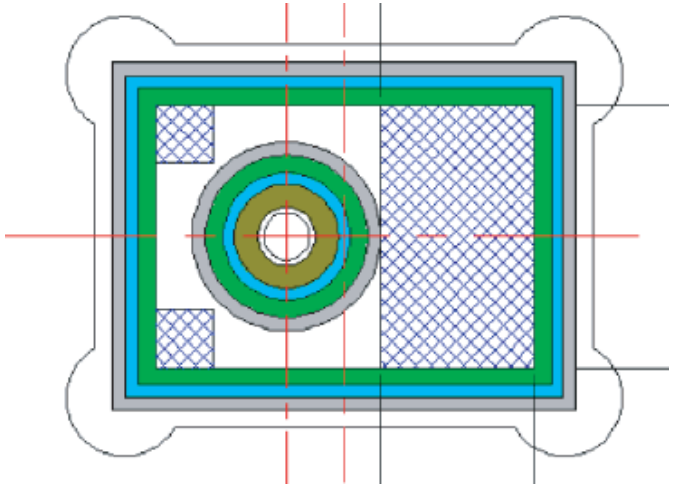
The Honeywell HMC5883L is a surface-mount, multi-chip module designed for low-field magnetic sensing with a digital interface for applications such as low-cost compassing and magnetometry. The HMC5883L includes our state-of-the-art, high-resolution HMC118X series magneto-resistive sensors plus an ASIC containing amplification, automatic degaussing strap drivers, offset cancellation, and a 12-bit ADC that enables 1° to 2° compass heading accuracy

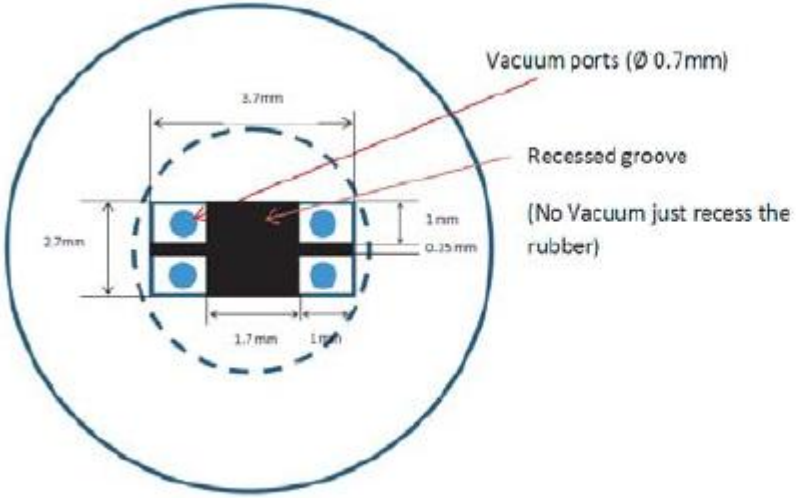




MP34DT01

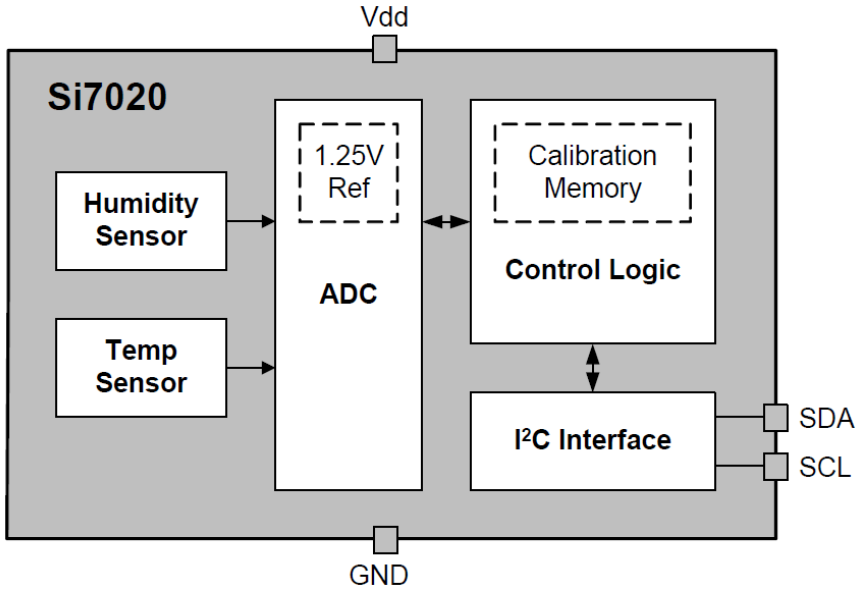
The MP34DT01 is an ultra-compact, low-power, omnidirectional, digital MEMS microphone built with a capacitive sensing element and an IC interface. The sensing element, capable of detecting acoustic waves, is manufactured using a specialized silicon micromachining process dedicated to produce audio sensors.





Si7020-A10

The Si7020 I2C Humidity and Temperature Sensor is a monolithic CMOS IC integrating humidity and temperature sensor elements, an analog-to-digital converter, signal processing, calibration data, and an I2C Interface. The patented use of industry-standard, low-K polymeric dielectrics for sensing humidity enables the construction of low-power, monolithic CMOS Sensor ICs with low drift and hysteresis, and excellent long term stability.The humidity and temperature sensors are factory-calibrated and the calibration data is stored in the on-chip non-volatile memory. This ensures that the sensors are fully interchangeable, with no recalibration or software changes required.

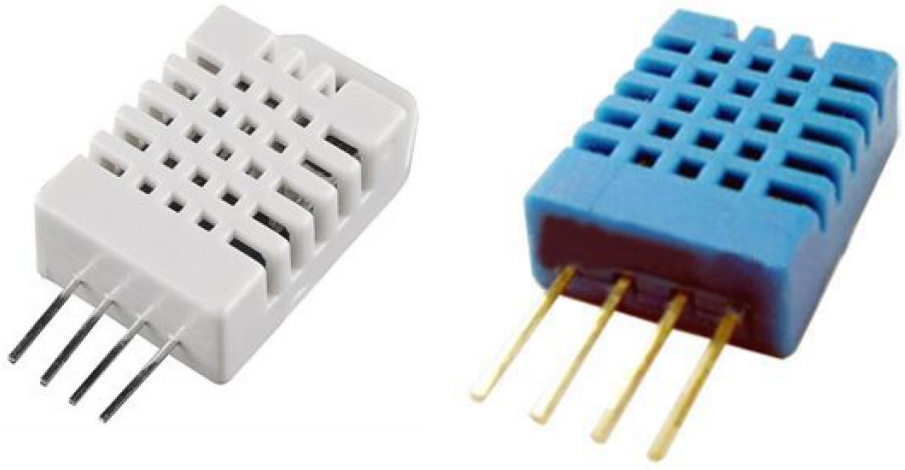


DHT11(DHT22)

The temperature sensor collects temperature data when disaster occurs.

The most popular one is called DFRobot DHT11, which provides temperature and humidity sensory. It's made by D-Robotics UK.

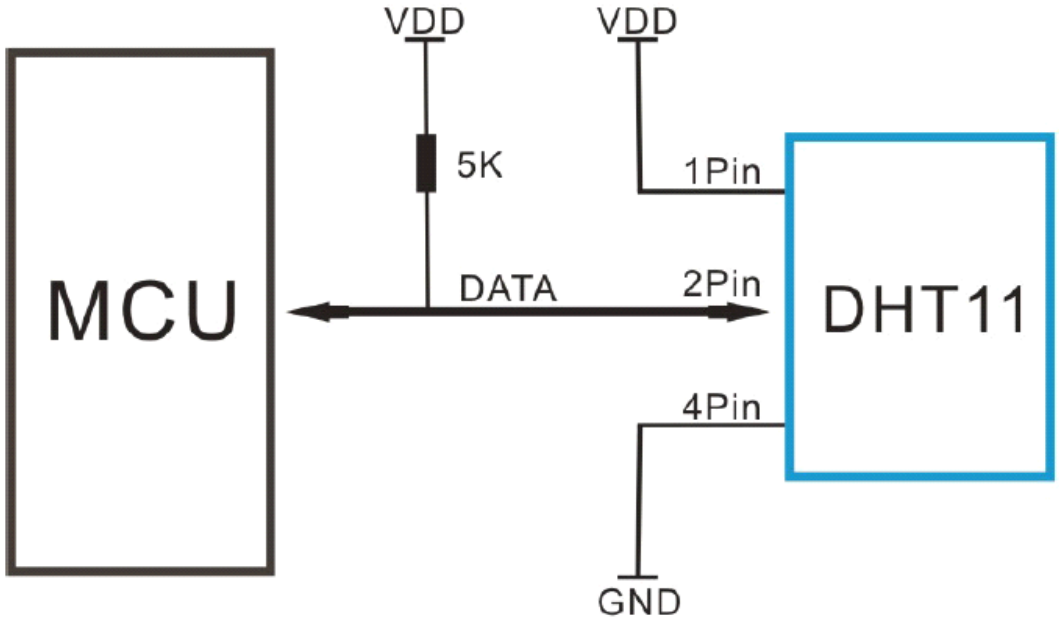
This DFRobot DHT11 features a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance microcontroller, offering excellent quality, fast response, and cost-effectiveness.



DHT11(DHT22)

The schematic is shown below.

When the connecting cable is shorter than 20 metres, a 5K pull-up resistor is recommended; when the connecting cable is longer than 20 metres, choose a appropriate pull-up resistor as needed. And, one capacitor valued 100nF is added between VDD and GND for power filtering. Power supply is 3-5.5V DC.



Sensor Series

To be continued… …