**Note: Baud rate is set to 9600 when using serial monitor else there will be error**

**Summarized Pin Table**

|  |  |  |  |
| --- | --- | --- | --- |
| **Pin on Arduino Mega** | **Device** | **Protocol** | **Details** |
| **Pin 15 (Analog IN)** | **Infra-red distance sensor** | **GPIO** | **-** |
| **Pin 20 (SDA)** | **AltIMU-10 v4** | **I2C** | **SDA** |
| **Pin 21 (SCL)** | **AltIMU-10 v4** | **I2C** | **SCL** |
| **Pin 22** | **HC-SR04** | **GPIO** | **Trigger pin** |
| **Pin 24** | **HC-SR04** | **GPIO** | **Echo pin** |
| **Pin 30** | **Keypad** | **GPIO** | **Keypad row3** |
| **Pin 31** | **Keypad** | **GPIO** | **Keypad row2** |
| **Pin 32** | **Keypad** | **GPIO** | **Keypad row1** |
| **Pin 33** | **Keypad** | **GPIO** | **Keypad row0** |
| **Pin 34** | **Keypad** | **GPIO** | **Keypad col2** |
| **Pin 35** | **Keypad** | **GPIO** | **Keypad col1** |
| **Pin 36** | **Keypad** | **GPIO** | **Keypad col0** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Arduino Mega 2560**

|  |  |
| --- | --- |
| Microcontroller | [ATmega2560](http://www.atmel.com/Images/Atmel-2549-8-bit-AVR-Microcontroller-ATmega640-1280-1281-2560-2561_datasheet.pdf) |
| **Operating Voltage** | **5V** |
| **Input Voltage (recommended)** | **7-12V** |
| **Input Voltage (limit)** | **6-20V** |
| Digital I/O Pins | 54 (of which 15 provide PWM output) |
| Analog Input Pins | 16 |
| **DC Current per I/O Pin** | **20 mA** |
| **DC Current for 3.3V Pin** | **50 mA** |
| Flash Memory | 256 KB of which 8 KB used by bootloader |
| SRAM | 8 KB |
| EEPROM | 4 KB |
| Clock Speed | 16 MHz |
| Length | 101.52 mm |
| Width | 53.3 mm |
| Weight | 37 g |

[**AltIMU-10 v4 Gyro, Accelerometer, Compass, and Altimeter (L3GD20H, LSM303D, and LPS25H Carrier)**](https://www.pololu.com/product/2470)

LPS25H (barometer) datasheet: https://www.pololu.com/file/download/LPS25H.pdf?file\_id=0J761

L3GD20H 3-axix gyroscope datasheet:

<https://www.pololu.com/file/download/L3GD20H.pdf?file_id=0J731>

LSM303D 3D accelerometer and 3D magnetometer module datasheet:

<https://www.pololu.com/file/download/LSM303D.pdf?file_id=0J703>

The LPS25H, L3GD20H, and LSM303D have many configurable options, including selectable resolutions for the barometer and dynamically selectable sensitivities for the gyro, accelerometer, and magnetometer. Each sensor also has a choice of output data rates. The three ICs can be accessed through a shared I²C/TWI interface, allowing the sensors to be addressed individually via a single clock line and a single data line. Additionally, the SA0 pin is accessible, allowing users to change the slave addresses and have two AltIMUs connected on the same I²C bus (For additional information, see the I²C Communication section below).

**The carrier board includes a low-dropout linear voltage regulator that provides the 3.3 V required by the LPS25H, L3GD20H, and LSM303D, allowing the module to be powered from a single 2.5 V to 5.5 V supply. The regulator output is available on the VDD pin and can supply** almost 150 mA to external devices. The breakout board also includes a circuit that shifts the I²C clock and data lines to the same logic voltage level as the supplied VIN, making it simple to interface the board with 5 V systems. The board’s 0.1″ pin spacing makes it easy to use with standard [solderless breadboards](https://www.pololu.com/category/28/solderless-breadboards) and 0.1″ perfboards.

### Pinout

|  |  |
| --- | --- |
| PIN | Description |
| SCL | Level-shifted I²C clock line: HIGH is VIN, LOW is 0 V |
| SDA | Level-shifted I²C data line: HIGH is VIN, LOW is 0 V |
| GND | The ground (0 V) connection for your power supply. Your I²C control source must also share a common ground with this board. |
| VIN | This is the main 2.5 V to 5.5 V power supply connection. The SCL and SDA level shifters pull the I²C bus high bits up to this level. |
| VDD | 3.3 V regulator **output** or low-voltage logic power supply, depending on VIN. When VIN is supplied and greater than 3.3 V, VDD is a regulated 3.3 V output that can supply up to approximately 150 mA to external components. Alternatively, when interfacing with a 2.5 V to 3.3 V system, VIN can be left disconnected and power can be supplied directly to VDD. **Never supply voltage to VDD when VIN is connected, and never supply more than 3.6 V to VDD.** |
| SA0 | 3.3V-logic-level input to determine I²C slave addresses of the three ICs (see below). It is pulled high by default through 10 kΩ resistor. *This pin is not level-shifted and is not 5V-tolerant.* |

Specifications

Operating voltage: 2.5 V to 5.5 V

Supply current: 6 mA

Output format (I²C):

Gyro: one 16-bit reading per axis

Accelerometer: one 16-bit reading per axis

Magnetometer: one 16-bit reading per axis

Barometer: 24-bit pressure reading (4096 LSb/mbar)

Sensitivity range:

Gyro: ±245, ±500, or ±2000°/s

Accelerometer: ±2, ±4, ±6, ±8, or ±16 g

Magnetometer: ±2, ±4, ±8, or ±12 gauss

Barometer: 260 mbar to 1260 mbar (26 kPa to 126 kPa)

Arduino mega Pin20(SDA), Pin21(SCL)

LSM303D 3D accelerometer and 3D magnetometer library:

https://github.com/pololu/lsm303-arduino

Gyro library:

<https://github.com/pololu/l3g-arduino>

Barometer Library:

<https://github.com/pololu/lps-arduino>

**Keypad (4x3)**

Using keypad library for Arduino from: http://playground.arduino.cc/Code/Keypad#Download

Configuration chart:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Keypad | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|  | Col2 | Col1 | Col0 | Row3 | Row2 | Row1 | Row0 |

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | Row0 (pin33) |
| 4 | 5 | 6 | Row1 (pin32) |
| 7 | 8 | 9 | Row2 (pin31) |
| \* | 0 | # | Row3 (pin30) |
| Col0 (pin36) | Col1 (pin35) | Col2 (pin34) | - |

Connected to Row pin {33, 32, 31, 30};

Connected to Column pin {36, 35, 34};

Power consumption: -

**Ultrasonic sensors:**

Using NewPing Library for Arduino (Ultrasonic sensors) from: <http://forum.arduino.cc/index.php/topic,106043.0.html>

Datasheet: <http://www.micropik.com/PDF/HCSR04.pdf>

Trigger pin: 22

Echo pin: 24

|  |  |
| --- | --- |
| Working Voltage | DC 5 V |
| Working Current | 15mA |
| Working Frequency | 40Hz |
| Max Range | 4m |
| Min Range | 2cm |
| Measuring Angle | 15 degree |
| Trigger Input Signal | 10uS TTL pulse |
| Echo Output Signal | Input TTL lever signal and the range in  proportion |

**Infra-red distance sensor**

Datasheet: <https://www.sparkfun.com/datasheets/Sensors/Infrared/gp2y0a02yk_e.pdf>

Connected to Mega Analog Pin 15

■Absolute Maximum Ratings

Symbol Rating Unit

Supply voltage VCC -0.3 to +7 V

Output terminal voltage VO -0.3 to VCC+0.3 V

Recommended operating conditions

Supply voltage VCC 4.5 to 5.5 V

Consumption current: Typ. 33 mA

Motor Shaftless Vibration Motor 8x3.4mm

|  |  |
| --- | --- |
| Free-run speed @ 3V: | 14500 rpm[1](http://www.robot-r-us.com/motor-vibration/shaftless-vibration-motor-8x3.4mm.html#note1) |
| Free-run current @ 3V: | 60 mA[2](http://www.robot-r-us.com/motor-vibration/shaftless-vibration-motor-8x3.4mm.html#note2) |
| Voltage: | 3 V[3](http://www.robot-r-us.com/motor-vibration/shaftless-vibration-motor-8x3.4mm.html#note3) |
| Vibration amplitude: | 0.75 g |

Notes:

1

12000 RPM minimum at 3 V.

2

80 mA maximum at 3 V.

3

Recommended operating range is 2.5 to 3.5 V.

Power consumption

-sonar : 15mA x ////////////4 x5V = 0.3A

-infrared: 0.33mA x /////////////5V = 0.00165A

-altimu-10 v4: 6mA x////////////// 3.3V = 0.0198A

-motor: 80mA x2 x/////////////////3.3V=

-Rpi bareboard : 200mA x ////////////////3.3V

-Arduino - 200.0 mA x ///////////////////5V

Total: 15m + 0.33m + 6m + 80m + 200m + 200m = 501.33mA

AA eneloop recharagable: 200mAh X 6 🡺 last for 2.4hours