Materials

- Arduino Uno
- GY521 IMU
- 9x LEDs
- 9x 220Ω series resistors

Background & Set-Up:

We will need to be able set up an inertial measurement unit (IMU) to determine the orientation. The GY521 is a type of IMU. An IMU uses both a gyrometer, which measures angular velocity i.e. rotation, and an accelerometer, which measures acceleration in 3 directions. An accelerometer can't differentiate between acceleration of the device and the earth's gravity when moving. The gyrometer helps tell the true orientation of the device and it communicates using I2C. For more info and a tutorial:

https://create.arduino.cc/projecthub/Nicholas_N/how-to-use-the-accelerometer-gyroscope-gy-521-6dfc19

Goal:

We want to write a program for the Arduino that can act as a level. We will use the IMU to tell the orientation. We want to detect if the unit is unlevel in the x and y direction. If the unit is perfectly level, we will light up the green LED in the center. If it is off in a certain direction, we will light up the LEDs that will correspond to the way the bubble would float in an actual level. For example, if the left side is higher than the right, then the yellow LED on the left will be lit up. If the left side is much higher than the right, then the red LED on the left will be lit up. If the right side is higher and the bottom side is higher, then the LEDs on the right and the LEDs on the bottom with both be lit up. On the next page is an image of the LED grid.

Instructor: Michael D'Argenio