

## Breakthroughs, Stumbles and Victories

### Initial Idea

At the beginning of this journey, ideas flew through my head. From motion sensors, to pingpong cannons, to led projecting. Finally I landed on the idea of making a companion. Like the world acclaimed Siri, I wanted to create something that the user could interact with. The concept was that given a a preset of coded phrases, the user would ask the companion anything and using sound recognition, the companion would respond using a randomly selected phrase imbedded within. This all seemed awesome until I really researched and pondered the process. Hardware was definitely a weak area of mine but I wanted to prove to myself that I was able to infect build such a creation. Ultimately, as days went on of truly trying to understand how Arduino worked and current circulation, I felt overwhelmed and wanted to simplify it for myself. I came across the idea of making somewhat of an eight ball, where the user would shake the device and based on a tilt sensor or accelerometer, it would output a random response. I decided to go with this final idea.

### How it was build:

The structure of this project used the Arduino UNO and a breadboard as a base. The power supply comes from a 9V battery. A 10k potentiometer, 110k resistor, tilt sensor and wires are used to create the eight ball. The following images are visuals of the finished product taken out of its shell.



### Breakthroughs:

For me personally, major breakthroughs came as simple as having a eureka moment of understanding how the current was flowing. The obtained knowledge of knowing that the Arduino only made sense if the electrons had a complete circuit clicked in my head after some time of trying to figure out “why” this was working or not. Some physics that I learned was with the potentiometer and its electrical resistance. I learned that it affects the amount of electrical current. Also I understood that having a sustained current to the Arduino board requires a voltage source to provide a difference in electrical potential.

## Stumbles:

Along the way of completing this project, there were many stumbles. Initially, I tried to use an accelerometer to execute the motion detection phase, however this required buying an accelerometer that would be compatible with this project. Unaware of this compatibility issue, I bought the wrong one and realized that after I soldered it to my designated pins. That was another stumble. Soldering. I had never soldered before, so I had to take the time learning this trait to not screw up the board. After understanding that my accelerometer was not going to achieve my desired results, I had to switch to plan me and simply it. I learned that a tilt sensor could produce the same results I needed without having to solder. An additional stumble was that the tilt sensor was too sensitive. It was quickly noticed that the user couldn't even pick up the device without the screen randomizing a new answer.

## Victories:

An easy victory that I remember vividly was seeing the LCD screen light up. It really showed a sense of understanding and self accomplishment. Another victory I would describe was having the potentiometer accurately control the contrast of the screen for me when connected properly. Although the final product was not my initial companion thought, knowing that I challenged myself and learned additional skills, such as soldering and circuitry really outshined the result. The end result successfully displayed a random array of pre-programmed phrases. Going with the extreme sensitivity of the tilt sensor, I decided to layout the structure in a way under the lid of the cover box so that instead of shaking the box to output a response, the user had to simply tap the screen and it would mimic a touch screen effect. I thought of this from a different angle and it ended up being pretty cool.

## ...Code Snippet...

```
if (switchState != prevSwitchState) {
  // if the state has changed from HIGH to LOW
  // you know that the ball has been tilted from
  // one direction to the other
  if (switchState == LOW) {
    lcd.clear();

    // randomly choose a reply
    reply = random(7);
    // set the cursor to column 0, line 0
    lcd.setCursor(0, 0);
    lcd.print("8ball says:");
    // set the cursor to column 0, line 1
    lcd.setCursor(0, 1);
    // choose a saying to print
    void setup () {
      // set up the LCD's number of columns and rows:
      lcd.begin(16, 2); // 16x2 lcd
      // set up the switch pin as an input
      pinMode(switchPin, INPUT);
      // print a message to the LCD

      lcd.print("Ask the");
      // set the cursor to column 0, line 1
      // note: line 1 is the second row, since counting begins at 0
      lcd.setCursor(0, 1);
      lcd.print("Magic 8Ball!");
    }
```