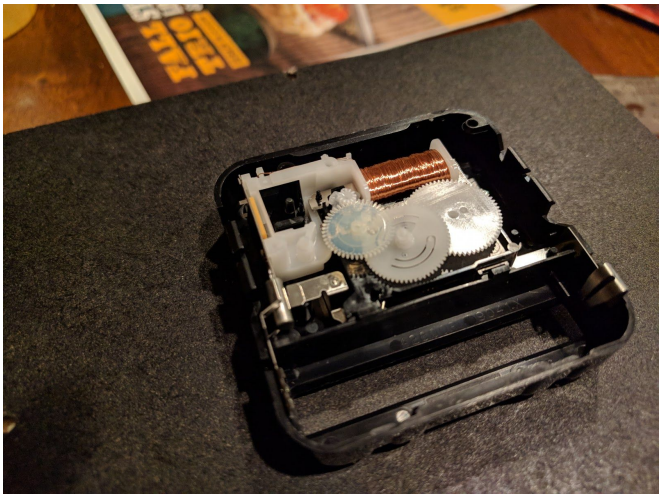
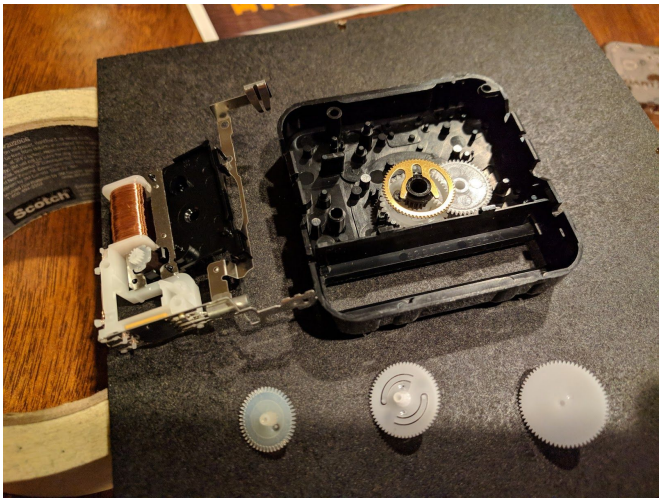
For the Texas Instruments Online Challenge, I picked to take a look inside a quartz clock. I picked this because it seemed like such a simple device but I still didn't understand it.





It's got quite a few different parts, A little cylindrical metal tube, a circuit board, a coil of wire, and a few gears, one tiny, and some more below those. I could make guesses about some stuff like the gears closer to the front of the clock controlled the hands, but I just wasn't sure. I definitely couldn't figure out what the coil was. After doing some research and looking in more detail, I found that the metal tube contained the thing that made the clock work- a little, 3 millimeter piece of quartz shaped like a tuning fork. As I found after some research, it has a certain property called Piezoelectricity, where mechanical energy can be converted into electricity or vice versa. The way that the crystal is used in a clock is that it vibrates 32768 times a second when electricity is run through it, In normal conditions. However, Depending on the temperature and altitude the fork will oscillate a different number of times, causing the clock to gain or lose seconds. The circuit board right next to it counts the amount of times it oscillates and uses that to count seconds. Then, it sends an electric signal every second to the coil of wire, Which is part of the motor that turns the gears.The reason why there is so many gears, and why there are so many is that everyone has two sections: a small, toothed circle on top and a bigger, more gear-like bottom part. Because the motor cannot move slowly enough for the clock, the gears have to perfectly go big to small repeatedly. The final of the top three gears goes down to connect to another three that are just rigged up perfectly to move the hour hand just right with the minute hand. I realized afterwards that I didn't have any pictures of what it looked like beforehand and I spent a long time trying to get it all back together, I learned to be prepared for everything.