Capstone Abstract

Title

Perpetual Motion Machine Melody

Description

My capstone will introduce a new audio component to the perpetual motion machine. The user-facing product will be a melody that plays in time with the looping of the ball.

Design Challenges

The melody must play in time with the ball, so the timing of the speaker with the ball must be very accurate. I am also planning on using an interface that allows the user to choose for themself what melody will be played, which introduces a level of complexity because of communication. Because the timing of the ball is unpredictable, I also plan on implementing a feature where the speaker will finish a melody on its own, regardless of whether a ball has been sensed, if the ball has not been sensed for a long period of time.

Approach/Challenges

I used a piezo speaker to play the melody, with notes determined by a library. The melody is stored as a number array. The perpetual motion machine plays notes when the music feature is enabled via Alexa. I keep track of the number of times the ball has been sensed by the inductive proximity sensor, and this number is used as the index into the notes array. One obstacle I encountered was setting the ball counter given the state. For example, I had to reset the counter any time the system was toggled on and off so that the melody would start to play from the beginning again. Also, I had to take into account the fact that once the ball counter had reached the size of the notes array, I needed to reset the ball counter so that the melody would start back from the beginning instead of stopping.

Photo/Diagram