Proprioception Trainer
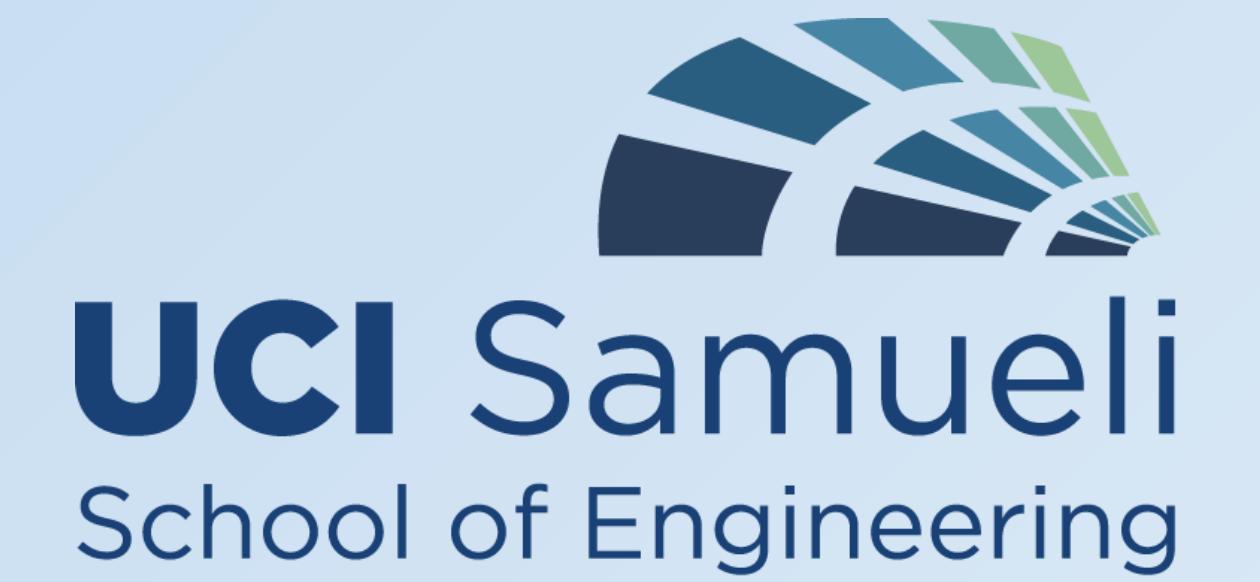
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Background

Proprioception is an individual's ability to recognize the position and/or movement of their body in space without obtaining visual cues. A stroke can cause damage to finger proprioception, which is a basic motor ability. As a result of the integration of robotics into rehabilitation methods, it has been shown that there have been great benefits in treatment for those with impaired proprioception.[2] Therefore, we seek to develop a game that trains finger proprioception.

Problem and Solution

Problem: The loss of finger proprioception can occur after stroke. There are a limited amount of devices that help retrain sensing of finger location.

Solution: Develop a game that assists neurological rehabilitation of finger proprioception, specifically the index and middle finger, that strays away from predictable motion yet allows for neurological connections to be made in order to restore basic motor skills

Innovation

- The team focused on designing the programming of the device on raspberry pi.
- Our design omits audio input, resulting in patients strictly relying on their finger proprioception to sense when their index and middle fingers are in a crossed position with each other.
- The music game is designed to motivate the patient to continue playing and is tailored for individuals of the age 65 and above.[1]

Current Device

Goals and Objectives

. The goals for this quarter were:
Improve the device through improvements of mechanics and code. This included:
1. Researching and scouting for servomotors that provided analog feedback
2. Improving pre existing code to widen the range of tolerance
3. Improving button feedback recognition through code
4. Research varied power sources to make the device more portable

Timeline
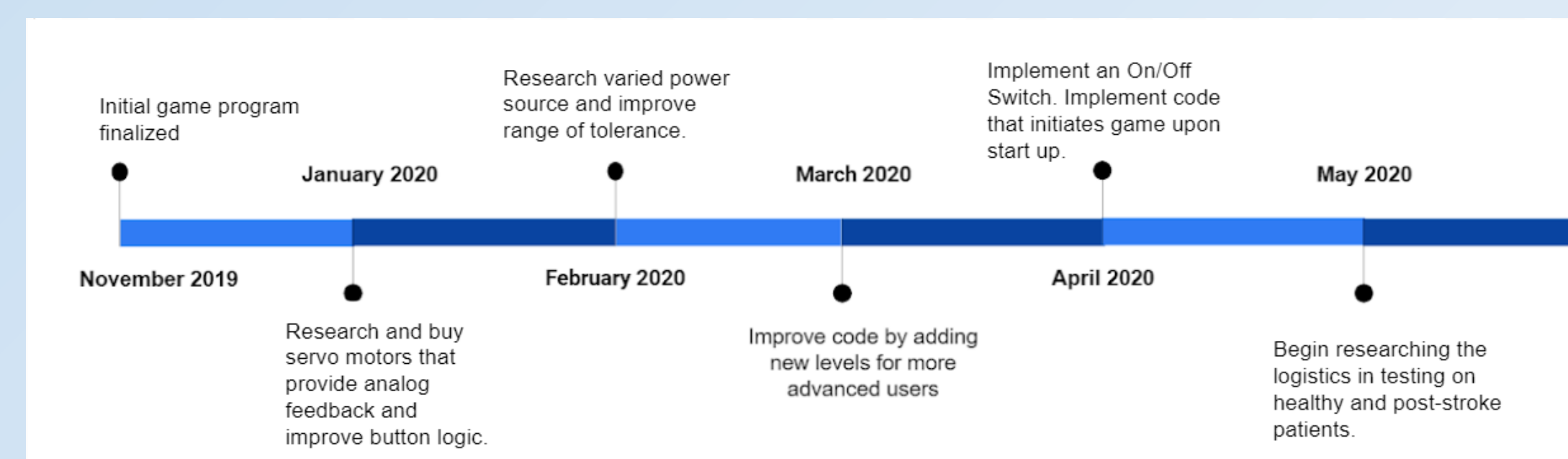
Game Design
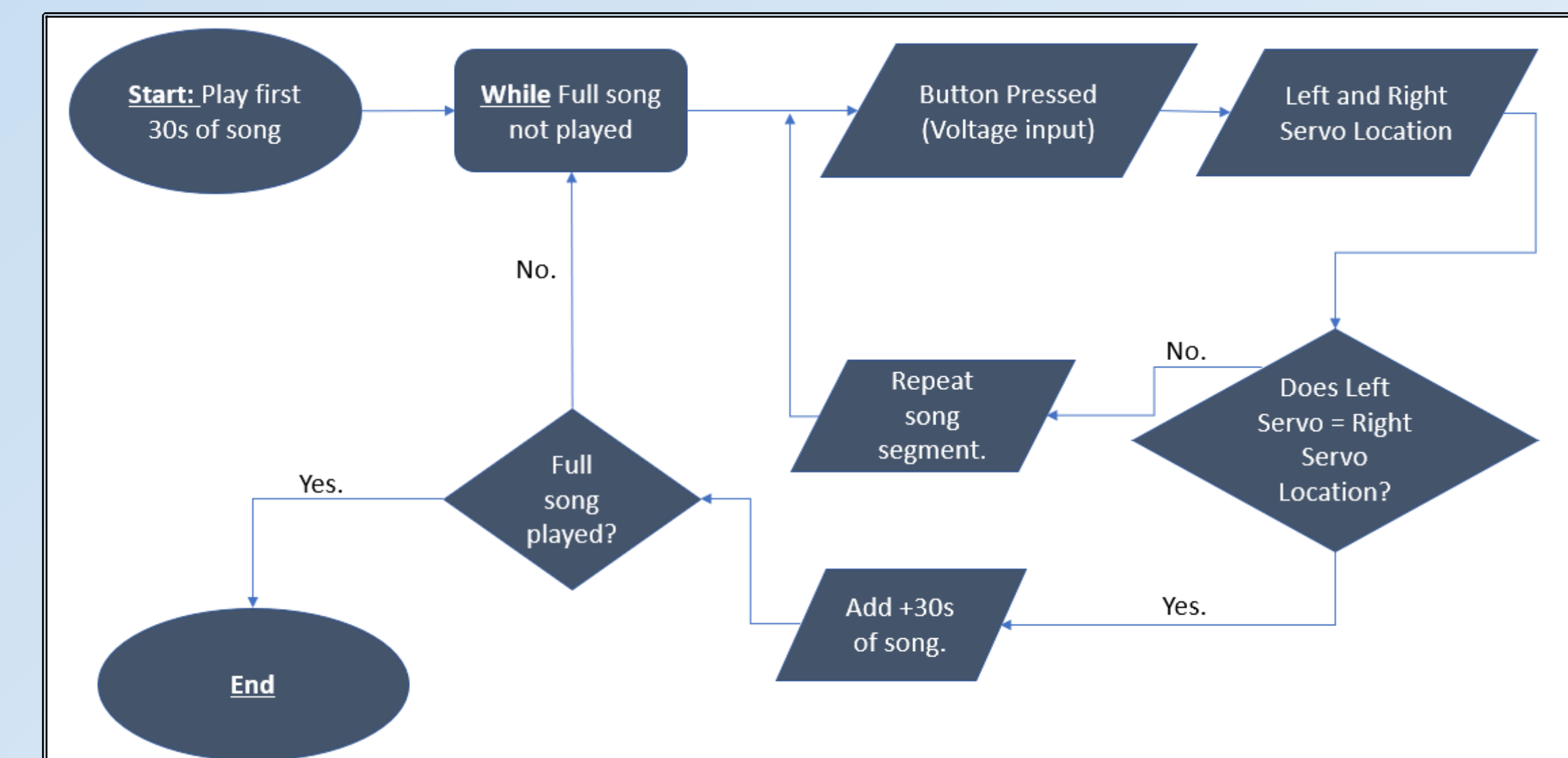
Next Steps

- Integrate varied levels of difficulty for the game
- Add more musical options for the game
- Randomize the motion of the finger
- Implement an on/off switch
- Code program so that it game initiates upon start-up

References

1. "Favorite Music Genres among Consumers by Age Group in the U.S. 2018." *Statista*, July 2018, https://www.statista.com/statistics/253915/favorite-music-genres-in-the-us/.
2. Rowe, J.B., PhD, Chan, V., MS, Ingemanson, M.L., PhD, Cramer,S.C., MD, Wolbrecht, E.T., PhD, Reinkensmeyer, D.J., PhD. Robotic Assistance for Training Finger Movement Using a Hebbian Model: A Randomized Controlled Trial. *Neurorehabil Neural Repair* **31(8),** 769-780 (2017). PMID: 28803535

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