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Project Proposal

EE267

For our final project, we are proposing to implement advanced IMU Filtering to fuse the 6-DOF IMU measurements from the gyroscope and accelerometer. We will implement both the Madgwick filter and the Extended Kalman Filter to improve the accuracy of the complementary filter implemented in the last assignment.

The motivation of this project is to enhance the orientation tracking of the IMU that is mounted on the head mounted display. Using either the EKF or the Madgwick filter, we can improve the accuracy of the orientation, and thus improve the user experience using the headset and the immersiveness of the virtual world. We also plan to film display a 360 video for the presentation, or create a simple virtual environment in Unity.

A few sources that we are using to guide our project include:

- Rasteiro, Miguel. "Accuracy versus Complexity of MARG-based Filters for Remote Control Pointing Devices." IEEE Xplore. This paper directly compares the complementary filter with the Madgwick filter and the Kalman filter.
- St-Pierre, M., and D. Gingras. "Comparison between the Unscented Kalman Filter and the Extended Kalman Filter for the Position Estimation Module of an Integrated Navigation Information System." IEEE Intelligent Vehicles Symposium, 2004 (n.d.): n. pag. Web.
- Madgwick, S., "An efficient orientation filter for inertial and inertial/magnetic sensor arrays" April 30, 2010

Timeline:

Our current timeline is to understand and read about the filters and their implementations until 5/13. Then we will start coding and debugging the filters until 5/23. We will then test and collecting data on the filters until 5/27 and be ready for the presentation on 6/1.