Assignment 2 – Analysis Report

In reviewing the methodology to completing this assignment, the approach was first to set up a ROS node for the camera. Then run that data through the visual odometry package to see how well the software would be able to go through the data and provide accurate results.

A screen shot of a computer screen

Description automatically generatedThis report analyzes the estimated trajectory versus the actual path taken by the robot when analyzed by the visual odometry package. The following figure 1, displays two paths. The red path is the path from the pose file displaying the actual path of the robot. The green path is the path estimated based on the features determined from the visual odometry.

Figure 1

There is some consideration to be made on improvements to the estimate to the actual path. Due to the quality of the video, the number of features or points that could be extracted from the data varied. As such, it became difficult to identify the distance travelled especially when avoiding obstacles as seen in our figure above. Since we did not record in a super high framerate that created some of these inherit difficulties. This identifies one clear improvement of high framerate with a better-quality camera.

Another issue is the suspension of the robot. As there is no suspension, any bump causes bouncing in the video. This causes a high amount of motion blur and interference with the video and contributes to the issues seen above. One way to help with this would be to add a gimbal to the camera component. This would reduce motion blur and shaking.

A graph of a robot position

Description automatically generatedThe MSE was not easily measured due to issues with our IMU, but we were eventually able to get more accurate results which can be seen in Figure 2. The issue with the IMU was initially we were only publishing when input was given and changed that to publish on a regular interval.

Figure 2