3D Reconstruction on an IMU enabled Mobile Device

Mini Project - CSD310

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Plan

1. Position and Orientation estimate from IMU sensors.
2. Refining the position and orientation using local regression, smoothening and Kalman filter.
3. Generate corresponding points between images.
4. Triangulation
5. Bundle Adjustment
6. Dense 3D Reconstruction

Present Progress

1. Position and orientation estimate from sensors.
2. Refinement and smoothening of sensor data.
3. Calculating Rotation Matrix (R) and Translation Matrix (T) using the refined data.
4. All this done as soon as a particular frame is captured.
5. Tracking and correspondence generation running in real time at 8 fps on 640*480 resolution on phone.
6. Triangulation working on phone using the calculated R,T and tracked data.

Difficulties

- Incorrect point tracking taking place leading to improper triangulation
  -Put in image of correct and incorrect tracks.

- Sensor data can at times drift leading to incorrect extrinsic parameters estimations.
  -Bundle adjustment will resolve this error.

Whats next

- Improving the tracking obtained from the KL tracker using Kalman filter
- Test and optimize bundle adjustment to run on the phone
- Dense tracking using GPU and correspondence for dense 3D reconstruction.

Thank You