Universiteit Antwerpen

Progress Report Week 8

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May 20, 2017

Abstract

Optimisation of wireless networks is critical for the localisation of wireless devices. For this purpose, a wave propagation model of the environment can be created. Such a model contains a map of the environment combined with RF measurements that are obtained within that map. In this paper, we compare several visual SLAM algorithms such as LSD SLAM [1] and RGB-D SLAM [2] that can be used to render an accurate 3D map of an indoor environment. In order to test these algorithms, simulation software is used to navigate a drone around a room. A camera that is mounted on the drone provides necessary data for the algorithms. After finishing a SLAM algorithm, the resulting point cloud can be implemented in an OctoMap [3] to generate a volumetric representation.

1 Progress

1.1 Microsoft Kinect

The first camera that we will be testing is a Kinect. This is an RGB-D camera that is developed by Microsoft. It consists of an RGB camera, an infra-red (IR) projector and an IR camera. The last two components create a depth image of the environment, by emitting an IR pattern that is analysed by the IR camera [4].

1.1.1 First tests

In order to test the Kinect, I connected it to my laptop and installed the open-source `freenect` driver. Then, I recorded a bagfile while walking around with the camera. This bagfile was used as input for the RGB-D SLAM algorithm, the resulting point cloud can be seen in figure 1.

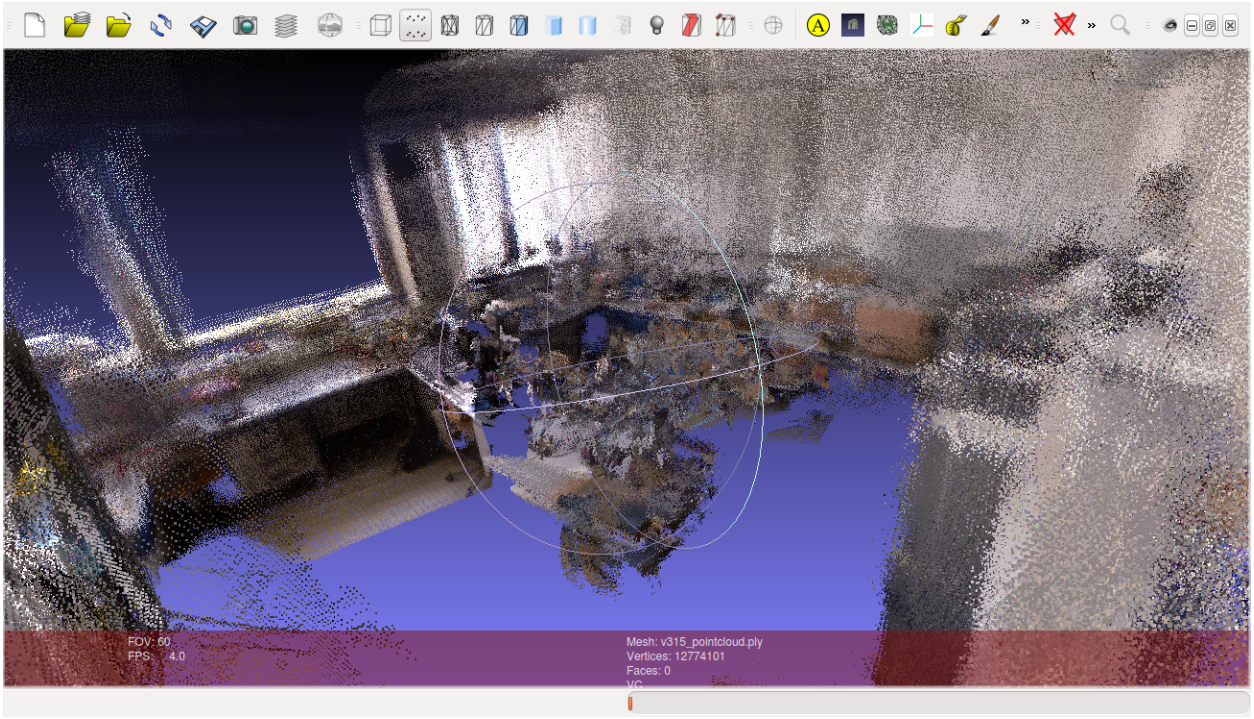

Figure 1: A point cloud of room V315 at the Groenenborger campus. The point cloud was created with the RGB-D SLAM algorithm and a Kinect camera.

1.1.2 Power supply

The Kinect requires a DC power supply between 10 volts and 12 volts. As we need the camera to be mobile, this power supply will have to be mounted to the Erle-Copter as well. Luckily, the Erle-Copter already has a battery that supplies 11.8 volts. By altering the Kinect power cable and soldering a DC jack to the Erle-Copter, the camera is now ready for mobile use.

1.2 Erle-Copter

I was able to echo rostopics from the Erle-Copter via an SSH connection on the WiFi network that is set up by the Erle-Copter. Furthermore, I mounted the landing gear and conducted some outdoor test flights.

2 Planning week 9

- Mount the Kinect to the Erle-Copter

- Install camera drivers for the Erle-Copter
- Record a bagfile

References

[1] Jakob Engel, Thomas Schöps, and Daniel Cremers. LSD-SLAM: Large-Scale Direct Monocular SLAM. *Computer Vision ECCV 2014*, pages 834–849, 2014.

[2] Felix Endres, Jurgen Hess, Nikolas Engelhard, Jurgen Sturm, Daniel Cremers, and Wolfram Burgard. An evaluation of the {RGB}-D {SLAM} system. *2012 {IEEE} International Conference on Robotics and Automation*, 2012.

[3] Armin Hornung, Kai M Wurm, Maren Bennewitz, Cyrill Stachniss, and Wolfram Burgard. {OctoMap}: an efficient probabilistic {3D} mapping framework based on octrees. *Autonomous Robots*, 34(3):189–206, 2 2013.

[4] Zhengyou Zhang. Microsoft Kinect Sensor and Its Effect. *IEEE Multimedia*, 19(2):4–10, 2 2012.