3D room mapping with a hand-held ToF camera
Requirement Specification

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1 Introduction

The project goal is to develop software that can process data captured from a Fotonic G-series depth camera and output a 3D model. The client is the Computer Vision Laboratory at the Department of Electrical Engineering at Linköping University.

2 System overview

The system consists of the Fotonic G-series camera which should capture data of a room and output a sequence of point clouds. Since the field of view of the camera is limited, several frames from the camera should be registered by the software to extend the field of view and from the sequence generate a 3D model of the surroundings. The data should also be filtered by the software to remove erroneous points and to improve the model accuracy.

3 System Requirements

In Table 1 the requirements for the project are specified. Those with priority 1 are mandatory and those with priority 2 are optional.

Table 1: Project Requirements

#	Requirement	Priority
1	The software should read point cloud files, .pcd	1
2	The software should be able to log data from the Fotonic API	1
3	The software should output a 3D model from a sequence of point cloud files	1
4	The software should be able to process a depth image sequence from an indoor environment (no larger than 5x5 m)	1
5	Documents and software should be delivered to client on time	1
6	The software should perform filtering of outlier points and noise	1
7	The software should use the FLANN library for optimization	2
8	The software should perform meshing on the 3D model	2
9	The software should remove flying pixels at depth-edges	2
10	The software should be able to process a depth image sequence from an outdoor environment	2

4 Requirements for further development

The source code should be sufficiently documented and commented to allow for further improvement and development. The software should also be written in an operating system independent programming language.

5 Resources

The team consists of four members, each with 240 hours of allocated time for this project. The client, Per-Erik Forssén at the Computer Vision Laboratory, designated Felix Järemo-Lawin to be the supervisor for the project, with 24 hours of allocated time.

6 Deliveries

The team should deliver the final software and a number of documents and supplementary material during the project. These document and the expected date of delivery is outlined in the table below.

Table 2: Project Deliveries

Date	Delivery
2017-09-21	Project Plan
2017-09-21	Requirement Specification
2017-09-21	System Design
2017-10	Half Time Evaluation
2017-12-08	Software with all functionalities
2017-12-08	Test Protocol
2017-12-08	User Guide
2017-12-08	Draft of Technical Documentation
2017-12-18	Software source code
2017-12-18	Project Website
2017-12-18	Presentation
2017-12-18	Reflection Document
2017-12-18	Technical Documentation

7 Documents

The team will deliver documents written in LaTeX based on the LIPS Project Model at the specified dates in Table 2.