

Textured 3D Mesh Reconstruction of Indoor Environments
Using RGB-D Camera

COLLIN BOOTS

A THESIS

in

Robotics

Presented to the Faculties of the University of Pennsylvania in Partial
Fulfillment of the Requirements for the Degree of Master of Science in Engineering

2014

Dr. Daniel D. Lee
Supervisor of Thesis

Dr. Camillo J. Taylor
Supervisor of Thesis

Abstract

Your abstract goes here... ...

Contents

1	Introduction	1
1.1	Related Work	1
1.2	Thesis Organization	1
2	Parallel Programming Paradigms	2
2.1	Principles of Parallel Programming	2
2.2	Parallel Algorithm Building Blocks	2
2.3	Programming with CUDA	2
2.3.1	CUDA GPU Architecture	2
2.3.2	Optimizing CUDA Code	2
3	Problem Formulation and Approach	3
3.1	Problem Specification	3
3.2	High Level System Design	3
3.3	Plane Detection and Meshing Pipeline Design	3

4	Implementation	4
4.1	RGBD Framework	4
4.2	Preprocessing	4
4.3	Plane Segmentation	4
4.4	Mesh Generation	4
5	Performance Analysis	5
6	Conclusions and Future Work	6

List of Figures

Chapter 1

Introduction

1.1 Related Work

1.2 Thesis Organization

Chapter 2

Parallel Programming Paradigms

2.1 Principles of Parallel Programming

2.2 Parallel Algorithm Building Blocks

2.3 Programming with CUDA

2.3.1 CUDA GPU Architecture

2.3.2 Optimizing CUDA Code

Chapter 3

Problem Formulation and Approach

3.1 Problem Specification

3.2 High Level System Design

3.3 Plane Detection and Meshing Pipeline Design

Chapter 4

Implementation

4.1 RGBD Framework

4.2 Preprocessing

4.3 Plane Segmentation

4.4 Mesh Generation

Chapter 5

Performance Analysis

Chapter 6

Conclusions and Future Work