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Degree of Master of Science at The University of Glasgow

Date of submission placed here

## **Abstract**

abstract goes here

## Education Use Consent

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## **Acknowledgements**

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# **Chapter 1**

## **Introduction**

### **1.1 Context**

### **1.2 Problem Objectives**

### **1.3 Problem Statement**

### **1.4 Application/ Motivation**

### **1.5 Outline of the dissertation**

## **Chapter 2**

# **Background Literature Survey**

Divide into hardware and software/implementation technology Do I need to discuss things I haven't used Existing/similar applications



## **2.1 Papers? - if required**

## **2.2 ROS**

## **2.3 Turtlebot**

## **2.4 Cameras**

### **2.4.1 RGB-D**

### **2.4.2 Stereo**

## **2.5 SLAM**

### **2.5.1 RtabMap**

### **2.5.2 Others**

## **2.6 Frontier Exploration**

## **2.7 Object Detection**

### **2.7.1 Feature Detection**

### **2.7.2 Tensorflow**

### **2.7.3 Haar Cascades**

### **2.7.4 Google Vision API**

### **2.7.5 3D Detection**

## **Chapter 3**

# **Requirements**

## **Chapter 4**

# **System Design**

## **Chapter 5**

# **System Implementation**

### **5.1 Mapping**

#### **5.1.1 Transforming data**

#### **5.1.2 Calibration**

### **5.2 Frontier Exploration**

### **5.3 Object Detection and Recognition**

#### **5.3.1 Blob Detection**

#### **5.3.2 Detecting Clusters - different methods**

#### **5.3.3 Creating Boxes**

#### **5.3.4 Tracking Boxes**

#### **5.3.5 Positioning Boxes in Map/Loop Closure**

#### **5.3.6 Recognising Objects**

#### **5.3.7 Publishing to Rviz/Rtabmap**

### **5.4 The whole package - how to utilise**

## **Chapter 6**

# **Evaluation**

### **6.1 Testing**

## **Chapter 7**

# **Conclusion**

### **7.0.1 Future work**

## **Appendix A**

### **First appendix**

#### **A.1 Section of first appendix**

## **Appendix B**

### **Second appendix**



# Bibliography

- [1] C. Baier and J.-P. Katoen. *Principles of Model Checking*. MIT Press, 2008.