Trajopt Documentation

Hybrit Project

at the

DFKI

Prepared by

Mahesh Kumar Karikalan

Supervisors:

Sankaranaryanan Natarajan

December 3, 2018

Table of Contents

List of Figures

List of Tables

Acronyms

SQP Sequential Quadratic Programming. 1

Chapter 1

Introduction

1.1 Architecture

The algorithm begins with an input problem description consisting of number of samples, maximum number of iterations, joint's position, velocity limit for each joint of robot and initial trajectory as an initial guess. Then, this problem is formulated as a Sequential Quadratic Programming (SQP) optimization problem (Problem as a Matrix) and solved based on [1] to get the optimized trajectory. Since the goal is not only to generate optimized trajectory but also to get a collision-free path, collision query will have to made for each step of the trajectory. Using robot description and world description and the current robot's current state, the collision query yields new constraints that updates the optimization problem. Then, the updated problems solved until a final collision-free optimized trajectory obtained that can be used to drive the robot. The architure of the algorithm is shown in Figure 1.2.

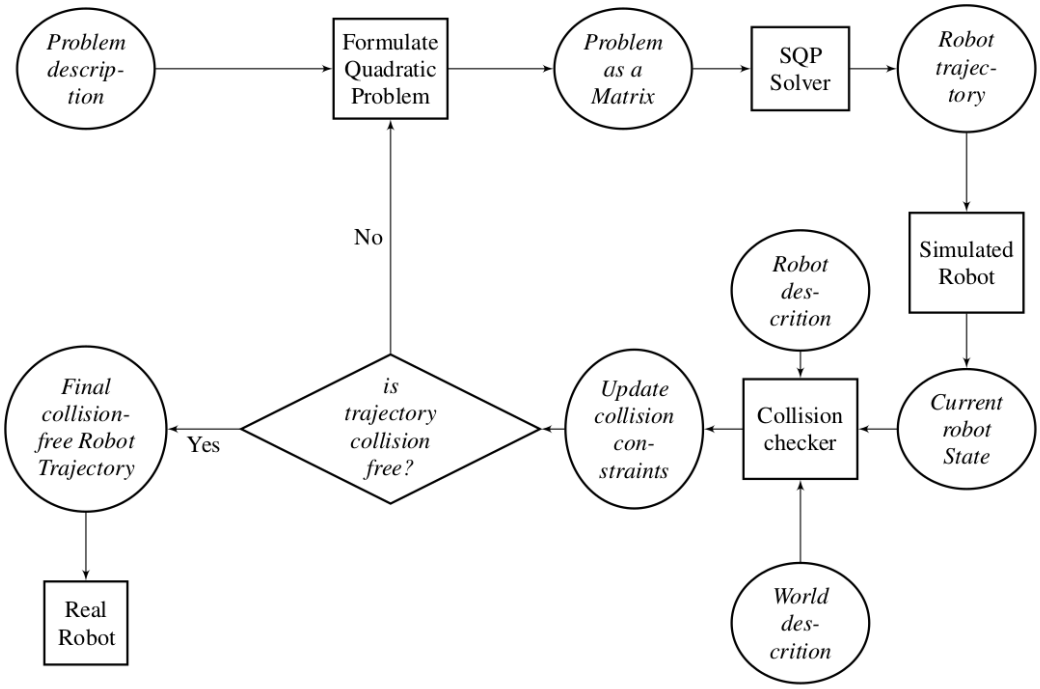

Figure 1.1: Architecture of Trajopt Planner

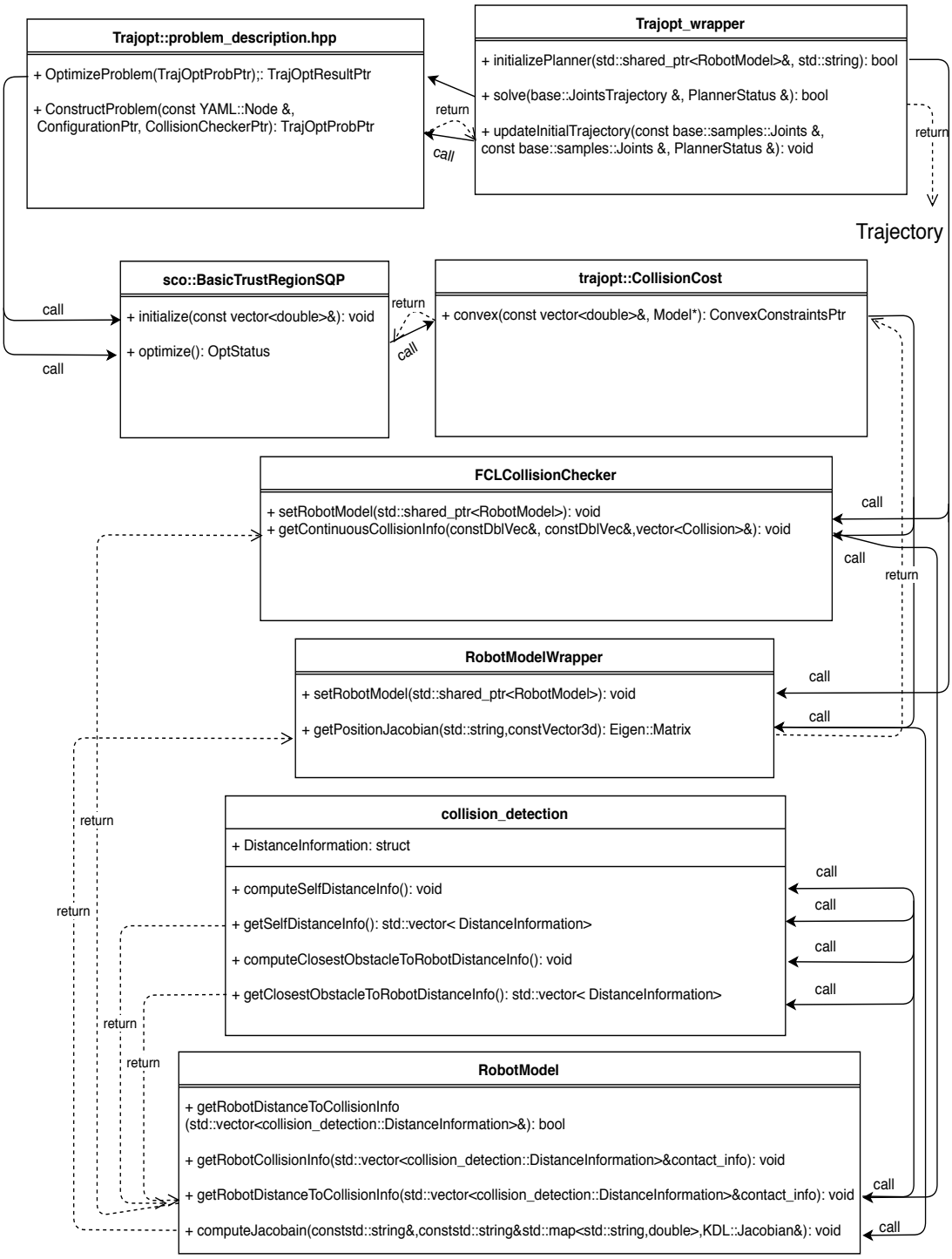

Figure 1.2: Architecture of Trajopt Planner

References

[1] Csaba Mészáros. "The BPMPD interior point solver for convex quadratic problems". In: *Optimization Methods and Software* 11.1-4 (1999), pp. 431–449.