

# Tachikoma Project (Subgroup 1)

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## Abstract

This project is a Capstone project for the Spring 2016 year under Prof. Kristin Dana and Prof. Bhattacharjee. We have two subgroups and therefore two reports; our second subgroup consists of Samani Gikandi and Kenneth Bambridge who worked on communications, focusing on long-range wireless control and video transmission through a distributed system of computers. In this report, we present the work of the first subgroup, specializing in the local robotic system, including items such as power distribution, mechanics, perception of objects, localization, motion, and state-based planning.

## 1 Introduction

The Tachikoma project was meant to be a mobile system of integrated components designed to perform many common actions, some of which include traversing pathways, climbing stairs, opening doors, pushing buttons, and picking up small objects. These actions are very relevant, since with these actions alone, robots are able to interact with and aid humans to complete everyday tasks, tasks that would otherwise be either extremely time-consuming or tedious, especially when humans are busy.

In order to accomplish such tasks, our team attempted to find a solution that was flexible and reliable, mobile in many common situations, stable in case of power cuts, and has the ability to interact with human-made structures. We also wanted to be able to finish such a project within the capstone time-limit, and yet still have the project prove to be a solid building block for future research endeavors. Because of this, we decided to choose a particular goal which we think will showcase much of the capability of the robot.

The goal we chose for the robot was quite simple: pick up a package and bring it back. Originally, the robot would have been able to pick up a bag of food from a different building, but for the sake of presentation purposes to account for as much error as possible, we instead chose a teddy bear. In this report, we decided to explain and showcase the capabilities of the robotic system which we have developed, as well as issues and development hindrances encountered along the way. We also mention our integration with subgroup 2, who was in charge of long-range communication for online processing.