Name of project	IntelChair
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Percentage of final system	80%

The project

Our project consists of a motorized wheelchair that can autonomously move itself in a known environment, giving the user the ability of hands free mobility while sitting in the chair. The chair will be used in conjunction with various sensors (RangeFinder, Inertial Measurement Unit , RGB-D camera) and with a mobile application with which the user can control all of its functions.
The chair will take care of transporting people or objects from location to location without its user ever need to pay attention to the course.

Minimum Viable product

Description

Our minimum viable product won't match the overall project in a sense that we opt to develop some features which we consider more valuable, such as the ability to control the chair manually, have the wheelchair travel between predefined locations, generate the map of a closed environment and save it to the server. There will be a safety function where the chair automatically stops when a object is detected in the path.

Features

Features of our MVP:

- Manual control of the chair through a joystick in the web application;
- Room mapping done by the chair, through the rangefinder installed, with human control and rectification in the end;
- The user can add locations that will be saved in the map.
- Travel between two predefined locations autonomously with object detection so the chair don't run over some dynamic objects that might appear in the path.

What the system is NOT MEANT to do:

- Recognize transparent objects (e.g. windows, glasses, glass doors...);
- Function properly if a kinect, or similar device, faces the chair;
- Function correctly if sensors are covered;
- Work with excessive weight on the chair;
- Move itself to a charging dock when the battery is low;
- Generate the map autonomously;
- Acquire the user's location in the map.

Scenario(s)

1 - Ramalho moves from place A to place B (manually or predefined locations)
Ramalho goes to work very early in the morning and leaves late afternoon. Sometimes he needs to move from places in order to get something that he needs. Ramalho decides to go to the vending machine which is quite far from his desk, but he had a full and tiring day. Given his desk and the vending machine were already set as predefined locations through the web application, the wheelchair is capable of transporting Ramalho between this locations.

2 - Chair goes from point A to point B transporting items
Rogério has been working on a new radio transmitter which it constantly needs to be tested by a networks team on the other side of the building. Rogério places the equipment on the wheelchair, and selects the networks team's room as destination to the , on his smartphone. The wheelchair will then travel de desired path to deliver Rogério's component. This way, Rogério doesn't need to make the delivery himself and can continue his work on his desk.

Rationale

When Rogerio moves from a place to another on the chair (scenario 1), he can opt for the manual control, i.e. use the joystick available in the app. In a case that his hands are busy he can choose the voice control feature and control the chair by voice.
In a situation where the user just wants to send the chair to somewhere in the building without having to go with it (scenario 2) he won't be able to control it manually or by voice. In this case the user will choose the feature where the chair travels by itself from its actual location to some given location in the map.

Possible evolutions

In the future we might implement some other features such as controlling the chair with voice commands, the ability to avoid dynamic objects that might appear rather than just stopping automatically. Furthermore we may implement a "Follow User" feature which is self explanatory. With the help of the Inertial Motion Unit (IMU) we will be able to calculate the incline level of the current position of the chair and with this information make it travel through uneven courses.
This are some features we have on mind to implement however, given the constraints, it's not viable to put them on the MVP.