DIY Dumbwaiter

Overview/Introduction

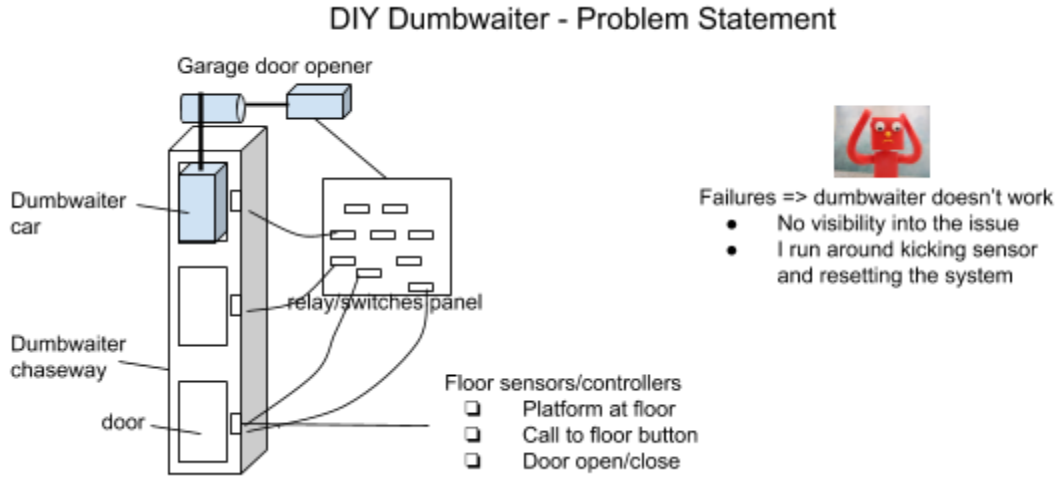
Overview

The system is a 3 story dumbwaiter. It has a call panel at each floor that allows users to call the dumbwaiter ‘car’ to the floor or send the dumbwaiter car to a different floor.

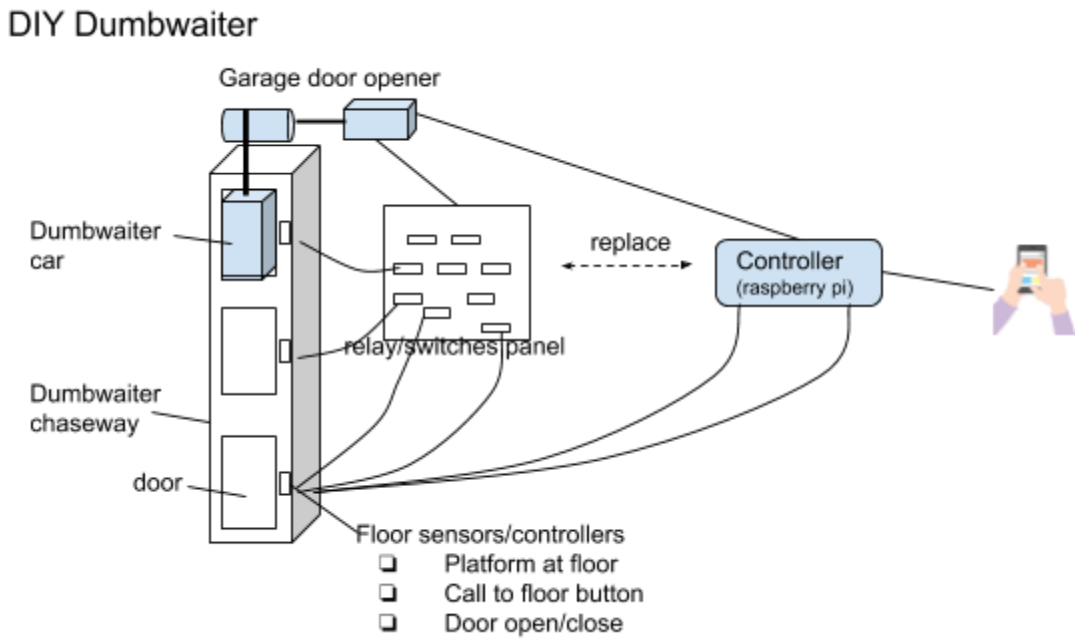
Dumbwaiter upgrade project

Problem statement:

Our house has a 3 story dumbwaiter built by a diy’er (do-it-yourself’er). It is powered by a garage door opener that accepts up, down and stop commands. The ‘controller program’ has been implemented with a relay/switch panel that accepts signals from sensors at each floor and translates them into up/down/stop commands to the garage door opener. Though an innovative solution, the relay/switch panel is difficult to understand and when we have sensor glitches, it is impossible to pinpoint the source of the problem.



Solution approach



Reimplement the dumbwaiter program using technology that allows user access to the sensor states and the ability to correct sensor glitches.

The overall logic will be implemented in a traditional programming language deployed on a raspberry pi device. The pi device will also host a web page that allows the user to manually control the dumbwaiter so as to correct sensor glitches. (The current up/down/stop buttons installed on each floor will still function.)

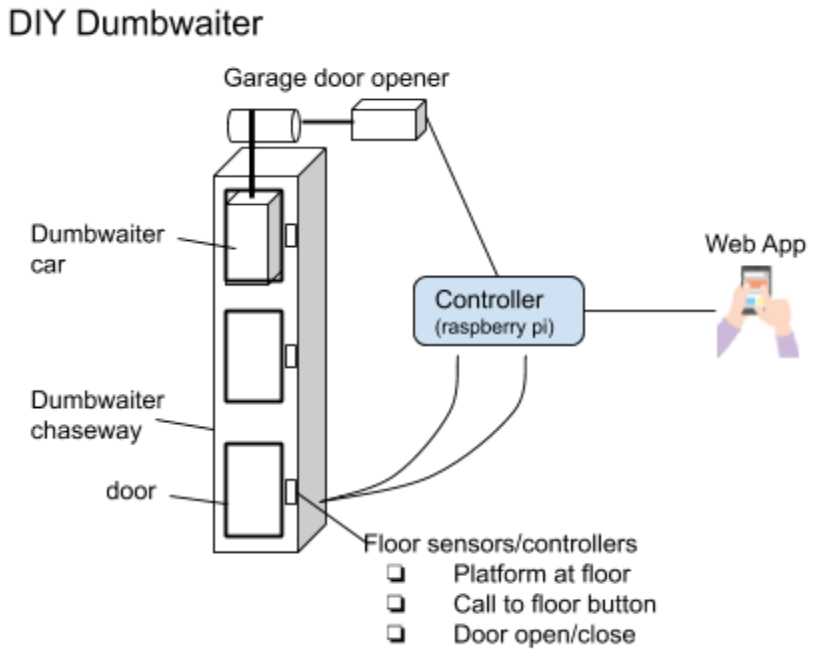
The users will be the homeowners or anyone the homeowners allow access to their local wifi.

User Documentation

- The user will use a floor call panel (located at the dumbwaiter door on each floor), to call the dumbwaiter car to that floor or send the car to another floor .
- The dumbwaiter door, at each floor, is not allowed to open till the dumbwaiter car is at that floor.
- The user will be able to visualize where the dumbwaiter car is and send the dumbwaiter car to a specific floor via a web application.

System Design

System Overview



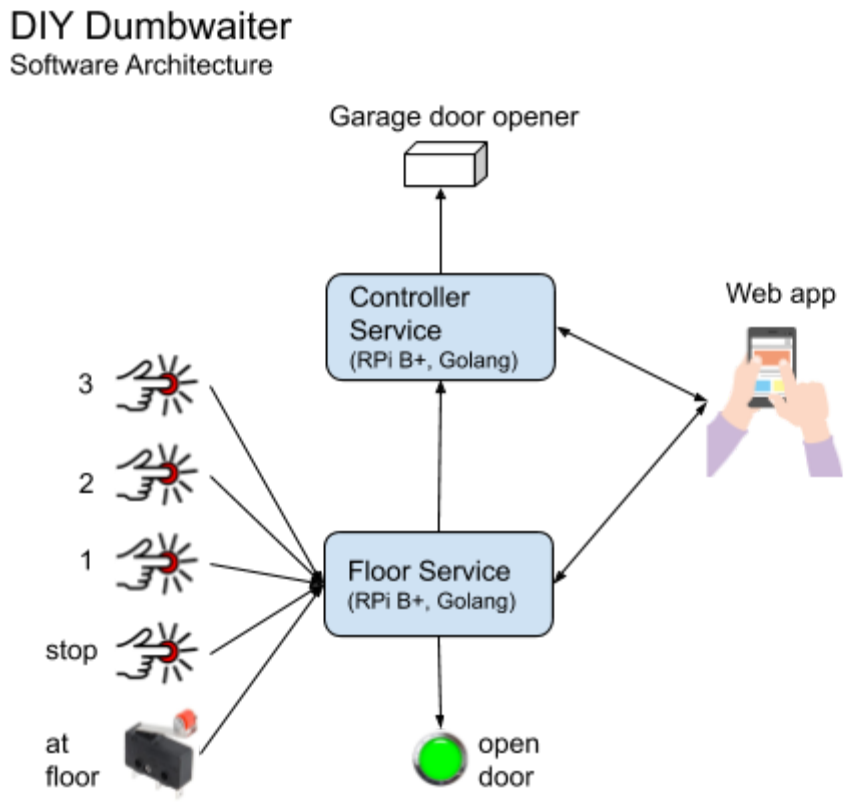
Each floor has

- A dumbwaiter door with electronically controlled door jamb striker plates that lock the door when it is not at that door's floor
- A dumbwaiter panel next to each dumbwaiter door. Each panel contains:
    - 3 buttons for sending the platform to the first, second and third floor
    - A stop button
    - A lighted button for releasing the door jamb striker plate allowing the door to open. The button is lit and enabled only when the dumbwaiter is at that floor.
    - A reset button that resets the current switches/relays.
- A sensor indicating if the dumbwaiter platform is at that floor.

The system will also offer a web app that can be accessed via the home's wifi. The web app allows the user to:

- See the state of each floor sensor
- Send an up/down/stop command to the engine

Software Architecture



Controller Service
The Controller service sends up, down, stop signals to the garage door opener based on getting control directives from the dumbwaiter floor services and/or the web app.

Floor Service
The floor service sends control directives to the controller service based on inputs from the buttons and sensors at that floor.

Web App
The web app sends control directives to the controller service based on inputs from the user.

Detailed Design

Controller Service

Main loop overview

The controller service has a main loop listening for requests from the floors and sends up/down/stop requests to the garage door opener as appropriate to respond to the floor's request. It also generates an emergency stop request when it recognizes that it should have received an 'at floor' signal but did not.

Api

Goto floor - tells the controller to send the dumbwaiter car to a specific floor
Stop - tells the controller to issue a stop request to the garage door opener
At floor - tells the controller that the dumbwaiter car has arrived at a floor
Status - requests the status of the various sensors and garage door opener

Security

The system will be installed on a private wifi network. No authentication/authorization will be used on the API requests.

Logging

The system will maintain rotating logs on the system's RPi devices. (No central logging.)

Development