

# ME 5659 Control Systems Engineering Project

**Title:** Elevator Control System Optimization for a Two-elevator Building.

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## 1. Introduction

For this project proposal, the objective is to design a control system for the operation of two elevators in a multi-floored building. The project will focus on developing an efficient algorithm to determine an optimum way to coordinate the two elevator responses. The algorithm will be based on several factors such as, the current floor in which the elevators are located, the requested floor, and the direction of travel.

## 2. Project goals

Elevators are a highly important part of transportation within buildings, especially in buildings that have a large number of floors. Optimizing elevator operations will result in a significant reduction of waiting times and energy consumption. This project seeks to simulate the logic that governs the movement of two elevators in a multiple-floor building. The control system will decide which elevator should respond to a call and serve a particular request.

The main problems intended to solve are:

- Determining which elevator should respond based on the current positions and direction in which they are moving.
- Conducting time and/or energy effective responses to the user's requests.
- Coordination of both elevators to avoid conflicts and to obtain quick responses.
- To avoid the overloading of elevators.

## 3. Proposed Controllers

A study of different strategies for controlling the elevators will be carried out:

- **First Call Controller (FCC):** A controller that will give priority to the request that have been waiting for a longer time.
- **Load Balancing Controller (LBC):** The workload will be distributed alternating the requests between both elevators.
- **Optimized Controller (OC):** This controller will focus on minimizing energy and waiting time by finding the most efficient routes.

## 4. Results

The controllers will be implemented in MATLAB and afterwards, they will be analyzed. The analysis will look for the most efficient controller. At the end of the report, result plots of the previously described controllers will be shown and analyzed.