

# Software Design Document

## MULTI ELEVATOR SYSTEM

### TEAM MEMBERS

Pratyush Singh | Unmesh Kanchan

#### Table of Contents

- 1. Introduction ..... 2
- 2. Design Overview ..... 2
  - 2.1. System Architecture..... 2
  - 2.2. Application Logic..... 4
    - 2.2.1. Elevator Request System: Application Logic..... 4
    - 2.2.2. Control System: Application Logic ..... 4
    - 2.2.3. Monitor System: Application Logic..... 4
    - 2.2.4. Elevator Unit: Application Logic..... 5

## 1. Introduction

This project provides the top-level architecture overview of the Multi Elevator System. This Architecture controls three elevators in a multi-story building. This document outlines all the software component of the multi elevator system. The basic major component of this software system are control system, Monitor system, Elevator request system, power unit and Elevator unit which also comprise of sub system. Elevator unit also contain subsystem, which are control unit(CU), Button Pad(BP), Door, Position and direction tracker (PDT), weighing system (ws). The Monitor system is basically responsible for decision making and processing information. Monitor system get information from the control unit which it process and send the feedback to the control unit. The second major component is control system which is responsible for coordination between all other components and their sub system. The three elevators are identical to each other, so will be represented here as one component. All the three elevators are connected to the power unit.

## 2. Design Overview

### 2.1. System Architecture

Figure 1 below depicts the overall system in the form of a deployment diagram. The system will be constructed from the following components:

- **Power Unit:**  
Power unit is connected to all component of the system. Since there is no physical power unit it is a simulation algorithm which keeps the system running until the user quits.
- **Elevator Request System(ERS):**
  - The ERS Panel is present on each floor with the up and down button.
- **Control System:**
  - This is a central unit which is basically responsible for coordination between different components of the system. It has complete information of the overall system. It maintain the data structure of the complete system.
- **Monitor System:**
  - This is a main brain of the control system which has all the algorithm to make decision. It communicates only with the control system in the form of message.

- **Elevator Unit:**

- Elevator is a unit which responds to every signal send by the control system. Elevator keep updating about its location and other activities to the control system. Elevator Has a subsystem- control unit which communicates with the control system. Control unit keep control system updated with the current location of elevator, the direction in which the elevator is moving. The weight which the elevator is carrying. The control unit takes order from the control system and moves the elevator as requested by the control system.

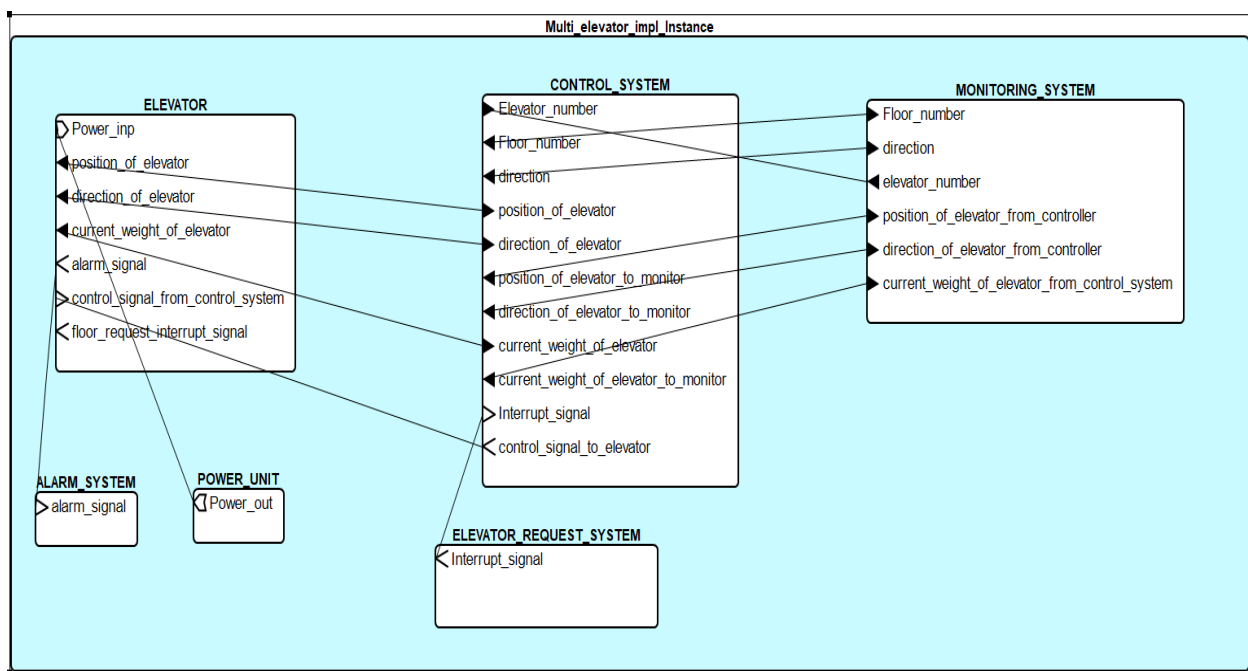


Figure 1: System Architecture of Multi Elevator System

## 2.2. Application Logic:

### 2.2.1 Elevator Request System(ERS):

- **Application Logic**

The user request the elevator by pressing up or down button. The ERS generates the interrupt signal for the control system to communicate that the request has just occurred. The control system then gets the information from the ERS about the direction of request and send the information to monitor system through the message.

### 2.2.2 Control System:

- **Application Logic**

This unit is where most of application logic is performed. This piece of the software basically handles the interrupt from the ERS. Send the signal of interrupt service request to monitor system which respond it with the message which contains which elevator needs to handle this request. It also gets the update from each elevator unit about their new position. The control system updates the data structure accordingly. The control system communicate with other component so it is essential component which integrates the whole system.

### 2.2.3 Monitor System:

- **Application Logic**

The control unit sends the signal to monitor system when the interrupt is generated by the Elevator request system. The signal contains the floor number and current positions of each elevator. The monitor system then process these message information and make decision through dispatch algorithm and informs the decision to control system. The control system validates the decision and sends the signal to the respective elevator to stop at the give floor.

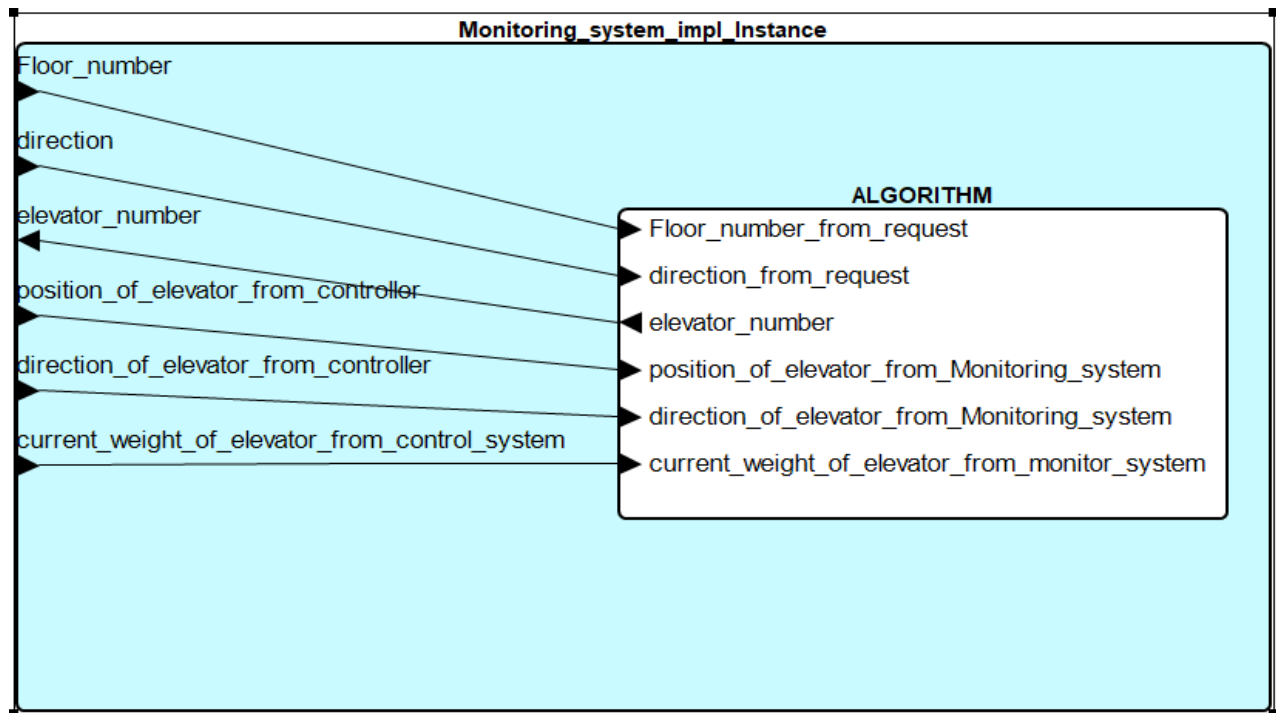


Figure 2: Architecture of Monitoring System

#### 2.2.4 Elevator Unit:

- **Application Logic**

Elevator is comprised with many other sub system such as control unit, Button Pad, Door, Position direction tracker, weighing system.

**Button pad** basically respond to the internal buttons which the user presses to choose its destination. The button pad informs the control unit of the elevator to which destination it needs to stop.

**Doors** of elevator are controlled by the control unit of the elevator. When the elevator stops the control, unit send the signal to the door to open.

**Position Direction Tracker** it inform the control system to which direction the elevator is currently moving and control system signals the direction in which elevator needs to move. The direction is communicated to the control unit of the elevator.

**Weighing System** computes the weight on the elevator and sends the weight to control unit. Control unit is responsible to maintain the maximum threshold. When the weight exceed the maximum threshold control unit will close the door and will not allow anymore passengers in the elevator.

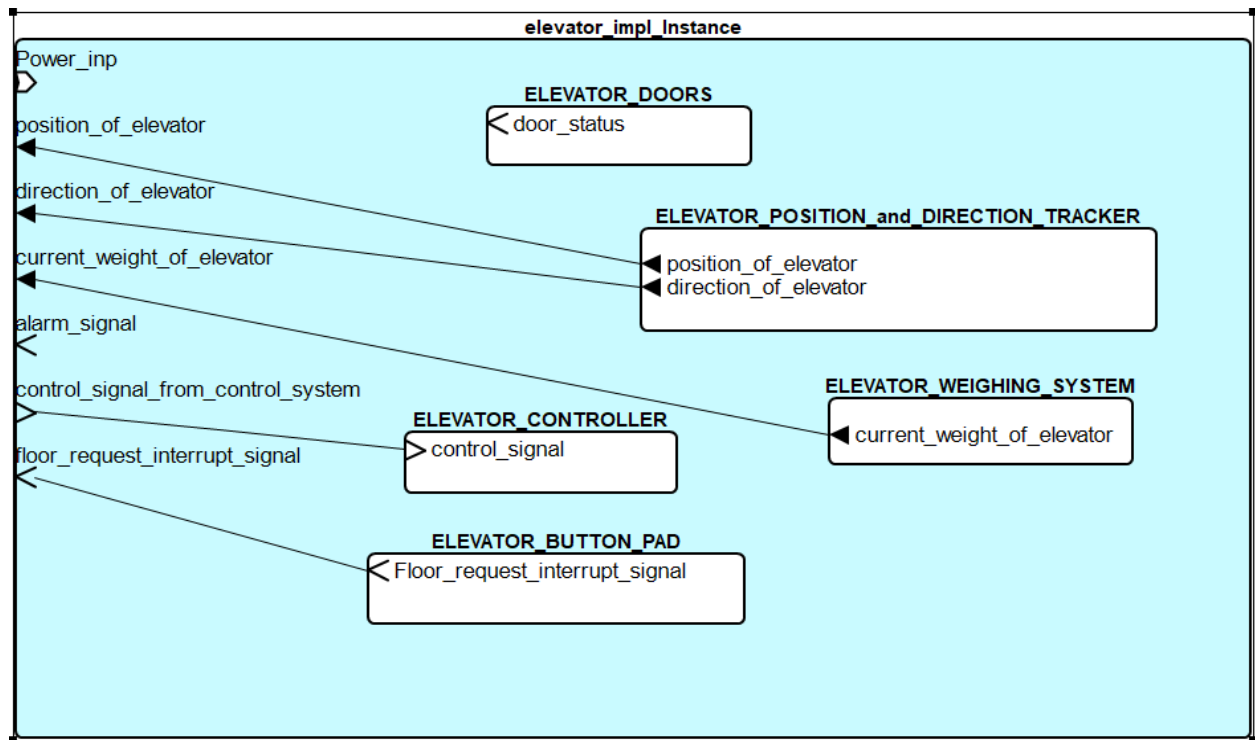


Figure 3: Architecture of Elevator Unit