

**CS 76890**

**Assignment 1**

**Elevator Design Architecture**

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The submitted architecture is a simple implementation of the embedded system of an Elevator Design.

The design is divided onto 3 parts connecting the controllers on each floor to the elevator itself: -

- **Unit Control**-Unit control is the elevator itself, having controls inside it which are to be used for the user to make it reach the desired destination
- **Request Resolver**- Its all the controls which the user interacts with outside of the elevator to be used for the required service
- **Fire Sytem**- Incase of an emergency which is mostly caused by fire the elevator will have to ignore the control by the

**Unit Control**

The unit control is divided into 6 states, 3 states describe the movement of the elevator, 2 describe the state of the door and 1 state outputs the floor which the elevator is in.

Elaborating on each state of the **Unit Control**:-

- **Going up** - The elevator will go up when either the floor requested from outside or within the elevator's is higher then the elevators current position, till a point where the elevator is at its top most position can't really go up anymore.
- **Going Down** - Similar to going up the elevator will go down only when the requested floor from either control is lower than the current floor, till a point where the elevator is at its bottom most position can't really go down anymore.
- **Idle** - Eventually after moving up or down the elevator will have to come to a state of idle once the requester floor = current floor, if the elevator is already in on the requested floor the elevator will be in a state of idle, incase of Fire emergency the elevator.
- **Door Open**- When an elevator is reaches its desired distance the door is opened for the user to get in or get out. From the inside there exists a button which when the elevator being in the state of idol with door open, will keep the door open for longer than 15 seconds.
- **Door Close**- The elevators door will always remain close while in movement and once reaching the desired destination after 15 seconds of the door being open, the door will shut on it own, a button exists in the unit control which can shut the door before the 15 second timer when pressed.
- **Floor indicator** – A digital display inside of the elevator in the unit control which keeps track of the floors visited while the elevator is in motion by displaying the floor number the elevator has visited inclusive of the number which is requested by the user to make the aware of the destination.

## Request Resolver

The request resolver can be divided into 3 states, 2 of them cater to the user interest and 3 help the user to track the movement of the elevator to complete the request.

Elaborating on each state of **Request Resolver** :-

- **Up Arrow**- On every floor there will be two buttons which help the user to control the action of elevator as per their requirement. Up Arrow indicates when the user choses to go above his current floor.
- **Down Arrow** – Similarly a down Arrow indicates when the user decides to go below then his current respective floor.
- **Up Light** - Every elevator has 3 static lights signaling the user the movement of elevator as per its current position which it has to travel to complete the desired request. Up light indicates the elevator travelling upwards to complete the user request.
- **Down Light** – Similar describes the elevator being have to travel down to complete the user requests.
- **Floor Light**- When an elevator finally comes to idle at a destination, emphasizing on the user request being completed the floor light is lit up signaling the user outside that the elevator has arrived.

## Fire System

Incase of Fire the Fire System take over the complete control of the elevators and provides the elevator a set of instructions. Elevator going through 3 states:-

- **Fire Alarm**- As soon as Sensors detect something the fire alarm inside the elevator as well on the request resolver goes off alerting the users inside or potential users outside.
- **Fire Go Down**-Ignoring any user input the elevator goes down at level 1. If the elevator is already on level 1 its stays there.
- **Fire Door Open** -As soon the as elevator reaches level 1, it open its door letting the user inside out and not letting any smoke gather inside.