Elevator

Elevator is a simple elevator simulator written in C++.

Primary Function

Manage 8 ACME Elevators

Secondary Functions

- Send the elevators to the correct floor
- Handle user input inside the elevator
- Open & close doors in a timely manner
  - Verify that there is no obstacle in the way
  - Time out after 5 seconds
- Update the floor indicator
- Manage Elevator Request Button Events
  - Up / Down
  - Reset Button Backlight
- Play sound via speaker
- Elevator is sent on proximity or path basis
- Measure cable tension for safety
  - Lock elevator in case of failure

Why is the system being built?

The current system isn't safe. It's old and needs to be replaced. The new system will be safer and more reliable. The system is improved by the inclusion of a new elevator control system. The new system will be able to handle more elevators and will be more reliable, alongside the cable tension measurement system.

Actors

- User
- Engineering / Maintenance Staff
- Emergency Services

Due to the fact the latter two aren't mentioned in the document, I will refrain from making a use case diagram for them.

Use Cases

- Call elevator
- Select floor
- Keep door open via blocking

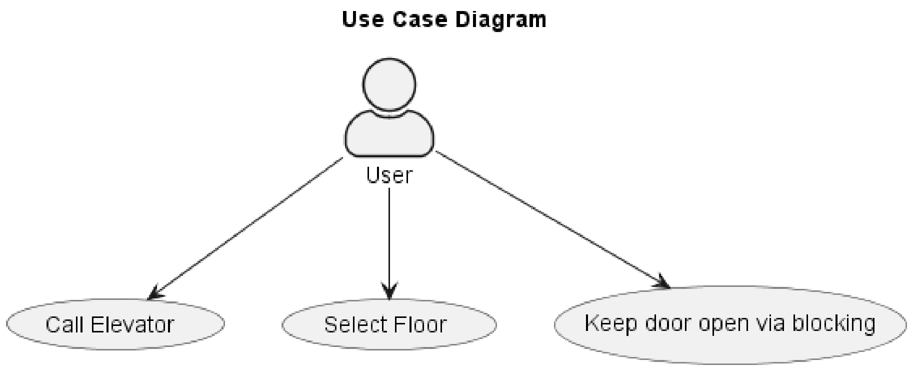


Figure 1: UseCaseDiagram

Use Case Diagram

Class Diagram

Class	Responsibility
Elevator	Combines all classes into a single usuable elevator
Button	Handles the pressing of a button
Door	Opens & Closes upon reaching a floor, as well as stopping in case of blocking
Floor	Controls Floor button panel & door
Speaker	Plays sound upon arrival at floor
Cable Tension Sensor	Checks & Maintains cable safety
Clamp	Clamps down in case of emergency
Proximity Sensor	Checks & relays data from proximity sensor
Optical Sensor	Checks & relays data from optical sensor

Note: I prefer working with events over wierd callback functions, so I will be using events in my code. I've tried to make this clear by using the following stucture:

- Always private
- Refers to the class name
- suffixes with "Event"

This is not a requirement, but I prefer it. You could definetly use callback functions or even interrupts, but that's diving too far into the hardware implementation for the scope of this project.

Sequence Diagrams

Call Elevator

Select Floor

Keep Door Open

Emergency

Sources

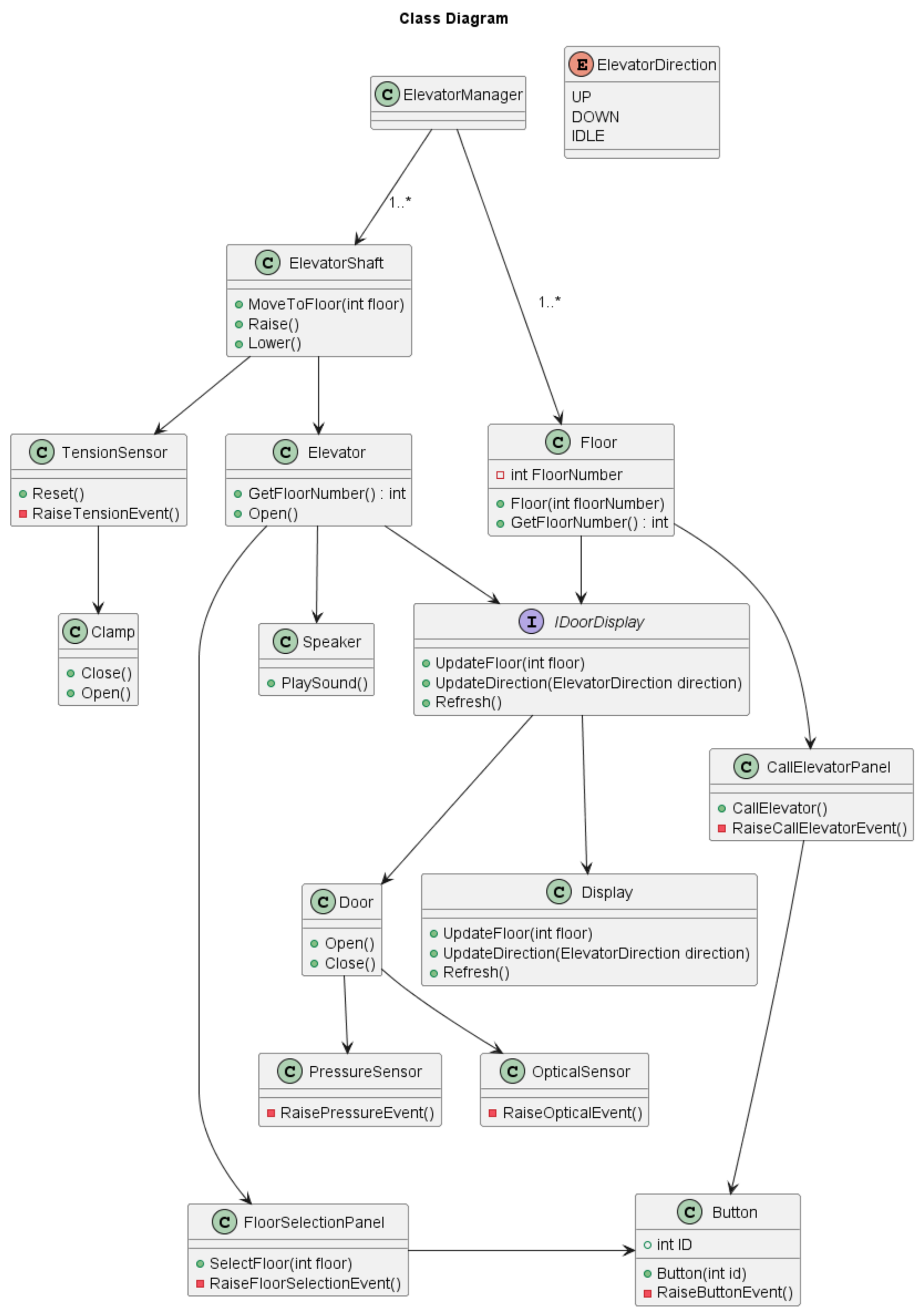


Figure 2: ClassDiagram

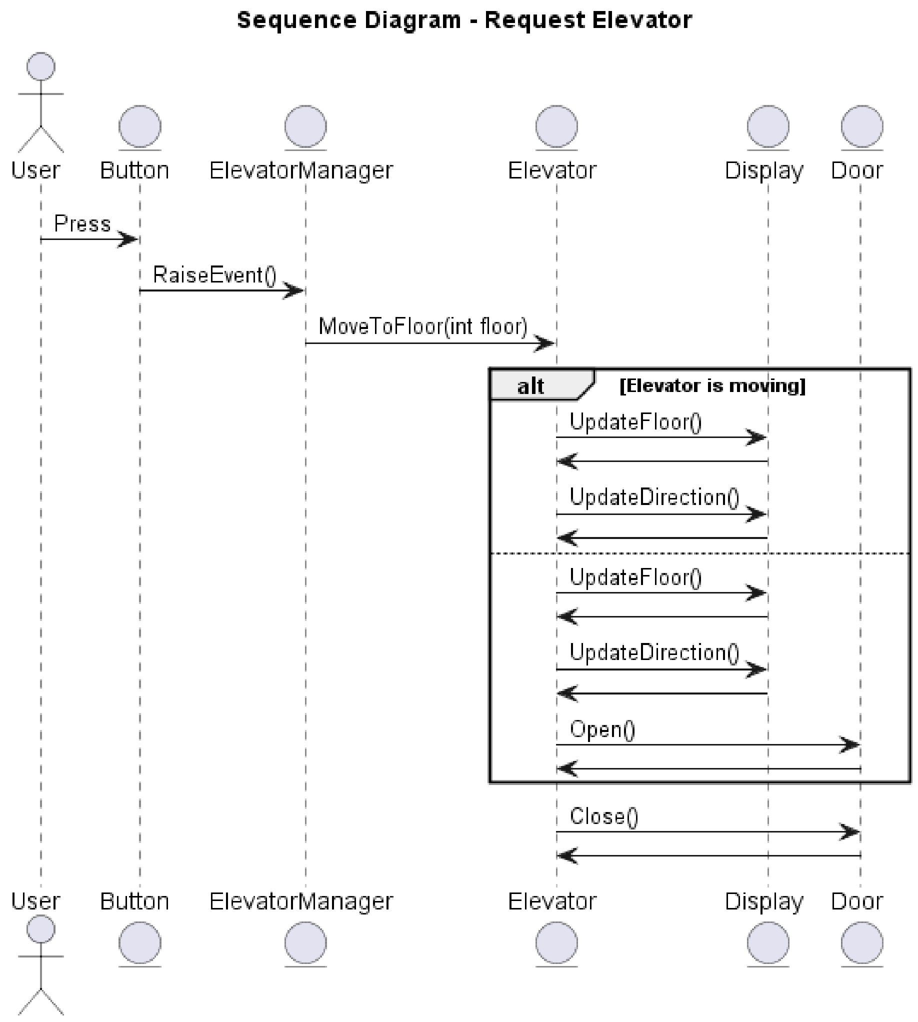


Figure 3: SequenceDiagram

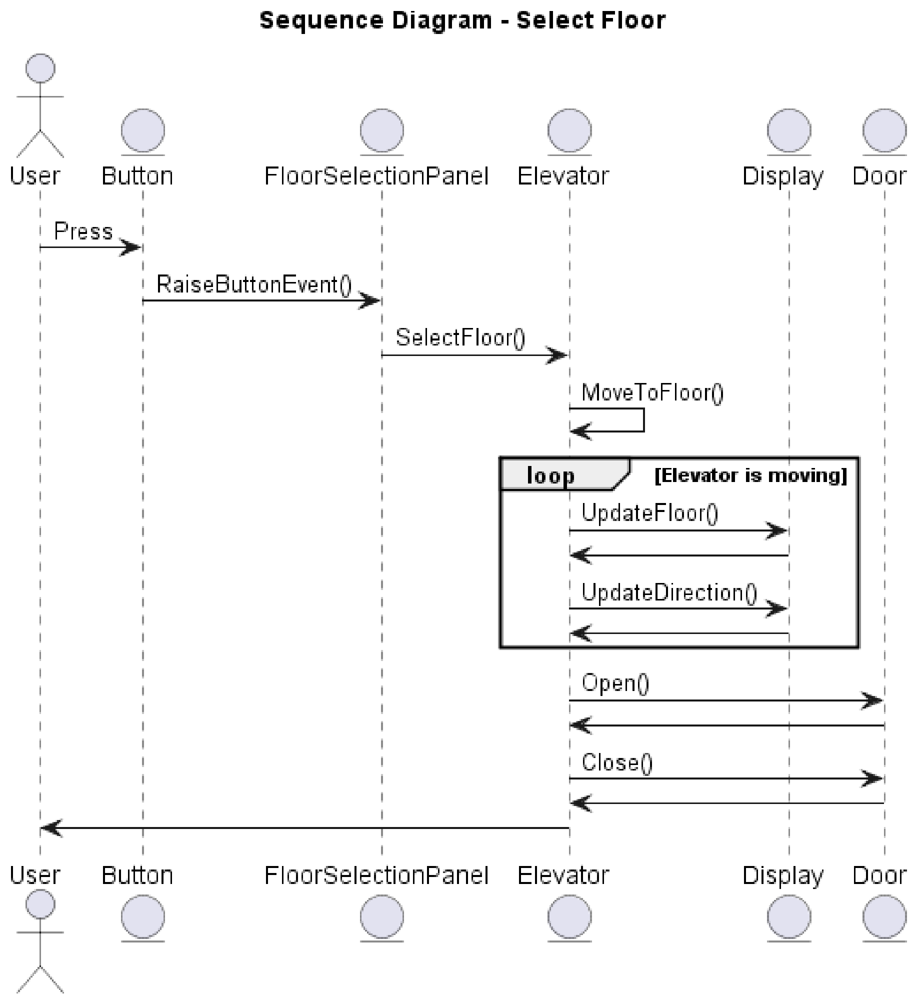


Figure 4: SequenceDiagram

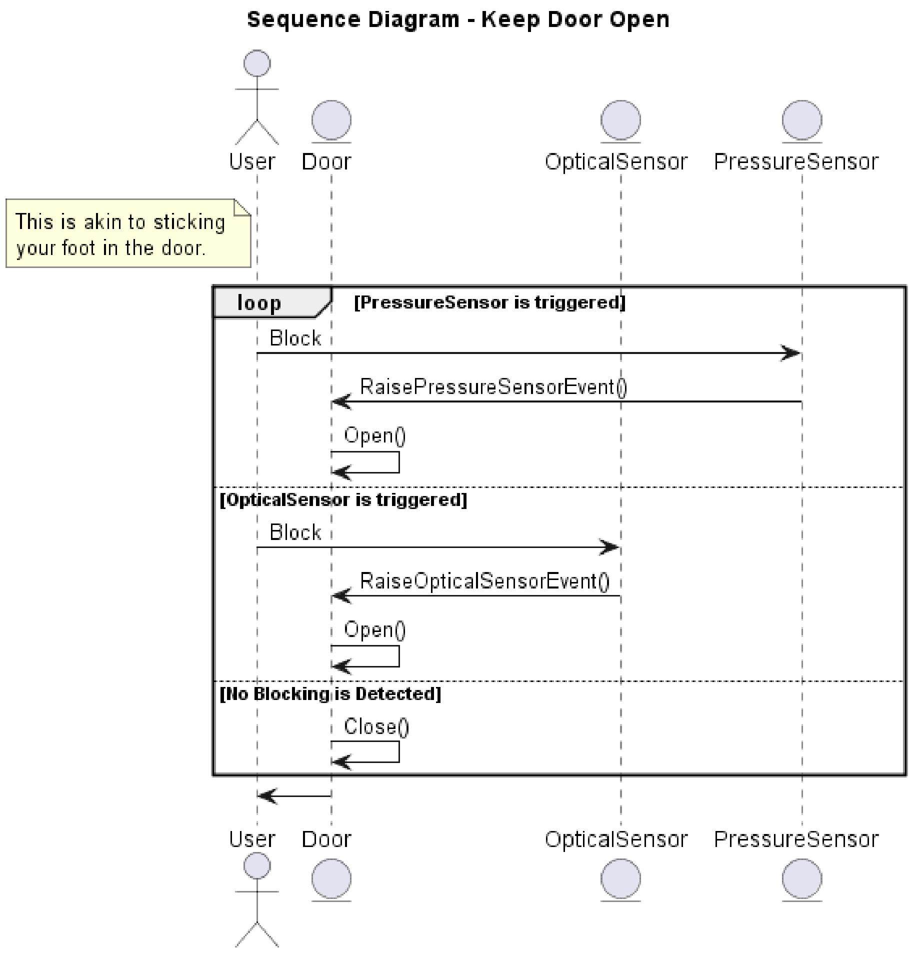

Sequence Diagram - Keep Door Open
User
Door
OpticalSensor
PressureSensor
This is akin to sticking your foot in the door.
loop
[PressureSensor is triggered]
Block
RaisePressureSensorEvent()
Open()
[OpticalSensor is triggered]
Block
RaiseOpticalSensorEvent()
Open()
[No Blocking is Detected]
Close()
User
Door
OpticalSensor
PressureSensor

Figure 5: SequenceDiagram

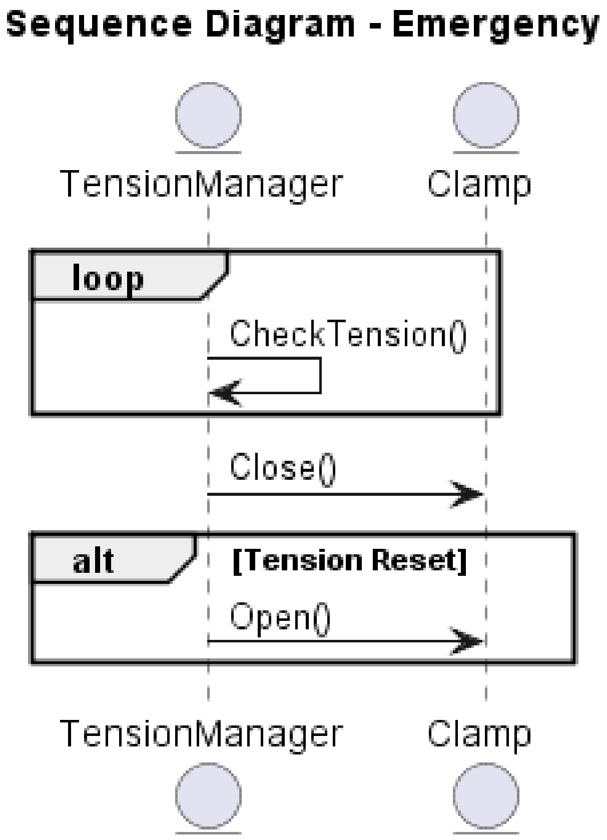
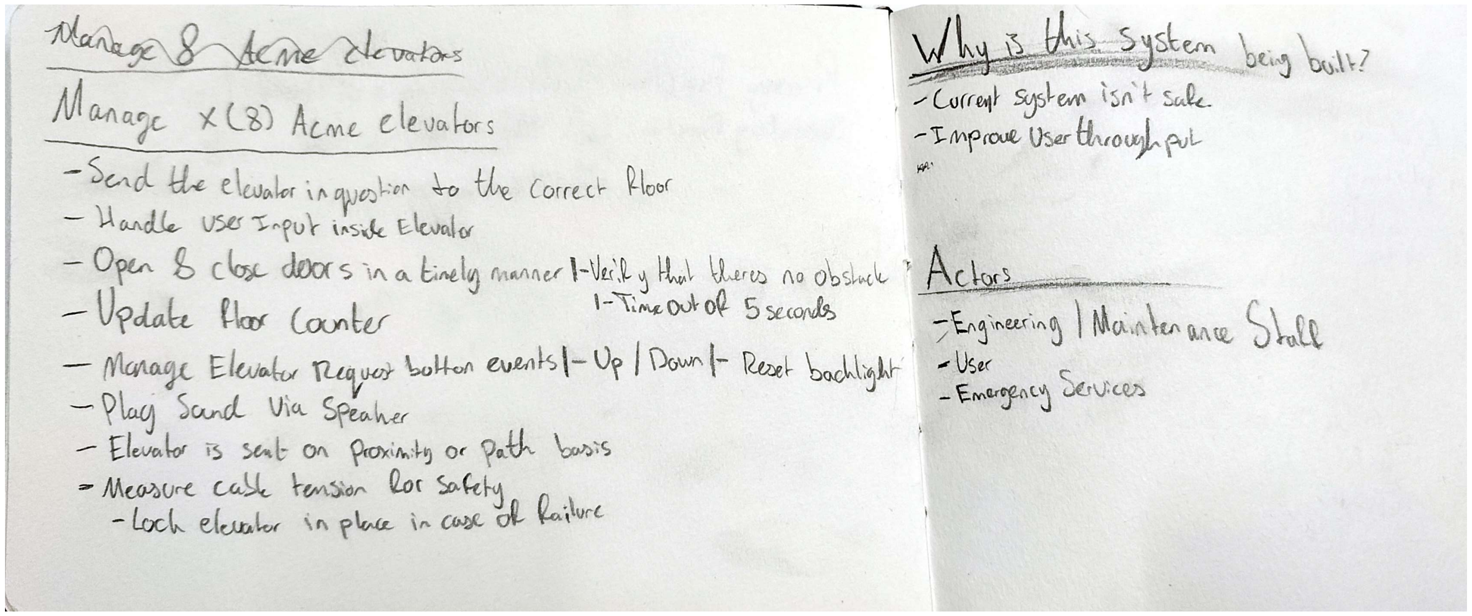


Figure 6: SequenceDiagram



Manage 8 Acme elevators

Manage x (8) Acme elevators

- Send the elevator in question to the correct floor
- Handle user Input inside Elevator
- Open & close doors in a timely manner |- Verify that theres no obstacle
  |- Time out of 5 seconds
- Update floor Counter
- Manage Elevator Request botton events |- Up / Down |- Reset backlight
- Play Sound Via Speaker
- Elevator is sent on proximity or path basis
- Measure cable tension for safety
  - Lock elevator in place in case of failure

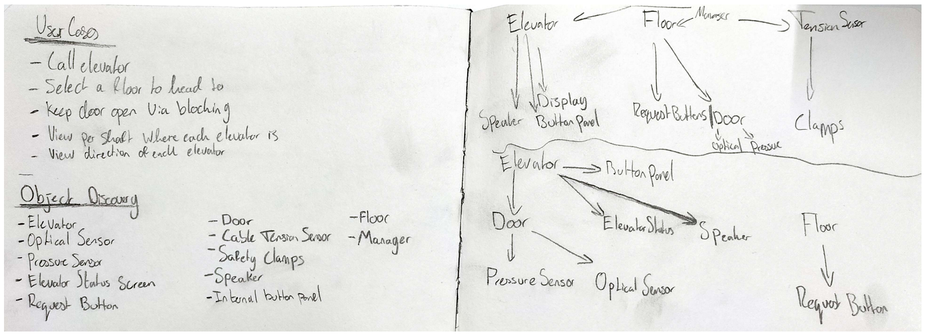
Why is this System being built?

- Current system isn't safe.
- Improve User throughput

Actors

- Engineering / Maintenance Staff
- User
- Emergency Services

Figure 7: Sketch1



User Cases

- Call elevator
- Select a floor to head to
- Keep door open Via blocking
- View per shaft where each elevator is
- View direction of each elevator

Object Discovery

- Elevator
- Optical Sensor
- Pressure Sensor
- Elevator Status Screen
- Request Button
- Door
- Cable Tension Sensor
- Safety Clamps
- Speaker
- Internal button panel
- Floor
- Manager

Figure 8: Sketch2