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| **Elevator**: Requirements Document Specification | **Version 1.2p** |

# Project Name: Elevator

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# 1. Introduction

This document contains the system requirements for project **Elevator**. These requirements have been derived from several sources, including brief listing of most important sources.

# Purpose of this document

This document is intended to guide development of ***Elevator***. It will go through several stages during the course of the project:

1. **Draft (d):** The first version, or draft version, is compiled after requirements have been discovered, recorded, classified, and prioritized.
2. **Proposed (p):** The draft document is then proposed as a potential requirements specification for the project. The proposed document should be reviewed by several parties, who may comment on any requirements and any priorities, either to agree, to disagree, or to identify missing requirements. Readers include end-users, developers, project managers, and any other stakeholders. The document may be amended and re-proposed several times before moving to the next stage.
3. **Validated (v):** Once the various stakeholders have agreed to the requirements in the document, it is considered validated.
4. **Approved (a):** The validated document is accepted by representatives of each party of stakeholders as an appropriate statement of requirements for the project. The developers then use the requirements document as a guide to implementation and to check the progress of the project as it develops.

# 2. Product Functions

The elevator lifts the users from their current floor to their destination floor. The user can call the elevator at any point in time and the elevator will service the user depending on the user’s current floor and the current elevator state. The elevator requires access authentication from the user using RFID tags. Once the user activates the elevator, he can choose his destination floor using a keypad interface inside the elevator. The elevator will then carry the user to his destination floor. The elevator can service more than one caller at a time provided that there are no more than 4 persons inside. When the elevator is activated, it can be used by other users and service multiple calls. The elevator needs to be re-activated when its service queue is empty.

# 3. Specific Requirements

This section of the document lists specific requirements for ***Elevator***. Requirements are divided into the following sections:

1. User requirements. These are requirements written from the point of view of end users, usually expressed in narrative form.
2. System requirements. These are detailed specifications describing the functions the system must be capable of doing.
3. Interface requirements. These are requirements about the user interface, which may be expressed as a list, as a narrative, or as images of screen mock-ups.

# 3.1 System Requirements

**Functional Constraints:**

1. Elevator dimensions: 10 cm (height) x 10 cm (width) x 10 cm (length).
2. The elevator must be able to lift up 50 gm.
3. The elevator must not carry more than 4 items at any time.
4. The elevator’s acceleration and de-acceleration must not be sudden.
5. The elevator must be able to lift people up to the 3rd floor (30 cm).
6. The goes into idle mode (deactivates) 30 (+/- 5) seconds after the last user leaves the elevator.
7. The elevator in idle mode has all its lights turned off to safe energy.
8. The elevator in idle mode can be called from any floor (elevator call keys at each floor).
9. When the elevator is in idle mode, then called from any floor, it will activate and go to the calling floor.
10. When the elevator is active, it turns on its lights to illuminate the elevator from the inside for the users.
11. When the elevator reaches the desired floor, it automatically opens its door after 1 (+/- 0.5) second.

**Elevator’s Access Control Requirements:**

1. Elevator requires a password of 4 digits to accept user requests.
2. The elevator has a 3x3 Keypad to enter the password.
3. The elevator has a 16x2 LCD to interface with the user.
4. When the user enters the wrong password, he must be indicated that the password is incorrect through the LCD and is prompted for another try.
5. When the user enters the right password, he must be indicated that he entered the correct password through the LCD.
6. Only when the password is correct, the elevator will accept requests from the user to go to the desired floor. Otherwise, it will ignore user requests.

**Elevator Algorithm Requirements:**

1. Follows “first order first served” rule. Meaning that if someone ordered the elevator first he should be served first
2. Follows “whenever someone orders and his destination is in elevator route he should be served if and only if there are less than 4 persons in the elevator”
3. Users should be able to assign their destinations when they ride and elevator should save these request and serve them in order of its route, if there are 2 different routes up and down, elevator chooses the shortest route.
4. If it happens and the elevator was ordered by more than one in the same moment, then elevator must choose the total shortest route of them all (this can happen by knowing and calculating each possible route can be and choose the shortest)
5. Elevator should be always aware of how many people it has at the moment which will affect its decision of postponing an active request from an outside
6. person or deciding to stop for this request.

**Door Lock Contact:**

1. The door lock contact detects whether the elevator’s door is properly locked or not. When the door is locked, it sends a signal to the controller indicating that the door is properly locked.
2. If the door isn’t properly locked, the elevator won’t service its call or request i.e. it won’t move up or down till the door is closed and the controller receives the door lock signal.
3. The made requests are queued and will be serviced as soon as the controller receives a signal from the door lock sensor.

# 3.3 Interface Requirements

**Floor keypad:**

1. The floor keypad is inside the elevator and it has 5 buttons. Three buttons for the 1st, 2nd, and the 3rd floor and a button to close the elevator door, and a button to open the elevator door.

**Elevator LCD:**

1. A 16 x 2 LCD display that interfaces with the user.
2. It indicates the user if the elevator is ready to move or not (requests are queued, number of users is 4 or less and door is locked).
3. It indicates the user after entering the password if it’s correct or incorrect.
4. It displays to the user the elevator’s current floor.
5. If any of the conditions of the elevator is not satisfied, the LCD should display an appropriate warning to the user (excessive load when more than 4 users are in the elevator, the door is not locked or if there are no requests)

**Elevator call keypad:**

1. A 2 x 1 keypad that calls the elevator, at each floor.
2. One key will indicate that the user is calling the elevator to go up and the other key for going down.

**Elevator current floor:**

1. A 2 x 7 segment display that displays the current floor of the elevator, and its direction if it’s moving upwards or downward.