Computer Aided Design

Design Session 1

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0 Group Members

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1 CS Department Elevator Analysis

Note: All answers are based on memory, and might not be exact.

As we remember, each elevator tended to continue in it's current direction and would change it's direction or go to standby mode at the last floor, if there are no more destinations in the direction.

There were two side-by-side elevators. When both active, when a button (upward or downward) was pressed on a floor, the elevator which was in the requested direction would process the job. If both elevators in the same direction, then the nearest elevator reaching the floor would accept the job.

2 Elevator Modeling

2.1 General flow

At each moment, the elevator keeps track of currently pressed buttons (both on inside and outside), the current floor number and current moving direction.

At button-press time, the highest and lowest floor numbers are determined and saved.

All buttons (inside the elevator and outside) are treated the same as requesting buttons but each with a direction attribute.

When moving in a direction (upward or downward), the elevator keeps moving in current direction until it reaches the most top requested (when moving upwards) or most bottom requested (when moving downwards) floors. When reaching these key floors, now the elevator decides whether to go up and down, or to halt moving and go to standby (OFF) mode and stay in the current floor; It is worth mentioning that this decision is made upon the number of keys pressed (inside and outside) and distance of requesting floors to current floor (overall state of the system).

2.2 States of the machine

- **OFF:** Standby
- **Active:** Moving upwards, Moving downwards

2.3 Actions of the machines

- **Up:** Move to upper floor
- **Down:** Move to lower floor
- **Stop:**
    1. Stop at current floor
    2. Open the doors
    3. Wait for a constant amount of time (e.g. 30 seconds)
    4. Check for door sensors (obstacle detection)
    5. Close the doors

- Note: Please find ASM on the next page. (Fig. 1)

2.4 Algorithmic State Machine (ASM) of the system:

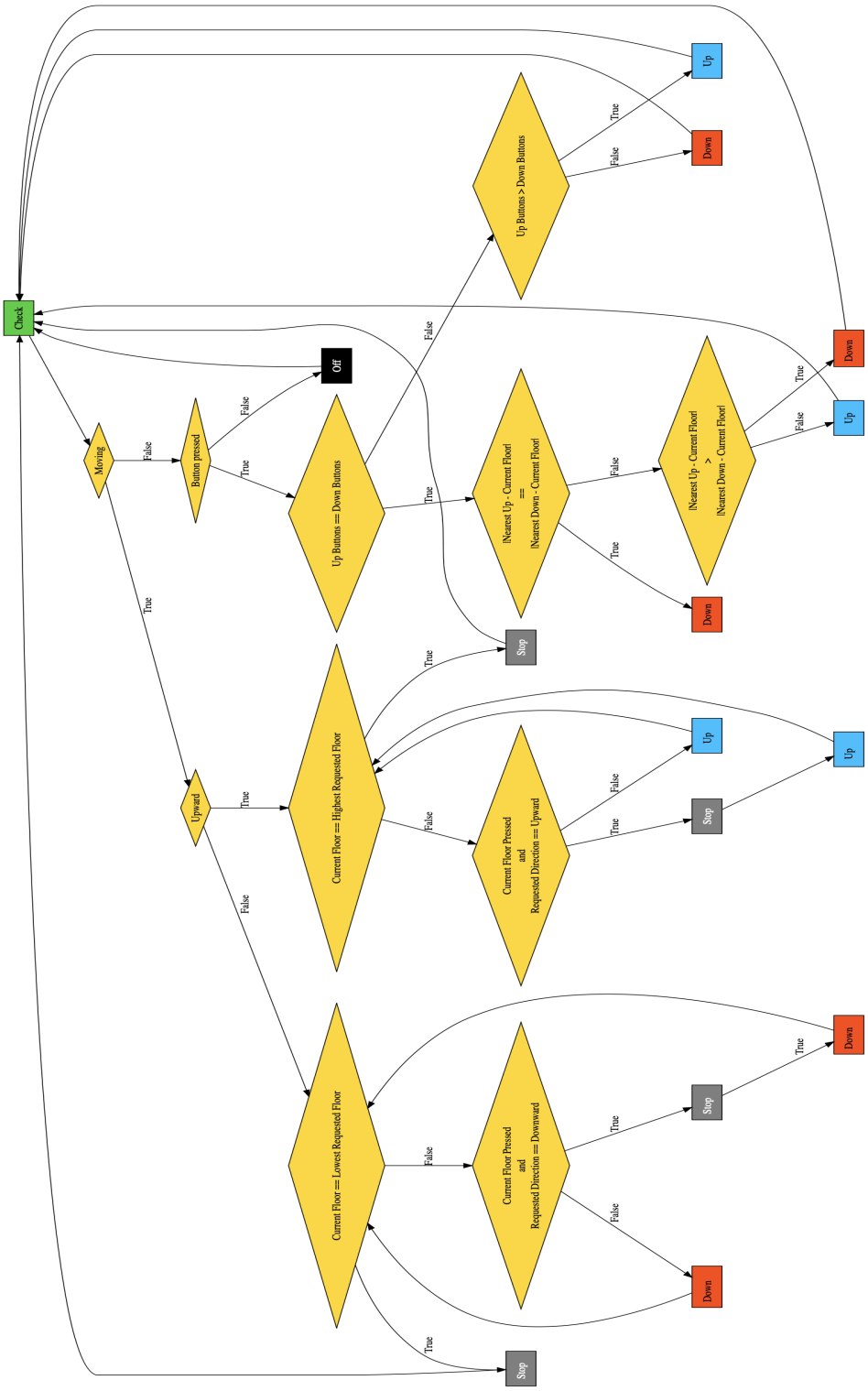

Figure 1: Algorithmic State Machine