Oregon TECH

Computer Systems Engineering Technology
CST 347 – Real-Time Operating Systems

Term Project
Winter 2018
Instructor: Troy Scevers
Possible Points: **40**

Name_____
Due Date: Friday of Dead Week

Instructions

As a team you will build a simulated elevator control system. There will be several deliverables through the rest of the term. The first will be a set of task layouts from each team member (due on Friday, February 23rd by midnight). Once you each turn in your task layouts, you must as a team decide which layout or combination of layouts to use, submit this along with work assignments (who is responsible for what part of the system, what technology you are going to use IE Google Hangout for meetings, GITHUB, etc.) by the following Friday (March 2nd). You will also need to send a weekly status report every Friday till the end of the term for your team. Final checkoff of integrated system will be due by Friday of dead weak. There will also be a team evaluation to complete.

Functional Description

You are to write a multi-tasked system that will simulate an elevator. The structure is assumed to have 52 floors; three stop floors at Ground floor (GD) [0 feet], and two penthouse floors P1 [500 feet] and P2 [510 feet]. A passenger is able to call the elevator from the outside on one of the three stop floors. Once inside, the passenger selects one of three floors to ride to. To be clear, this elevator does not stop on floors 2 – 50.

From GD, the car should accelerate to a maximum speed, maintain maximum speed, decelerate to stop at either P1 or P2. The process should be reversed if the direction is down from floors P1 or P2. If traveling between P1 and P2, the car should accelerate for half the floor distance and decelerate to stop for the second half of the distance.

Default Acceleration: 2 ft/s^2

Maximum Speed: 20 ft/s

Operation

The outside call button will call the elevator to the appropriate floor. The UART Inputs specify the call button possibilities. The travel rules are as follows:

Location of car:

Car will remain on last serviced floor with door closed.

Possible Locations:

GD Floor Door Closed

GD Floor Door Open

P1 Floor Door Closed

P1 Floor Door Open

P2 Floor Door Closed

P2 Floor Door Open

Emergency Stop

Return car to the ground floor, open door and wait for Emergency Clear button press. If the car is traveling up, the car should decelerate to a stop, then travel back down to the GD floor, open door and wait for Emergency Clear button press.

Discrete Inputs and Outputs

UART RX

Keyboard "z" – GD Floor Call outside car

Keyboard "x" – P1Call DN outside car

Keyboard "c" – P1Call UP outside car

Keyboard "v" – P2Call outside car

Keyboard "b" – Emergency Stop inside car

Keyboard "n" – Emergency Clear inside car

Keyboard "m" – Door Interference

Starter Kit Buttons

SW1 – P2 button inside car

SW2 – P1 button inside car

SW3 – GD button inside car

Eflight Board Buttons

RC1 – Open Door inside car

RC2 – Close Door inside car

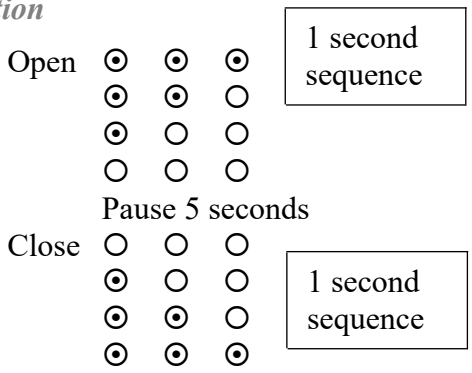
Starter Kit LEDs

LED1 – Door Simulator

LED2 – Door Simulator

LED3 – Door Simulator

Operation



Eflight Board LEDs

D7 (RB9) – UP indicator

D6 (RB8) – DN indicator

UART TX

Floor indicator reached Status: “Floor [GD/P1/P2]” “[Stopped/Moving]”

Distance from ground level and Current Speed Status: “n Feet:: m ft/s” every 500 ms

Simulated Frequency Motor Control

Toggle RDn at 1Hz for every 10 ft/sec of travel speed.

Commands (via) CLI

[S n] Change Maximum Speed in ft/s

[AP n] Change Acceleration in ft/s^2

[SF 1/2/3] Send to floor

[ES] Emergency Stop (identical to Emergency Stop Button)

[ER] Emergency Clear (identical to Emergency Clear Button)

[TS] Task-states

[RTS] Run-time-stats