

Software Requirement Analysis for Elevator System

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1 Introduction

1.1 Purpose

엘리베이터 시스템을 소프트웨어로 만들기 위한 가상의 시스템을 구상하는 문서이다.

1.2 Scope

Elevator는 사용자가 현재 있는 층에서 원하는 층으로 사람을 이동시킨다.

모든 시스템은 SW만으로 구현한다

1.3 Definition, acronyms, and abbreviations

HW – Hardware

SW – Software

EL - Elevator

1.4 Reference

1.5 Overview

2 Overall Description

2.1 Product Perspective

SW로 개발하는 가상의 Elevator 시스템

2.2 Product functions

엘리베이터는 사람이 선택한 층까지 올라가거나 내려갈 수 있다.

엘리베이터는 사람이 요청한 층에 자동으로 응답할 수 있다.

엘리베이터는 사람을 태우기 위하여 문을 열고 닫을 수 있다.

엘리베이터의 문 닫힘은 상황에 따라 불가능할 수 있다.

엘리베이터의 운행은 상황에 따라 불가능할 수 있다.

2.3 User characteristics

2.4 Constraints

모든 명령 및 입력은 command line의 입력으로 대체된다.

모든 출력은 경보음과 화면 출력으로 대체된다.

파일을 통하여 관리해야 할 정보들은, 시스템의 루트 디렉토리에 파일을 만들어서 관리한다.

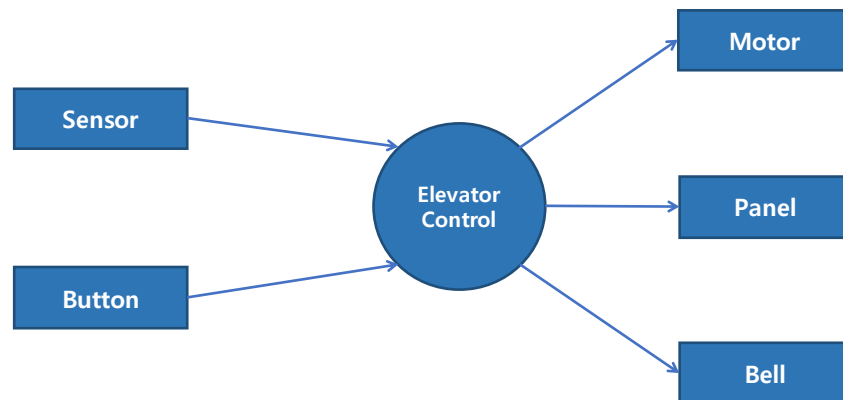
2.5 Assumptions and dependencies

엘리베이터는 최고층과 최저층 내에서만 운행한다

3 Structured Analysis

3.1 System Context Diagram

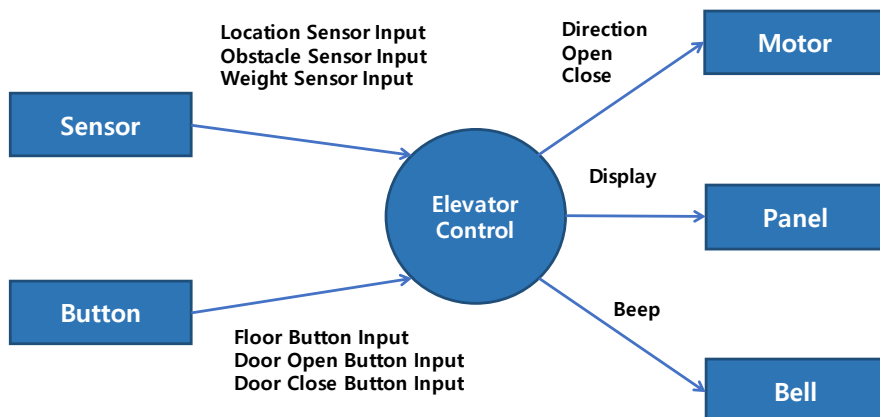
3.1.1 Basic System Context Diagram



3.1.2 Event List

Input/Output Event	Description
Floor Button Input	Detects the floor number of pressed button
Door Open Button Input	Detects whether door open button is pressed
Door Close Button Input	Detects whether door close button is pressed
Obstacle Sensor Input	Detects obstacles between door
Weight Sensor Input	Detects total weight of elevator
Location Sensor Input	Detects which floor the elevator is on
Open	Opens the door
Close	Closes the door
Direction	Direction commands to motor(go up/go down)
Display	Displays current info(floor, up/down)
Beep	Rings warning bell

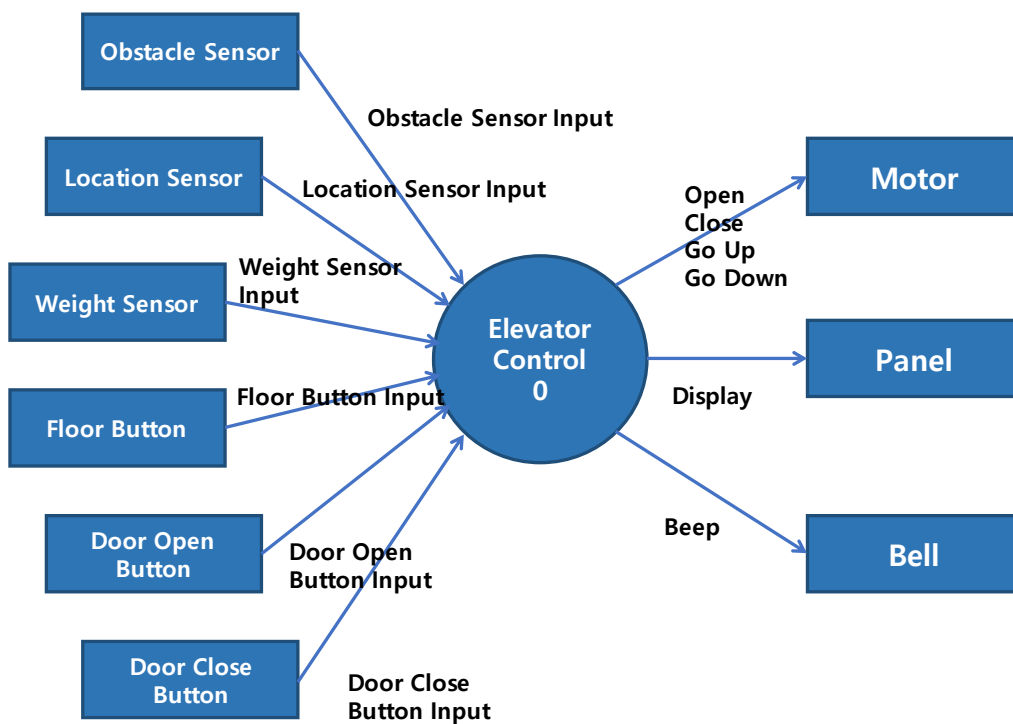
3.1.3 The System Context Diagram



3.2 Data Flow Diagram

3.2.1 DFD level 0

3.2.1.1 DFD



3.2.1.2 Process Specification

3.2.1.2.1 Process 0

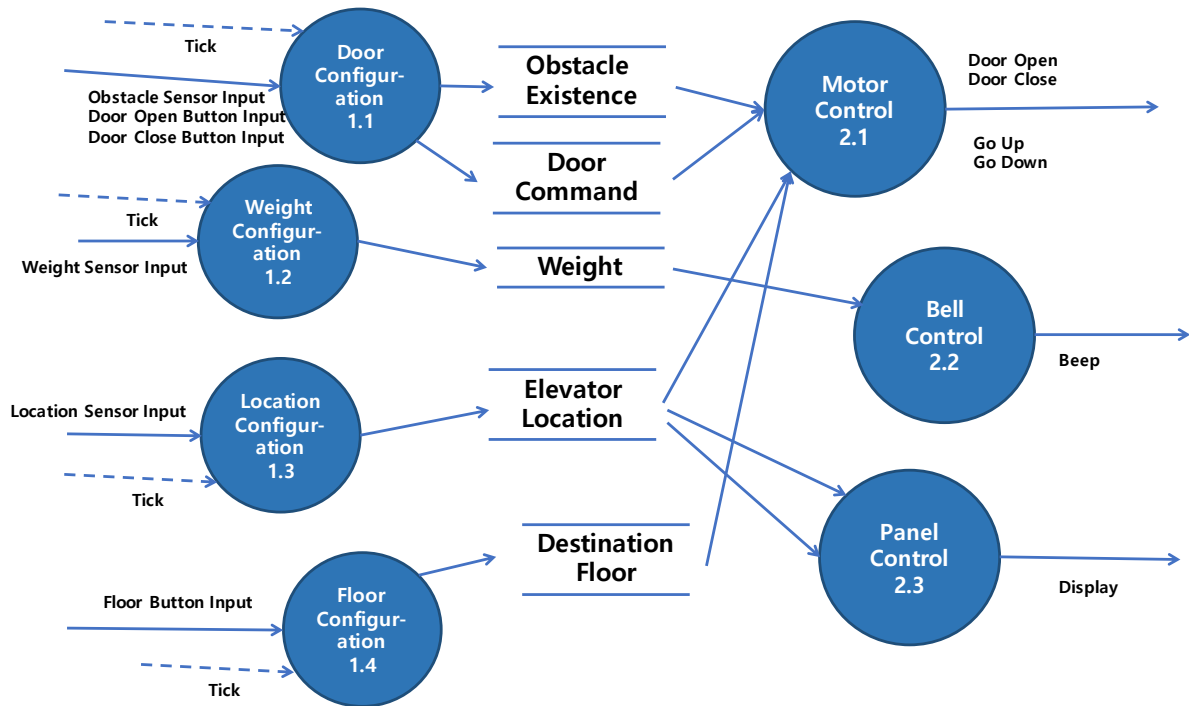
Reference no.	0
Name	Elevator Control
Input	Obstacle Sensor Input, Location Sensor Input, Weight Sensor Input, Floor Button Input, Door Open Button Input, Door Close Button Input
Output	Door Open, Door Close, Go Up, Go Down, Display, Beep
Description	Receives obstacle existence from obstacle sensor, and determines whether to keep door open. Determines elevator's current location with input from location sensor. Determines elevator has reached its weight limit with input from weight sensor. Determines the destination of elevator with input from floor button.

3.2.1.3 Data Dictionary

Input/Output Event	Description	Format/Type
Obstacle Sensor Input	Determines whether obstacle is located between elevator door	Boolean
Location Sensor Input	Finds current floor of the elevator	Integer
Weight Sensor Input	Calculates the weight of the elevator, and determines whether the elevator is overweighed.	Floating Point, Boolean
Floor Button Input	Finds Floor number of the button	Integer
Door open/close Button Input	Finds whether door open/closed button is pressed	Boolean
Direction	Direction of elevator	Up/Down
Door	Next status of door	Open/Close
Display	Display current info	Display
Beep	Rings Warning Bell	Beep

3.2.2 DFD Level 1

3.2.2.1 DFD



3.2.2.2 Process Specification

3.2.2.2.1 Process 1.1

Reference no.	1.1
Name	Door Configuration
Input	Obstacle Sensor Input, Open Button Input, Door Close Button Input, Tick
Output	Obstacle Existence, Door Command
Description	When ticks, determines whether door to be open or closed with input from obstacle sensor and button inputs. Door command and obstacle existence are stored as data.

3.2.2.2.2 Process 1.2

Reference no.	1.2
Name	Weight Configuration
Input	Weight Sensor input, Tick
Output	Weight
Description	When ticks, determines whether the elevator is over-weighed by receiving input from weight

sensor. Weight of the elevator is stored as data
--

3.2.2.2.3 Process 1.3

Reference no.	1.3
Name	Location Configuration
Input	Location Sensor input, Tick
Output	Elevator Location
Description	When ticks, determines the current floor of the elevator by receiving input from location sensor. The result is stored as data

3.2.2.2.4 Process 1.4

Reference no.	1.4
Name	Floor Configuration
Input	Floor Button input, Tick
Output	Destination Floor
Description	When ticks, determines the destination of elevator by receiving input from floor button. The result is stored as data.

3.2.2.2.5 Process 2.1

Reference no.	2.1
Name	Motor Control
Input	Obstacle Existence, Door Command, Elevator Location, Destination floor
Output	Door Open, Door Close, Go Up, Go Down
Description	Receives information from configurations, and moves the elevator.

3.2.2.2.6 Process 2.2

Reference no.	2.2
Name	Bell Control

Input	Weight
Output	Beep
Description	Receives weight data, and beeps warning bell when overweighed

3.2.2.2.7 Process 2.3

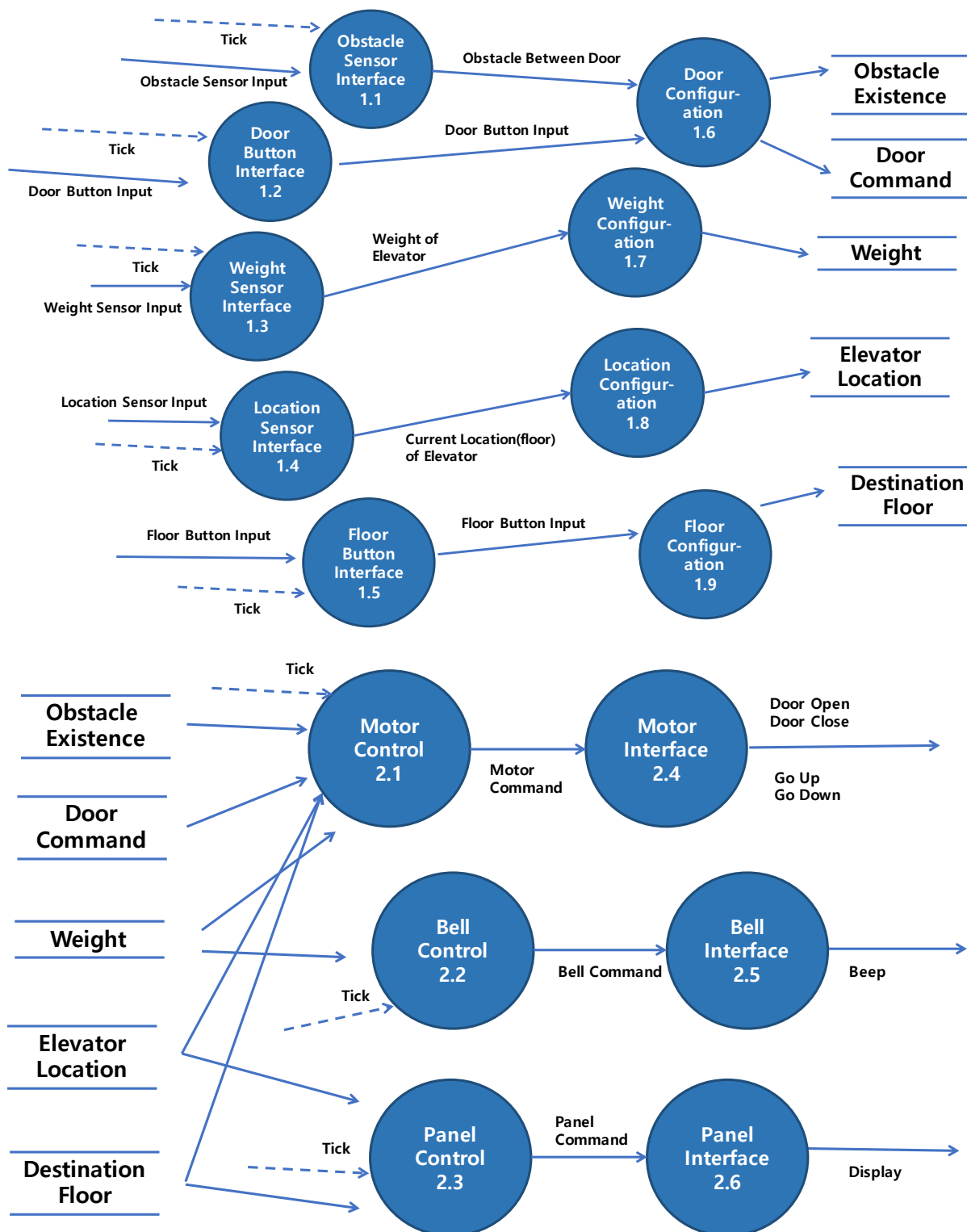
Reference no.	2.3
Name	Panel Control
Input	Obstacle Existence, Door Command, Elevator Location, Destination floor
Output	Door Open, Door Close, Go Up, Go Down
Description	Receives information from configurations, and moves the elevator.

3.2.2.3 Data Dictionary

Input/Output Event	Description	Format/Type
Weight	the weight of the elevator whether the elevator is overweighed.	Floating Point, Boolean
Direction	Direction of elevator	Up/Down
Door	Next status of door	Open/Close
Display	Display current info	Display
Beep	Rings Warning Bell	Beep
Obstacle Existence	Whether obstacle exists	Boolean
Elevator Location	Finds current floor of the elevator	Integer
Destination Floor	Destination of elevator	Integer
Tick		Boolean

3.2.3 DFD Level 2

3.2.3.1 DFD



3.2.3.2 Process Specification

3.2.3.2.1 Process 1.1

Reference no.	1.1
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Name	Obstacle Sensor Interface
Input	Obstacle Sensor Input, Tick
Output	Obstacle existence between door
Description	When ticks, senses obstacle between door, and sends its existence to door configuration

3.2.3.2.2 Process 1.2

Reference no.	1.2
Name	Door Button Interface
Input	Door Button Input, Tick
Output	Door Button Input
Description	When ticks, senses the input of door button, and sends to door configuration

3.2.3.2.3 Process 1.3

Reference no.	1.3
Name	Weight Sensor Interface
Input	Weight Sensor Input, Tick
Output	Weight of Elevator
Description	When ticks, measures the weight of elevator, and sends it to weight configuration.

3.2.3.2.4 Process 1.4

Reference no.	1.4
Name	Location Sensor Interface
Input	Location Sensor Input, Tick
Output	Current Floor of Elevator
Description	When ticks, finds current location(floor) of elevator and sends it to location configuration

3.2.3.2.5 Process 1.5

Reference no.	1.5
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Name	Floor Button Interface
Input	Floor Button Input, Tick
Output	Floor Button Input
Description	When ticks, finds the destination of elevator and sends it to floor configuration

3.2.3.2.6 Process 1.6

Reference no.	1.6
Name	Door Configuration
Input	Obstacle between door, Door Button Input
Output	Obstacle Existence, Door Command
Description	Determines whether door to be open or closed with input from obstacle sensor and button inputs. Door command and obstacle existence are stored as data.

3.2.3.2.7 Process 1.7

Reference no.	1.7
Name	Weight Configuration
Input	Weight of elevator
Output	Weight
Description	Determines whether the elevator is overweighed by receiving input from weight sensor. Weight of the elevator is stored as data

3.2.3.2.8 Process 1.8

Reference no.	1.3
Name	Location Configuration
Input	Current Location(floor) of elevator
Output	Elevator Location
Description	Determines the current floor of the elevator by receiving input from location sensor. The result is stored as data

3.2.3.2.9 Process 1.9

Reference no.	1.4
Name	Floor Configuration
Input	Floor Button input, Tick
Output	Destination Floor
Description	When ticks, determines the destination of elevator by receiving input from floor button. The result is stored as data.

3.2.3.2.10 Process 2.1

Reference no.	2.1
Name	Motor Control
Input	Obstacle Existence, Door Command, Elevator Location, Destination floor
Output	Door Open, Door Close, Go Up, Go Down
Description	Receives information from configurations, and moves the elevator.

3.2.3.2.11 Process 2.2

Reference no.	2.2
Name	Bell Control
Input	Weight
Output	Beep
Description	Receives weight data, and beeps warning bell when overweighed

3.2.3.2.12 Process 2.3

Reference no.	2.3
Name	Panel Control
Input	Obstacle Existence, Door Command, Elevator Location, Destination floor
Output	Door Open, Door Close, Go Up, Go Down
Description	Receives information from configurations, and

moves the elevator.

3.2.3.2.13 Process 2.4

Reference no.	2.4
Name	Motor Interface
Input	Motor Command
Output	Go Up, Go Down, Door Open, Door Close
Description	Receives motor command and moves the elevator, and opens/closes the door when needed.

3.2.3.2.14 Process 2.5

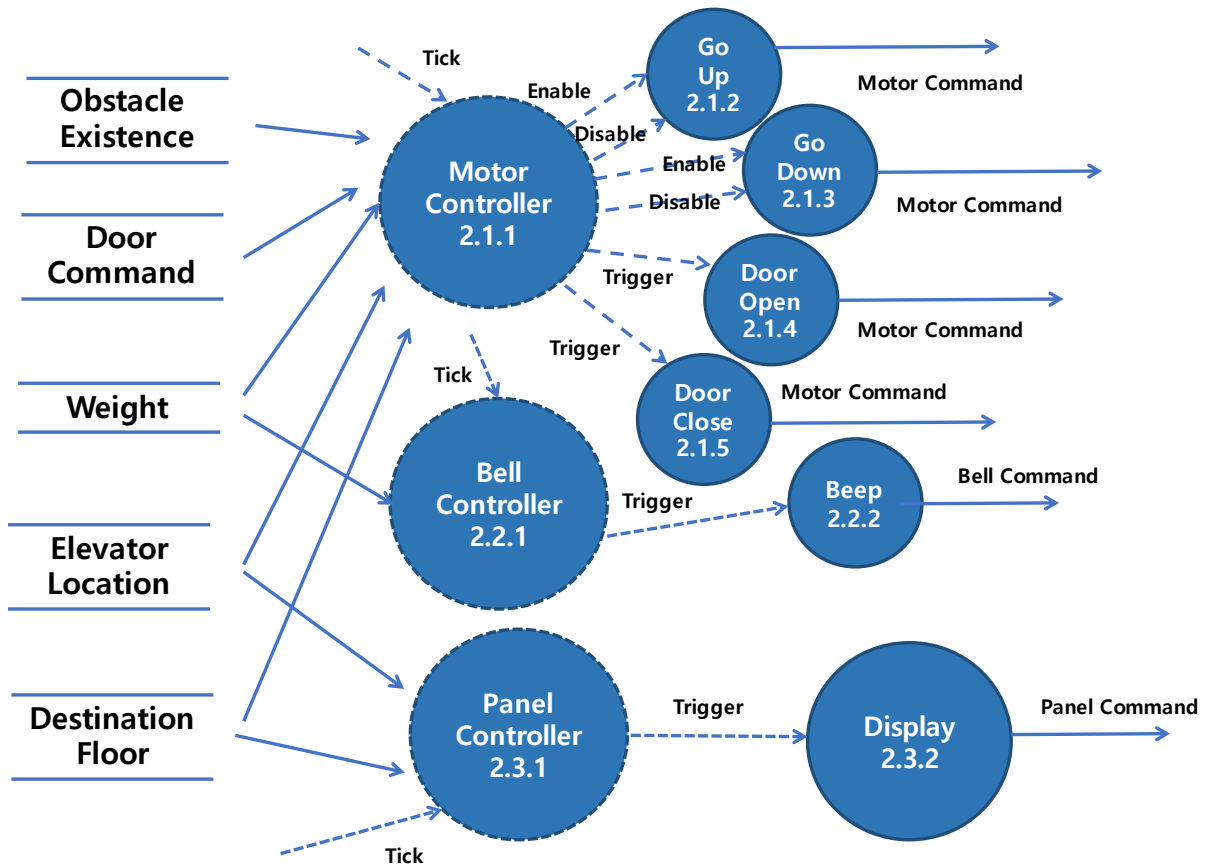
Reference no.	2.5
Name	Bell Interface
Input	Bell Command
Output	Beep
Description	Receives bell command and beeps when needed.

3.2.3.2.15 Process 2.6

Reference no.	2.6
Name	Panel Interface
Input	Panel Command
Output	Display
Description	Receives panel command and displays current elevator information.

3.2.4 DFD Level 3

3.2.4.1 DFD



3.2.4.2 Process Specifications

3.2.4.2.1 Process 2.1.1

Reference no.	2.1.1
Name	Motor Controller
Input	Obstacle Existence, Door Command, Weight, Elevator Location, Destination Floor
Output	Enable/Disable of commands
Description	When ticks, receives stored data and enables/disables necessary commands

3.2.4.2.2 Process 2.1.2

Reference no.	2.1.2
Name	Go Up
Input	Enable/Disable
Output	Motor Command
Description	When enabled, moves elevator up. When

disabled, stops elevator

3.2.4.2.3 Process 2.1.3

Reference no.	2.1.3
Name	Go Down
Input	Enable/Disable
Output	Motor Command
Description	When enabled, moves elevator down. When disabled, stops elevator

3.2.4.2.4 Process 2.1.4

Reference no.	2.1.4
Name	Door Open
Input	Trigger
Output	Motor Command
Description	When triggered, opens elevator door.

3.2.4.2.5 Process 2.1.5

Reference no.	2.1.4
Name	Door Open
Input	Trigger
Output	Motor Command
Description	When triggered, closes elevator door.

3.2.4.2.6 Process 2.2.1

Reference no.	2.2.1
Name	Bell Controller
Input	Weight
Output	Trigger
Description	Receives weight of elevator, and triggers beep when overweightd

3.2.4.2.7 Process 2.2.2

Reference no.	2.2.2
Name	Beep
Input	Trigger
Output	Bell Command
Description	When triggered, beeps warning bell.

3.2.4.2.8 Process 2.3.1

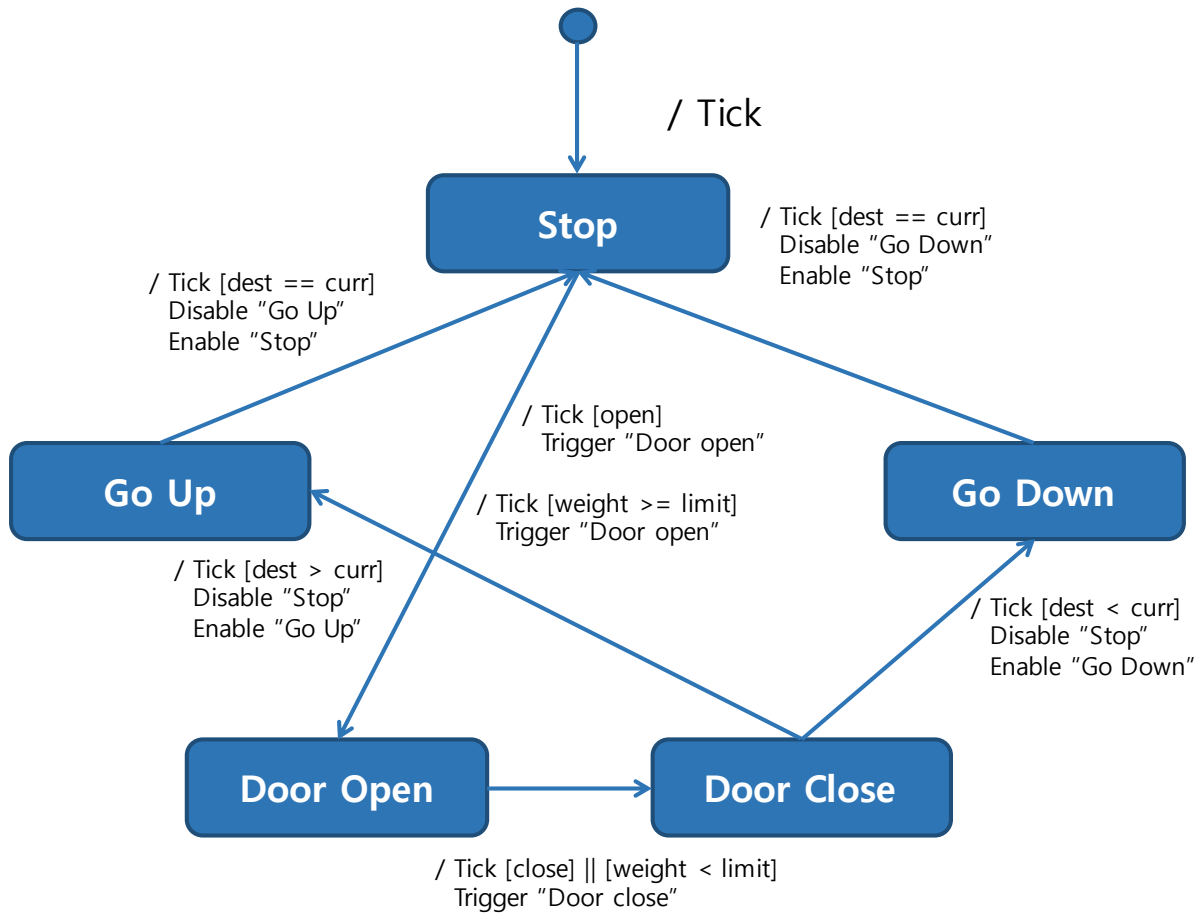
Reference no.	2.3.1
Name	Panel Controller
Input	Elevator Location, Destination Floor
Output	Trigger
Description	Receives elevator location(current floor) and destination floor, and triggers display when they are renewed.

3.2.4.2.9 Process 2.3.2

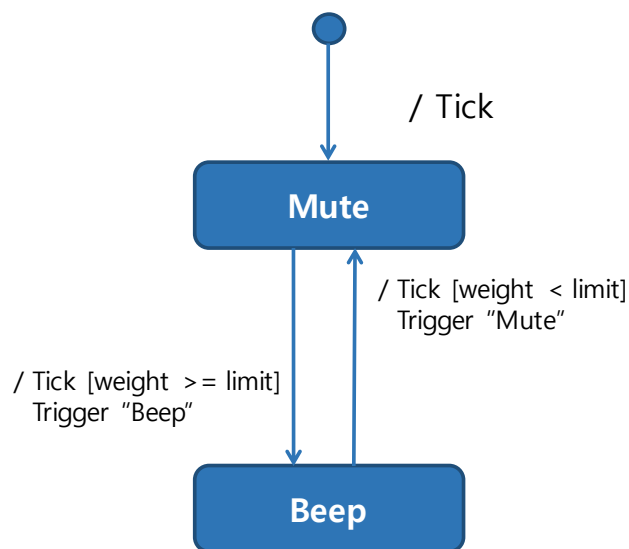
Reference no.	2.3.2
Name	Display
Input	Trigger
Output	Panel Command
Description	When triggered, updates displayed information.

3.2.5 DFD Level 4

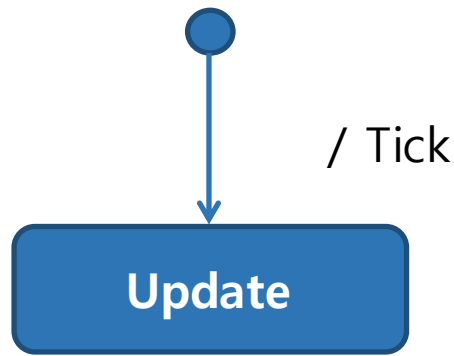
3.2.5.1 State Transition Diagram for Motor Controller



3.2.5.2 State Transition Diagram for Bell Controller



3.2.5.3 State Transition Diagram for Panel Controller



3.2.5.4 Data Dictionary

3.2.6 Overall DFD

