2011-2 <소프트웨어공학개론> Team Project #1.

Robot Vacuum Cleaner SASD

Class A - T1
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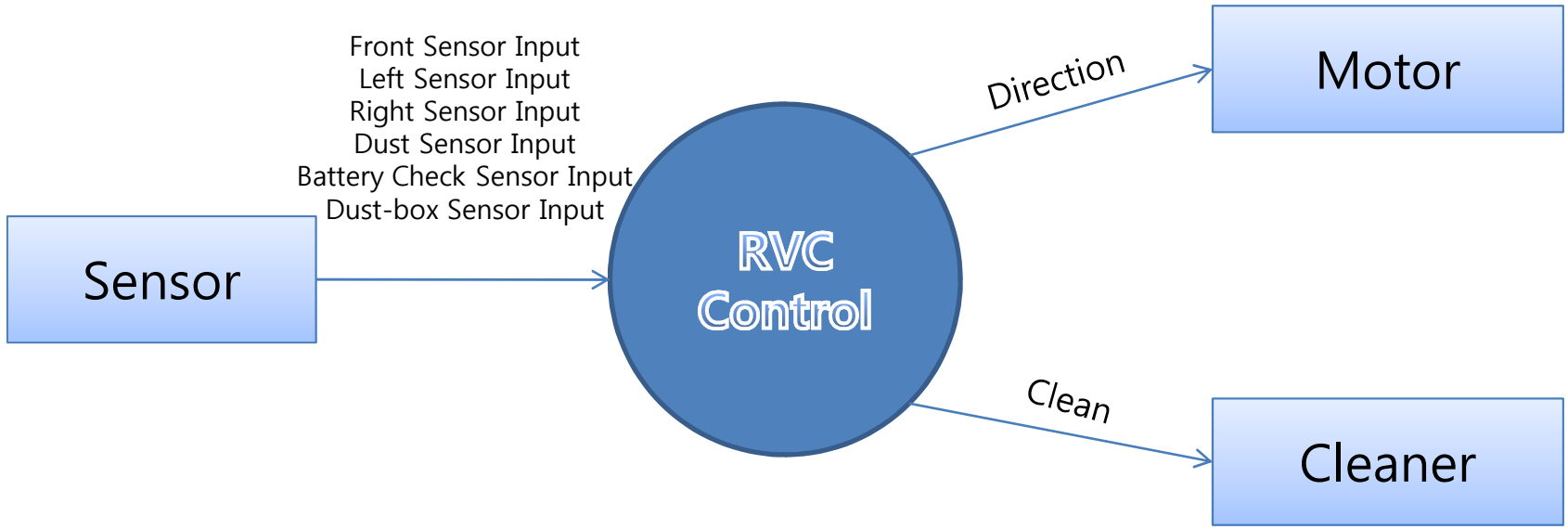
Structured Analysis

- **Statement of Purpose**
- **System Context Diagram**
  - Event List
- **Data Flow Diagram**
  - Data Dictionary
  - Process Specification

Statement of Purpose

- 바닥을 자동적으로 청소한다.
- 청소 중엔 앞으로 곧장 움직인다.
- 장애물을 감지하면, 청소를 멈추고, 방향을 전환하여 다시 앞으로 곧장 움직인다.
- 먼지를 감지하면, 잠시 동안 power up상태에서 먼지를 빨아들인다.
- HW control만 고려하고 자세한 디자인은 생략한다.
- 먼지박스 상태를 체크하여 진행여부를 결정한다.
- 자동적인 cleaning function에 초점

System Context Diagram



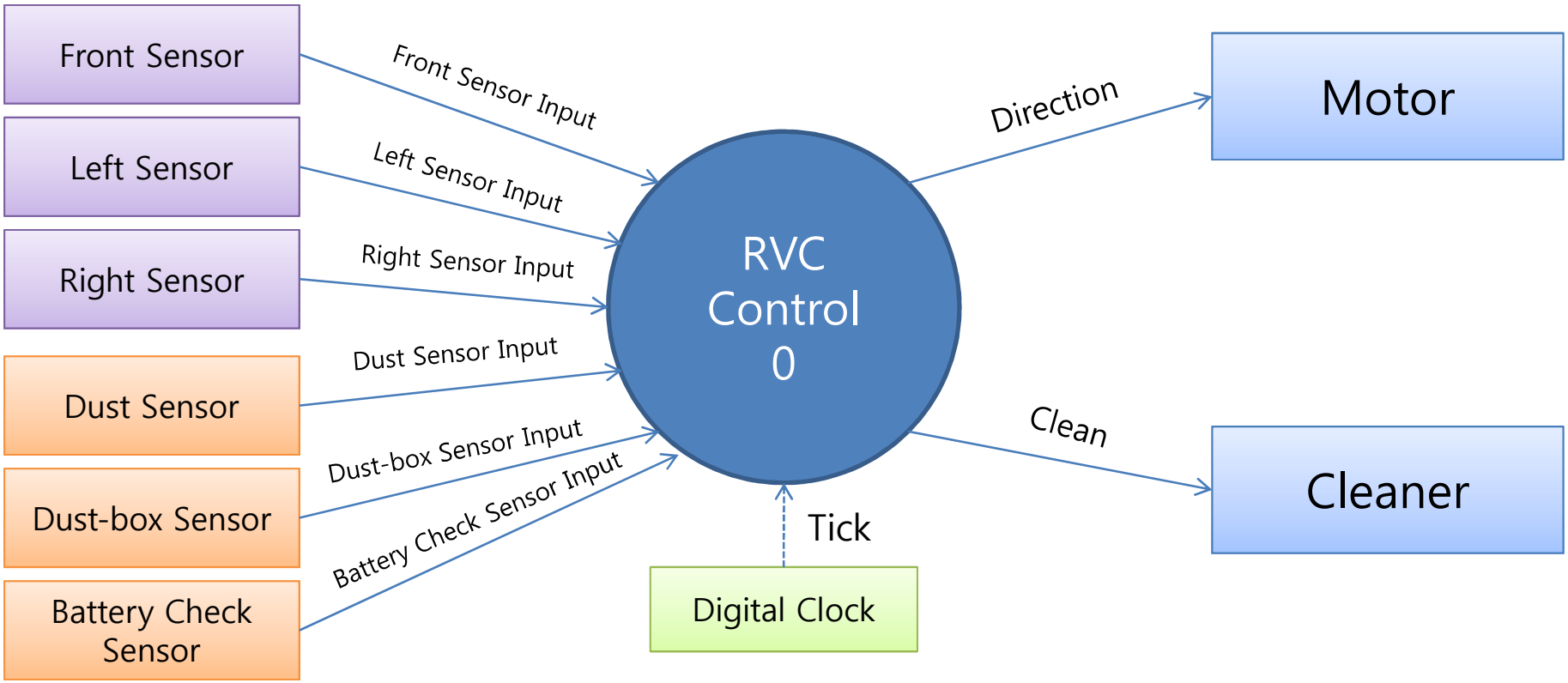
Event List

Input Event	Description
Front Sensor Input	Detect obstacles in front of the RVC
Left Sensor Input	Detect obstacles in the left side of the RVC periodically
Right Sensor Input	Detect obstacles in the right side of the RVC periodically
Dust Sensor Input	Detect dust on the floor periodically
Battery Check Sensor Input	Check battery gauge of the RVC periodically
Dust-box Sensor Input	Check dust-box capacity of the RVC periodically

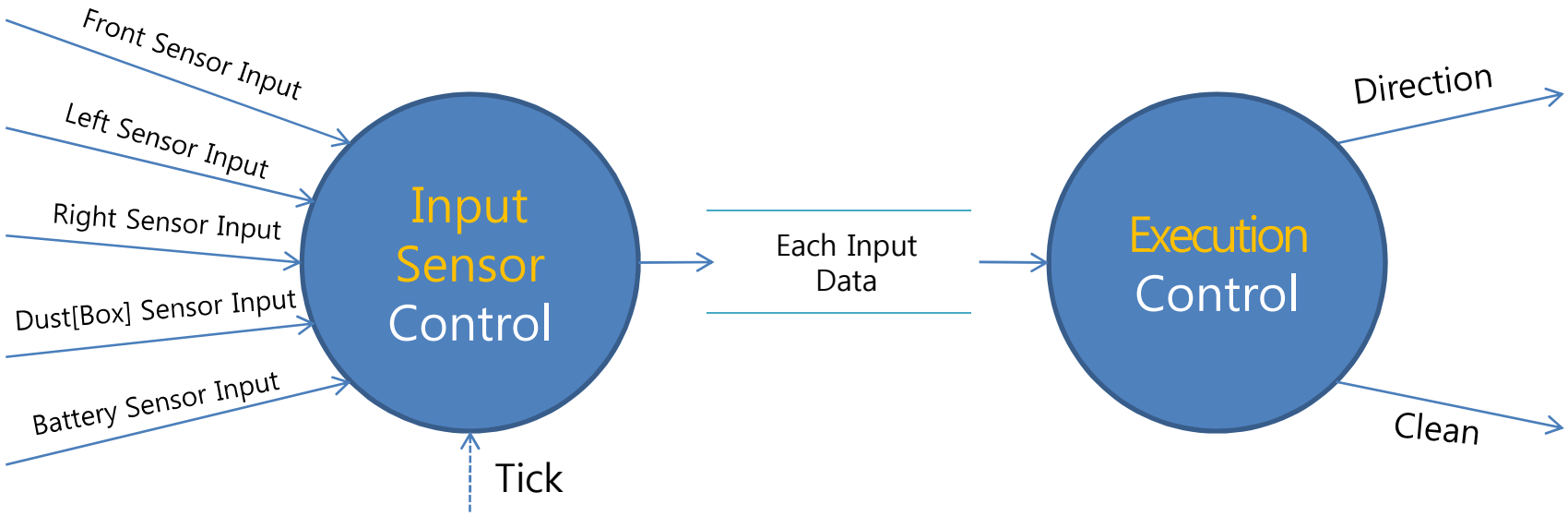
Event List (cont.)

Output Event	Description
Direction	Direction commands to the motor (go forward / turn left with an angle / turn right with an angle / back / stop)
Clean	Turn off / Turn on / Power up

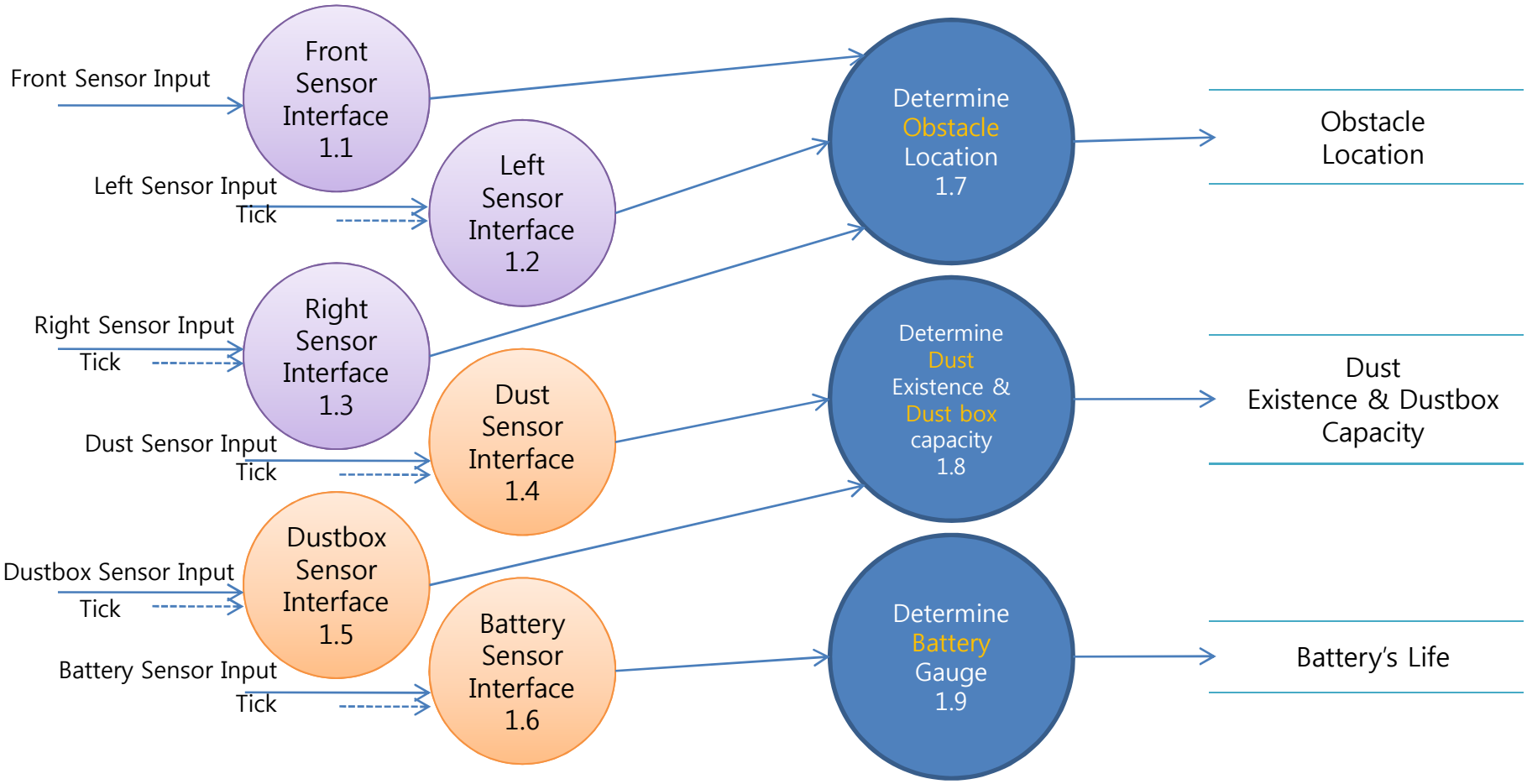
Data Flow Diagram – Level 0.



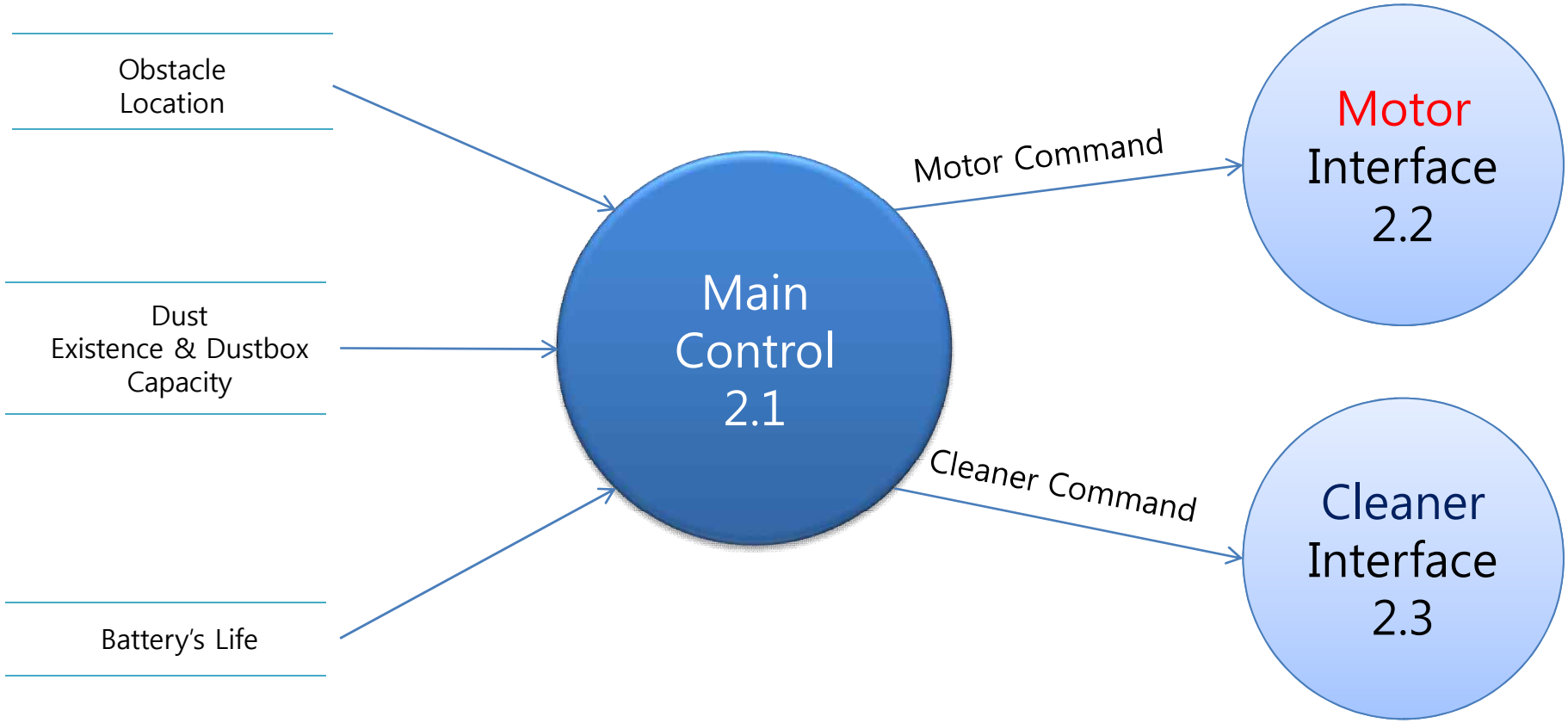
Data Flow Diagram – Level 1.



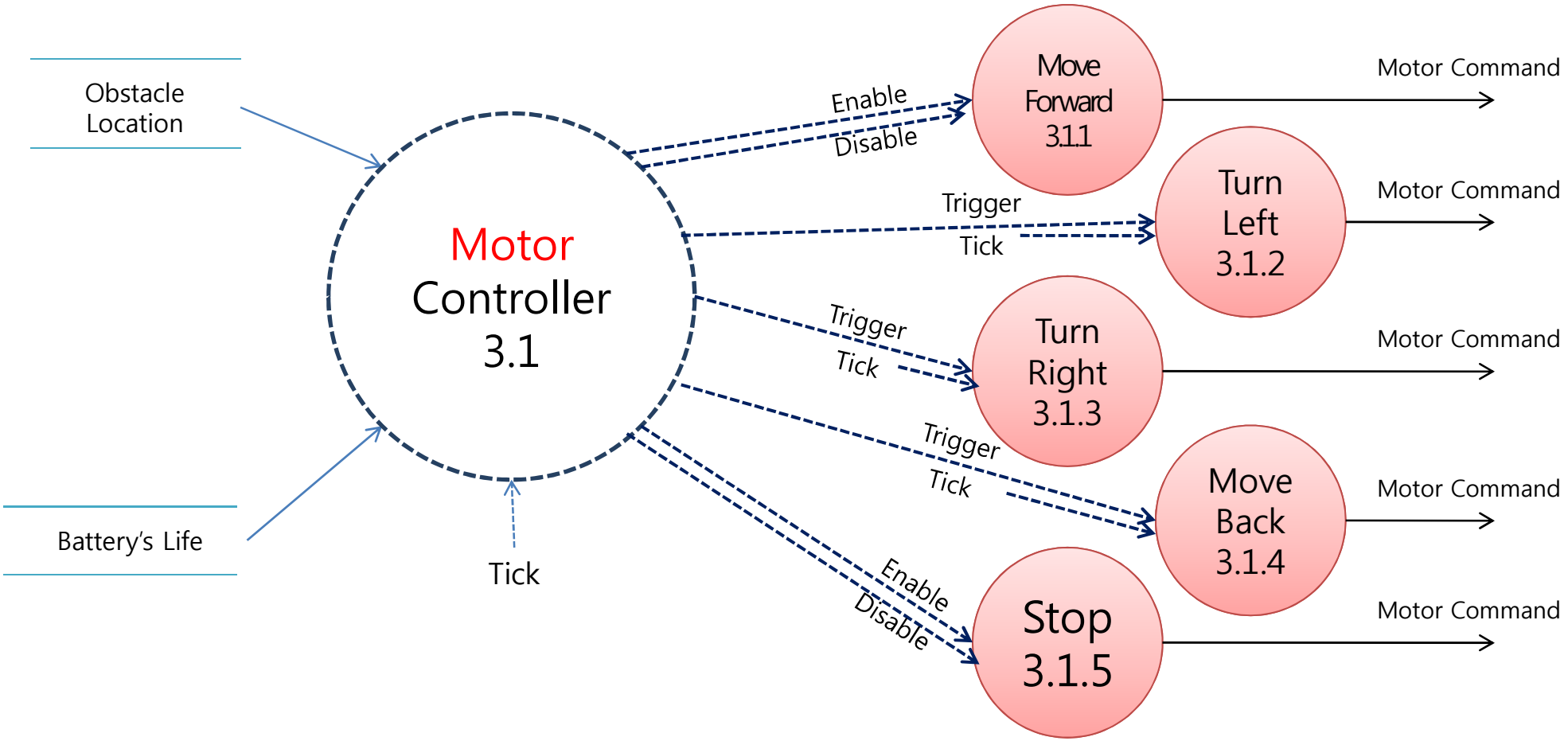
Data Flow Diagram – Level 2.



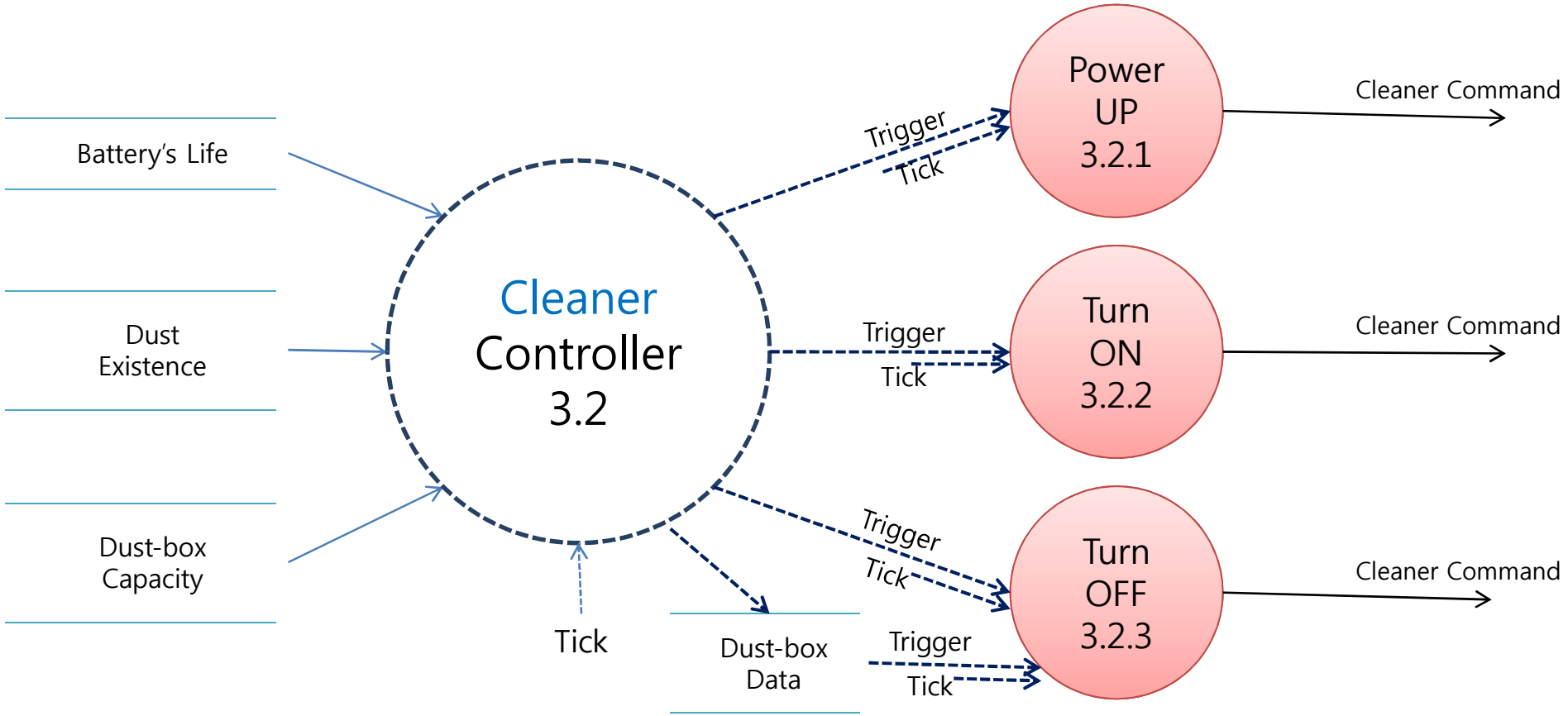
Data Flow Diagram – Level 2.



Data Flow Diagram – Level 3.

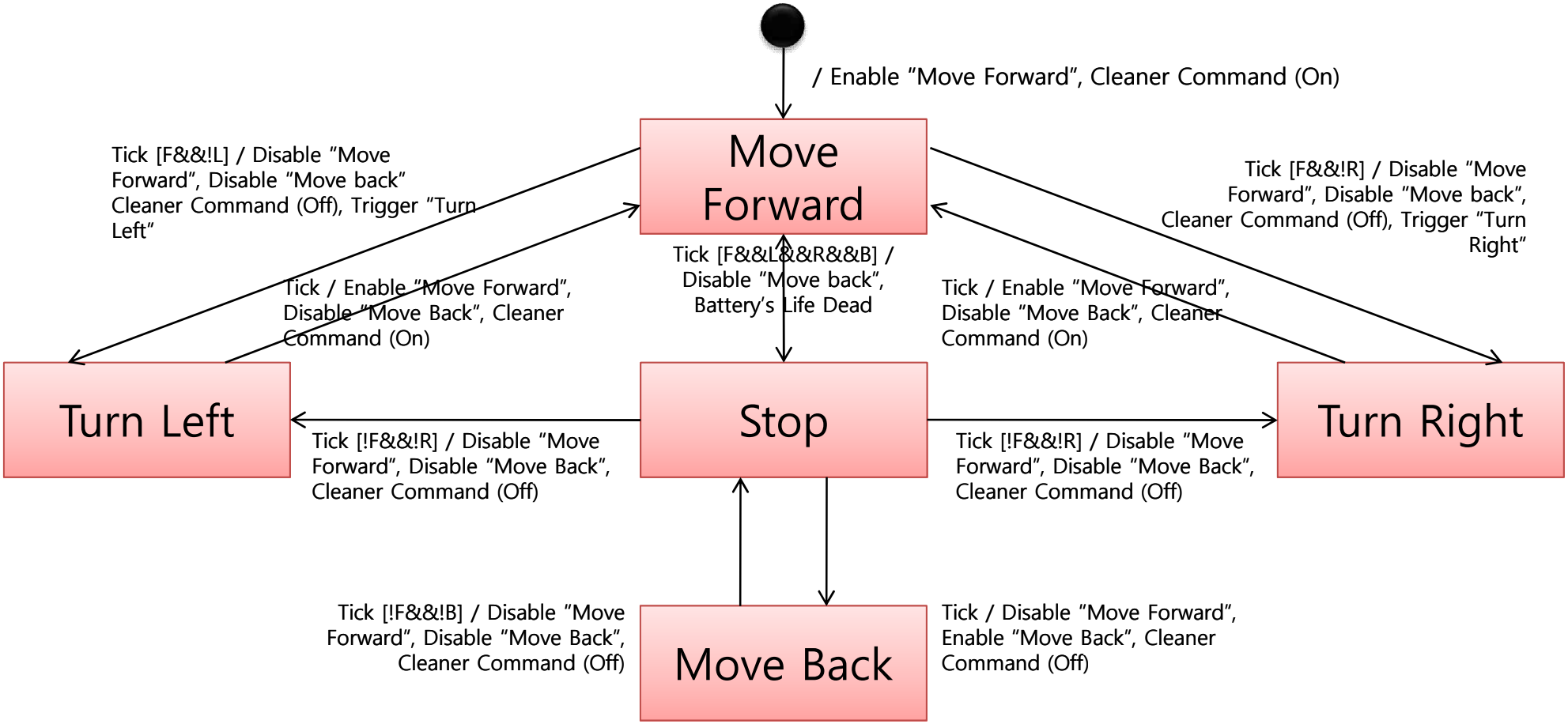


Data Flow Diagram – Level 3.



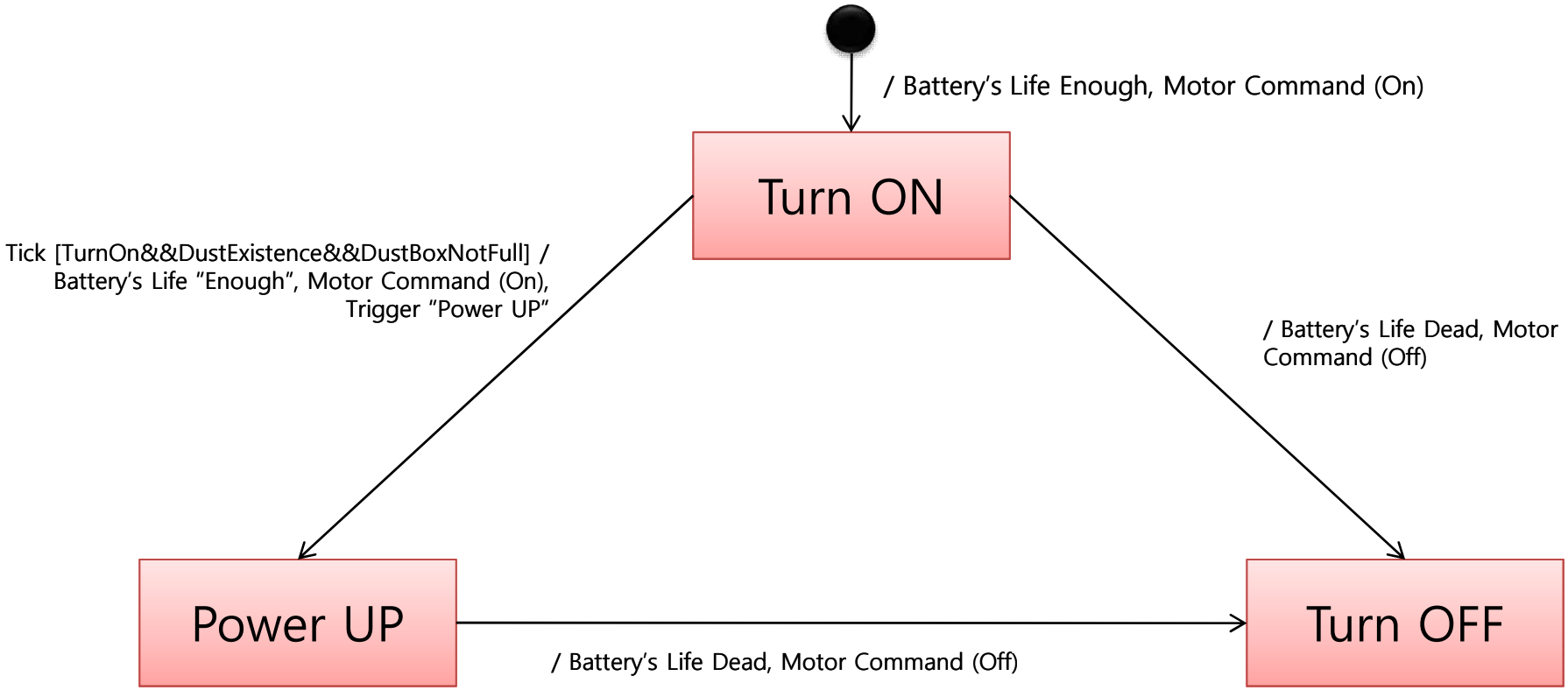
Data Flow Diagram – Level 4.

(1) State Transition Diagram for Controller3.1

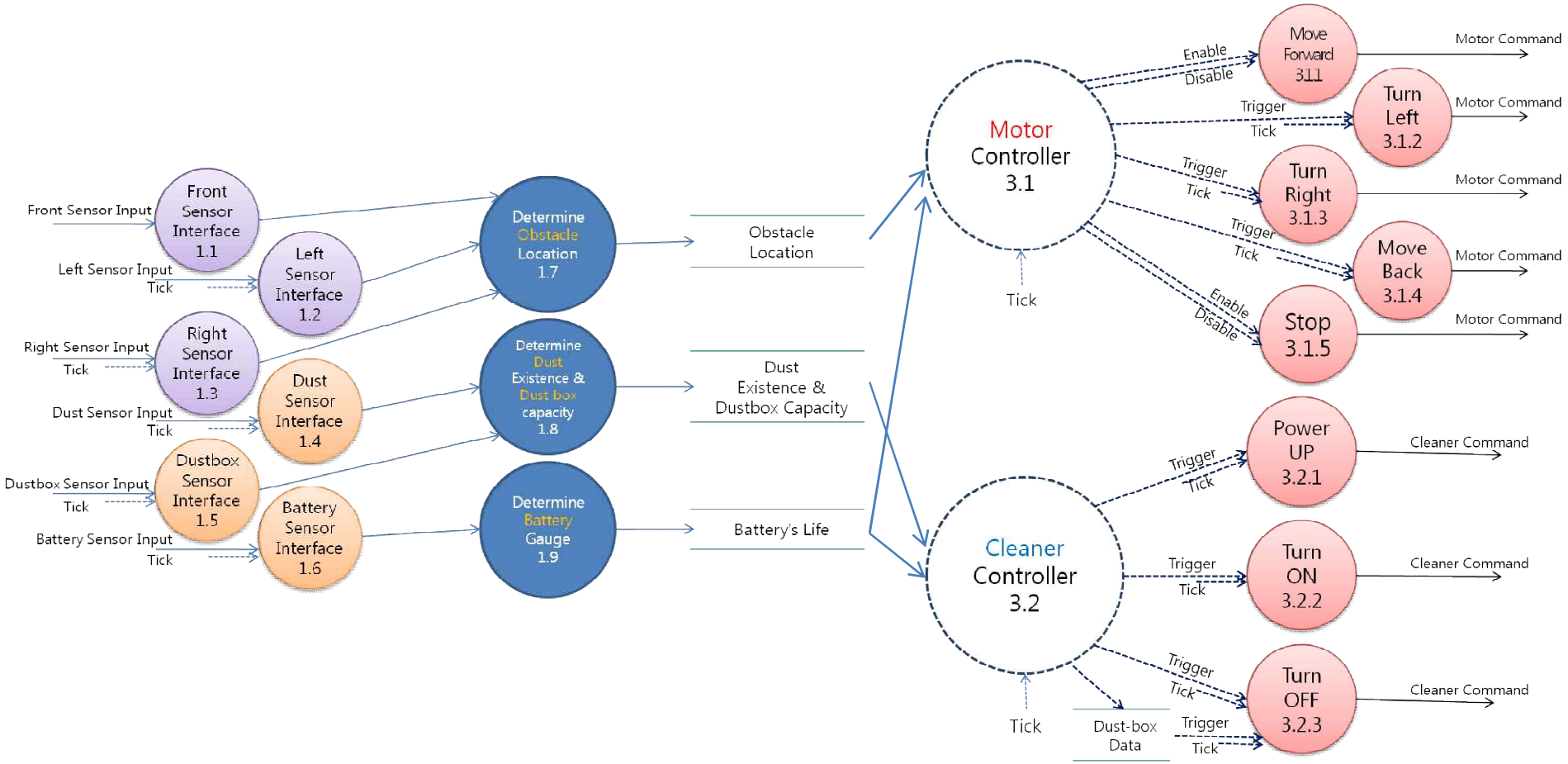


Data Flow Diagram – Level 4.

(2) State Transition Diagram for Controller3.2



Total DFD


Front Sensor Input
Front Sensor Interface 1.1
Left Sensor Input
Tick
Left Sensor Interface 1.2
Right Sensor Input
Tick
Right Sensor Interface 1.3
Dust Sensor Input
Tick
Dust Sensor Interface 1.4
Dustbox Sensor Input
Tick
Dustbox Sensor Interface 1.5
Battery Sensor Input
Tick
Battery Sensor Interface 1.6
Determine Obstacle Location 1.7
Determine Dust Existence & Dust box capacity 1.8
Determine Battery Gauge 1.9
Obstacle Location
Dust Existence & Dustbox Capacity
Battery's Life
Motor Controller 3.1
Tick
Enable
Disable
Move Forward 3.1.1
Motor Command
Trigger
Tick
Turn Left 3.1.2
Motor Command
Trigger
Tick
Turn Right 3.1.3
Motor Command
Trigger
Tick
Move Back 3.1.4
Motor Command
Enable
Disable
Stop 3.1.5
Motor Command
Cleaner Controller 3.2
Tick
Dust-box Data
Trigger
Tick
Power UP 3.2.1
Cleaner Command
Trigger
Tick
Turn ON 3.2.2
Cleaner Command
Trigger
Tick
Turn OFF 3.2.3
Cleaner Command
Trigger
Tick

Data Dictionary

Data 명	설 명
Obstacle Location	Front, Left, Right Sensor 들을 통해 입력 받은 값을 저장
Battery's Life	Battery Check Sensor를 통해 입력 받은 값을 Battery Gauge로 저장
Dust Existence	Dust Sensor를 통해 입력 받은 값을 먼지의 존재 여부로 판단하여 저장
Dust Box Capacity	Dust Box Sensor를 통해 입력 받는 값을 통해 dust box안에 있는 먼지의 양을 판단하여 저장
Motor Controller	Obstacle Location과 Battery's Life Data를 입력 받아 각각의 모터에 data 값을 전달
Cleaner Controller	Battery's Life와 Dust Existence와 Dust Box Capacity Data를 입력 받아서 Cleaner에 data 값을 전달

Process Specification

Name	1.1 Front Sensor Interface
Input	Front Sensor Input(+Data Structure if possible)
Output	Front Obstacle (+Data structure)
Process Description	"Front Sensor Input" process reads an analog value of the sensor, converts it into a digital value such as True/False, and assigns it into output variable "Front Obstacle".

Name	1.2 Left Sensor Interface
Input	Left Sensor Input(+Data Structure if possible), Tick
Output	Left Obstacle (+Data structure)
Process Description	"Left Sensor Input" process reads an analog value of the sensor periodically, converts it into a digital value such as True/False, and assigns it into output variable "Left Obstacle".

Process Specification (cont.)

Name	1.3 Right Sensor Interface
Input	Right Sensor Input(+Data Structure if possible), Tick
Output	Right Obstacle (+Data structure)
Process Description	"Right Sensor Input" process reads an analog value of the sensor perio dically, converts it into a digital value such as True/False, and assigns it into output variable "Right Obstacle".

Name	1.4 Dust Sensor Interface
Input	Dust Sensor Input(+Data Structure if possible), Tick
Output	Dust Existence (+Data structure)
Process Description	"Dust Sensor Input" process reads an analog value of the sensor perio dically, converts it into a digital value such as True/False, and assigns it into output variable "Dust Existence".

Process Specification (cont.)

Name	1.5 Dust Box Sensor Interface
Input	Dust Box Sensor Input, Tick
Output	Dust Box Capacity.
Process Description	"Dust Box Sensor Interface" process reads an analog values of dust box's capacity periodically, converts it into a digital value, and assigns it into output variable dust box capacity.

Name	1.6 Battery Check Sensor Interface
Input	Battery Check Sensor Input
Output	Battery Gauge
Process Description	"Battery Check Sensor Interface" process reads an analog value of the sensor periodically, converts it into a digital value such as True(Non Empty)/False(Empty), and assigns it into output variable "Battery Guage".

Process Specification (cont.)

Name	1.7 Determine Obstacle Location
Input	Front Obstacle, Left Obstacle, Right Obstacle
Output	Obstacle Location
Process Description	"Determine Obstacle Location'" process reads an analog value of the obstacles, converts them into a digital value and then assigns them into output variable "Obstacle Location".

Name	1.8 Determine Dust Existence
Input	Dust Existence
Output	Dust Existence
Process Description	"Determine Dust Existence'" process reads an analog value of the existence of the dust, converts it into a digital value and then assigns it into output variable "Dust Existence".

Process Specification (cont.)

Name	1.9 Determine Battery Gauge
Input	Battery Gauge
Output	Battery's Life
Process Description	"Determine Battery's Life" process reads an analog value of the battery Gauge, convert it into a digital value and the assigns it into output var iable "Battery Dies"

Name	3.1 Motor Controller
Input	Obstacle Location, Battery's Life, Tick
Output	Motor Command which controls moving forward or back, turning to le ft or right and stop.
Process Description	"Motor Controller" process reads an analog values of obstacle location and the life of the battery, then makes a command to move forward o r back, turn left or right. And also when battery dies make the RVC to stop.

Process Specification (cont.)

Name	3.2 Cleaner Controller
Input	Dust Existence, Battery's Life, Dust Box Capacity, Tick
Output	Cleaner Command which controls the RVC to be turned off or on and making it to power up. And Dust Box Data.
Process Description	"Cleaner Controller" process reads an analog values of dust existence, the life of the battery and dust box capacity, then makes a cleaner co mmand to turn off or on, and makes RVC to power up.

The End

감사합니다!