

Team Practice #1 (RVC SA)

T9

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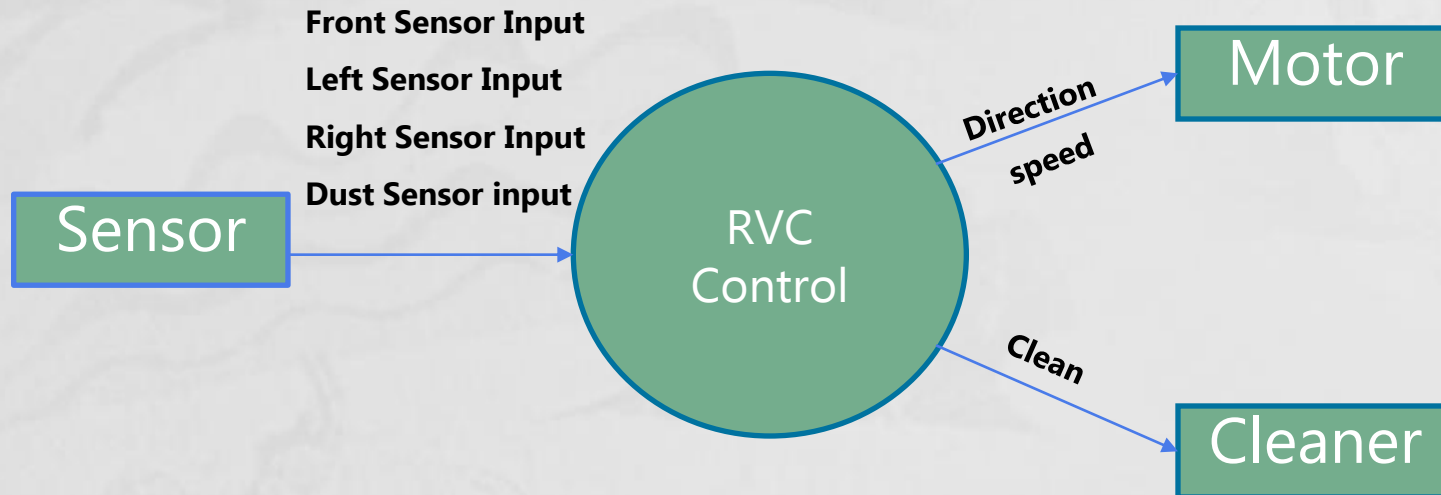
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Statement of Purpose

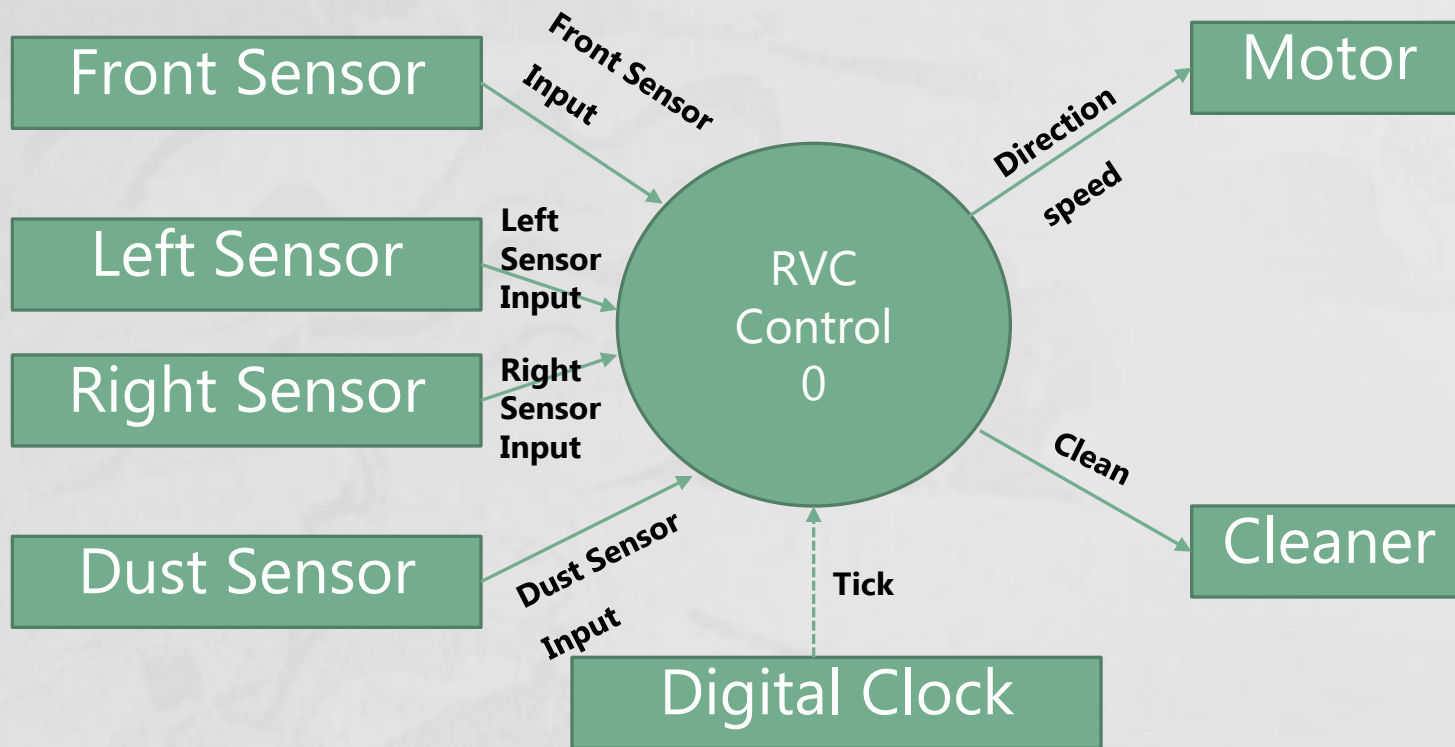
Robot Vacuum Cleaner (RVC)

- An RVC automatically cleans and mops household surface.
- It goes straight forward while cleaning.
- If its sensors found an obstacle, it stops cleaning, turns aside, and goes forward with cleaning.
- If it detects dust, power up the cleaning for a while.
- We do not consider the detail design and implementation on HW controls.
- We only focus on the automatic cleaning function.

System Context Diagram



DFD Level 0



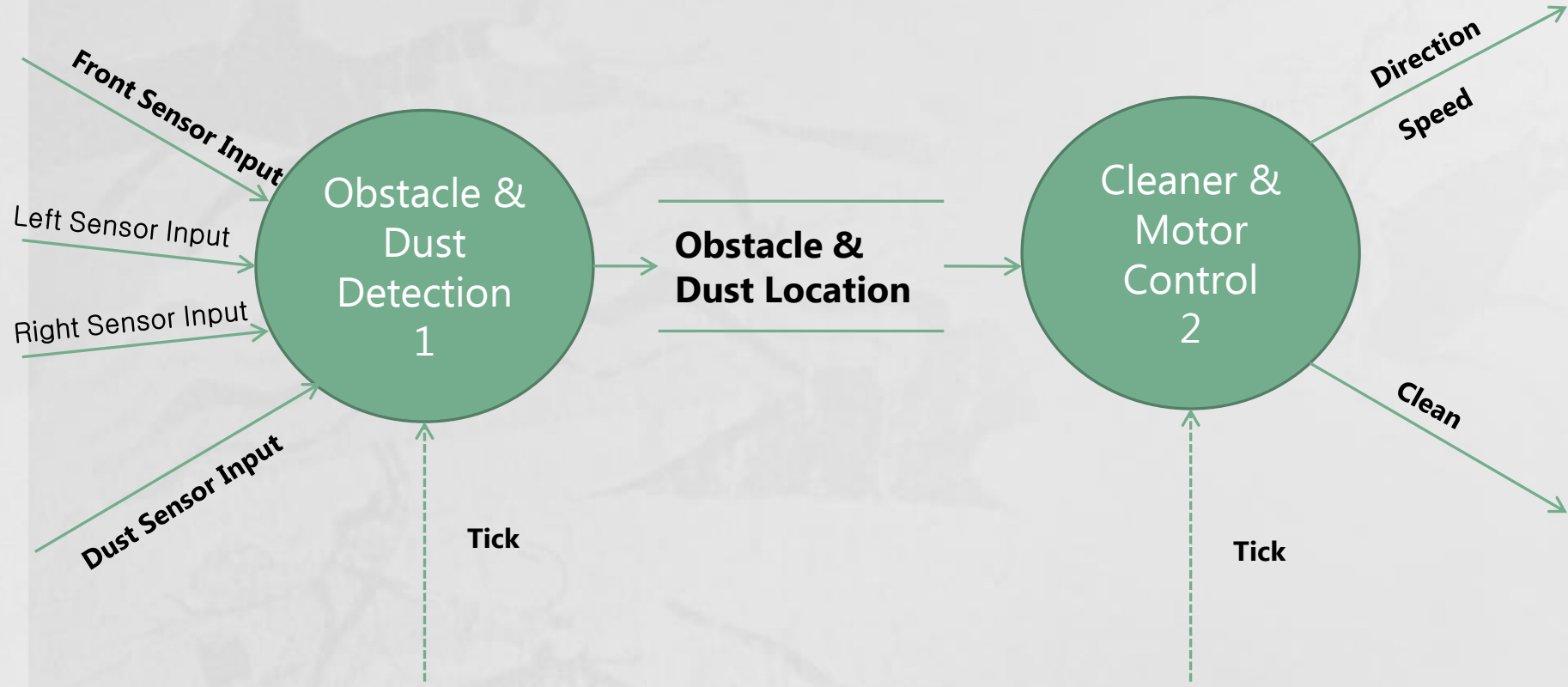
DFD Level 0-Data Dictionary

Input / Output Event	Description	Format / Type
Front Sensor Input	Detects obstacles in front of the RVC	True / False , Interrupt
Left Sensor Input	Detects obstacles in left side of the RVC periodically	True / False , Periodic
Right Sensor Input	Detects obstacles in right side of the RVC periodically	True / False , Periodic
Dust Sensor Input	Detects dust on the floor periodically	True / False , Periodic
Direction	Direction Commands to the motor (go forward / turn left with an angle / turn right with an angle)	Forward / Stop / Left / Right
Speed	Speed up / Speed down	Up / Down , dust
Clean	Turn off / Turn on / Power-Up / Power-Down	On / Off / Up / Down

DFD Level 0 – Process Specification

Reference No.	0
Name	RVC Control
Input	Front Sensor Input, Right Sensor Input, Left Sensor Input, Dust Sensor Input, Tick
Output	Direction, Speed, Clean
Process Description	각 Sensor(Front/Right/Left/Dust)로 부터 Input 값을 받아 Motor와 Cleaner로 Output한다.

DFD Level 1



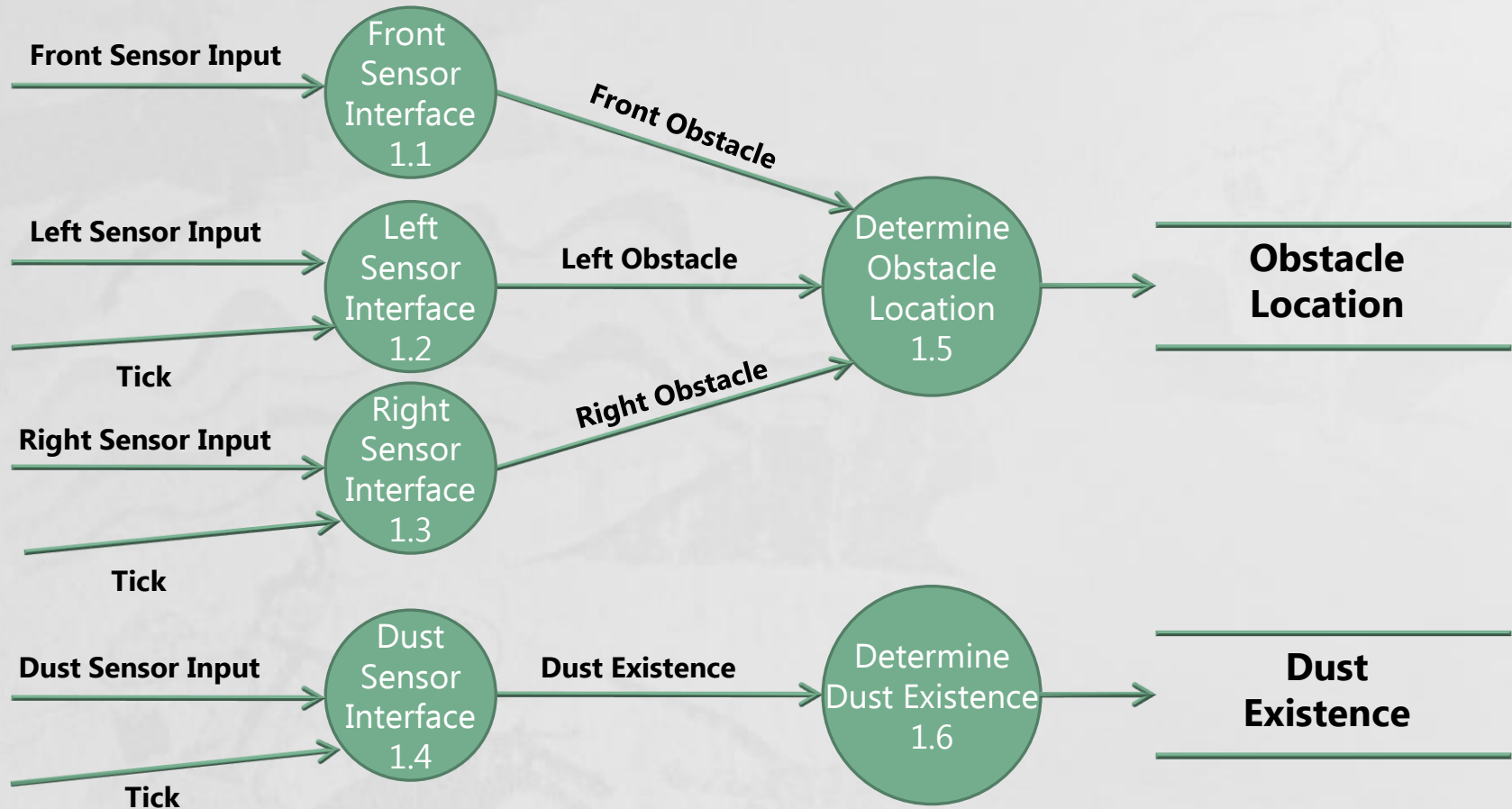
DFD Level1-Process Specification

Reference No.	1
Name	Obstacle & Dust Detection
Input	Front Sensor Input, Right Sensor Input, Left Sensor Input, Dust Sensor Input, Tick
Output	Obstacle & Dust Location
Process Description	각 Sensor(Front/Right/Left/Dust)로부터 input 값을 받아 Obstacle & Dust Location 데이터 영역의 저장한다.

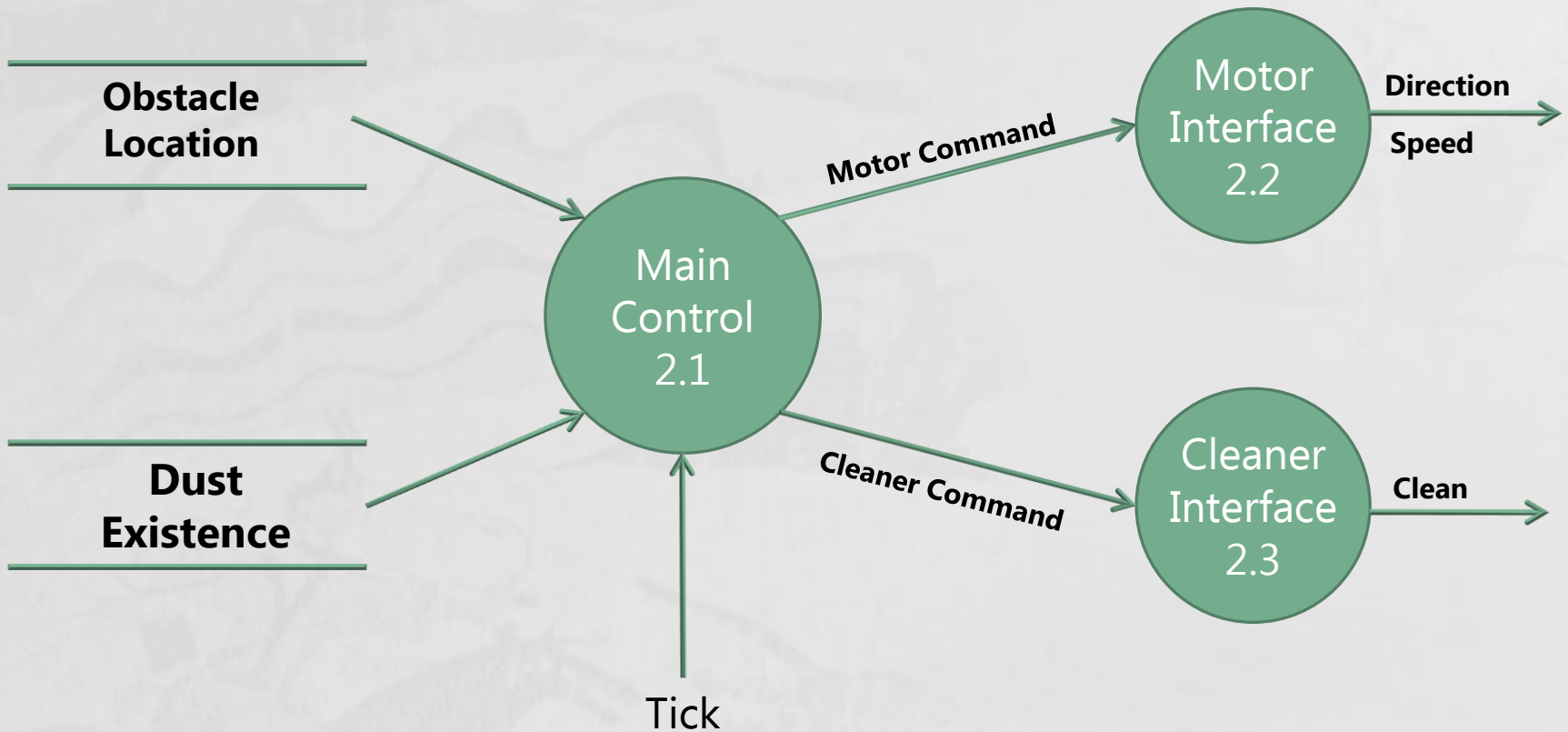
DFD Level1-Process Specification

Reference No.	2
Name	Cleaner & Motor Control
Input	Obstacle & Dust Location
Output	Direction & Clean
Process Description	Obstacle & Dust Location 데이터 영역에서 값을 받아 Motor와 Cleaner로 명령을 전달한다.

DFD Level2



DFD Level2



DFD Level2-Process Specification

Reference No.	1.1
Name	Front Sensor Interface
Input	Front Sensor Input
Output	Front Obstacle
Process Description	Front Sensor로부터 Input값을 받아 True/False와 같은 digital 신호로 변환하여 Output Front Obstacle에 저장한다.

Reference No.	1.2
Name	Left Sensor Interface
Input	Left Sensor Input
Output	Left Obstacle
Process Description	Left Sensor로부터 Input값을 받아 True/False와 같은 digital 신호로 변환하여 Output Left Obstacle에 저장한다.

DFD Level2-Process Specification

Reference No.	1.3
Name	Right Sensor Interface
Input	Right Sensor Input, Tick
Output	Right Obstacle
Process Description	Right Sensor로부터 Input값을 받아 True/False와 같은 digital 신호로 변환하여 Output Right Obstacle에 저장한다.

Reference No.	1.4
Name	Dust Sensor Interface
Input	Dust Sensor Input, Tick
Output	Dust Existence
Process Description	Dust Sensor로부터 Input값을 받아 True/False와 같은 digital 신호로 변환하여 Dust Front Obstacle에 저장한다.

DFD Level2-Process Specification

Reference No.	1.5
Name	Determine Obstacle Location
Input	Front Obstacle, Left Obstacle, Right Obstacle
Output	Obstacle Location
Process Description	각각의 Interface(Front, Left, Right)로부터 입력받은 값을 데이터 영역 Obstacle Location 저장한다.

Reference No.	1.6
Name	Determine Dust Existence
Input	Dust Existence
Output	Dust Existence
Process Description	Dust Sensor Interface로부터 입력받은 값을 데이터 영역 Dust Existence 저장한다.

DFD Level2-Process Specification

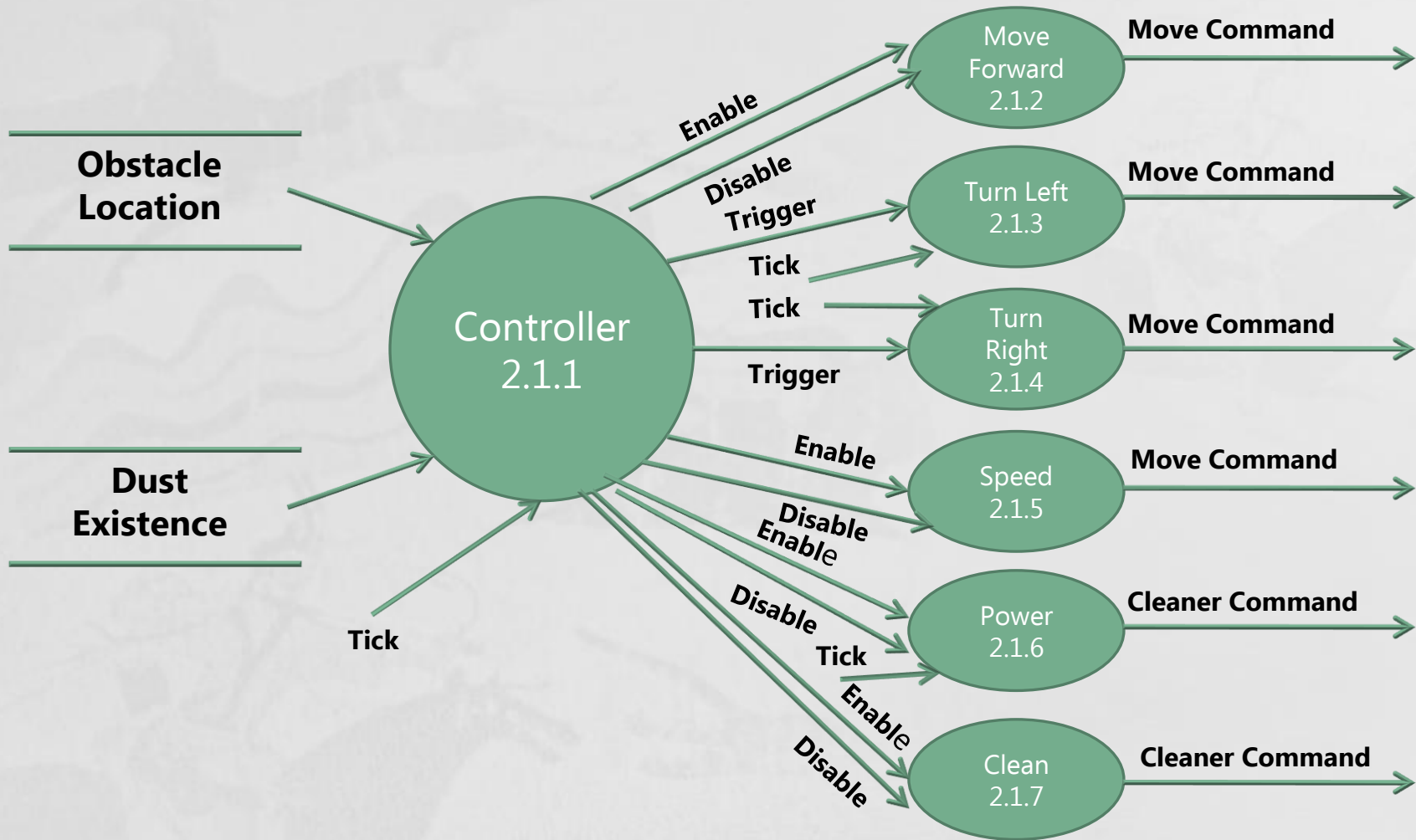
Reference No.	2.1
Name	Main Control
Input	Obstacle Location, Dust Existence, Tick
Output	Motor Command, Cleaner Command
Process Description	데이터 영역(Obstacle Location, Dust Existence)에서 입력받아 Motor와 Cleaner 동작을 결정하여 각 Interface에 Command를 전달한다.

Reference No.	2.2
Name	Motor Interface
Input	Mortor Command
Output	Direction
Process Description	입력 받은 Motor Command에 따라 Motor를 동작시키는 신호(Forward / Left / Right / Stop)를 보낸다.

DFD Level2-Process Specification

Reference No.	2.3
Name	Main Control
Input	Cleaner Command
Output	Clean
Process Description	입력 받은 Cleaner Command에 따라 Cleaner를 동작시키는 신호(ON / OFF / UP / DOWN)를 보낸다.

DFD Level3



DFD Level2-Process Specification

Reference No.	2.1.1
Name	Controller
Input	Obstacle Location, Dust Existence, Tick
Output	Enable, Disable, Trigger
Process Description	데이터 영역(Obstacle Location, Dust Existence)에서 입력 받아 Motor와 Cleaner 동작을 결정하여 Motor와 Cleaner를 동작시키는 프로세스에 신호(Enable/Disable, Trigger)를 보낸다.

Reference No.	2.1.2
Name	Move Forward
Input	Enable, Disable
Output	Move Command
Process Description	Controller로부터 Input(Enable, Disable)을 받아 Motor Interface로 Motor Command[Forward]를 보낸다.

DFD Level2-Process Specification

Reference No.	2.1.3
Name	Turn Left
Input	Trigger, Tick
Output	Move Command
Process Description	Controller로부터 Input(Trigger)을 받아 Motor Interface로 Motor Command[Left]를 보낸다.

Reference No.	2.1.4
Name	Turn Right
Input	Trigger, Tick
Output	Move Command
Process Description	Controller로부터 Input(Trigger)을 받아 Motor Interface로 Motor Command[Right]를 보낸다.

DFD Level2-Process Specification

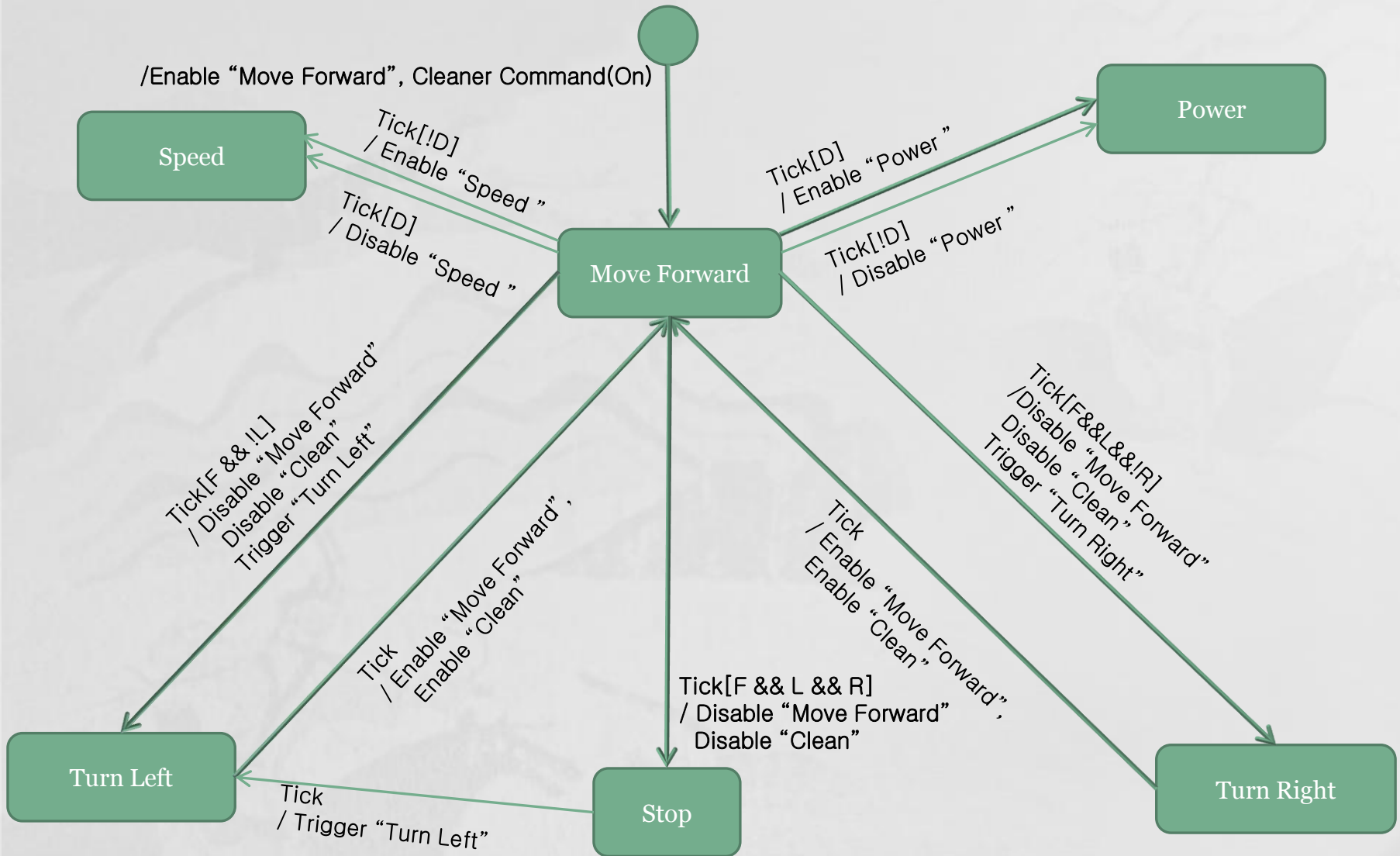
Reference No.	2.1.5
Name	Speed
Input	Enable, Disable
Output	Move Command
Process Description	Controller로부터 Input(Enable, Disable)을 받아 Motor Interface로 Motor Command[Up, Down]를 보낸다.

Reference No.	2.1.6
Name	Power
Input	Enable, Disable
Output	Cleaner Command
Process Description	Controller로부터 Input(Enable, Disable)을 받아 Cleaner Interface로 Cleaner Command[UP, DOWN]를 보낸다.

DFD Level2-Process Specification

Reference No.	2.1.7
Name	Clean
Input	Enable, Disable
Output	Cleaner Command
Process Description	Controller로부터 Input(Enable, Disable)을 받아 Cleaner Interface로 Cleaner Command[ON, OFF]를 보낸다.

DFD Level4



DFD

