Robot Vacuum Cleaner

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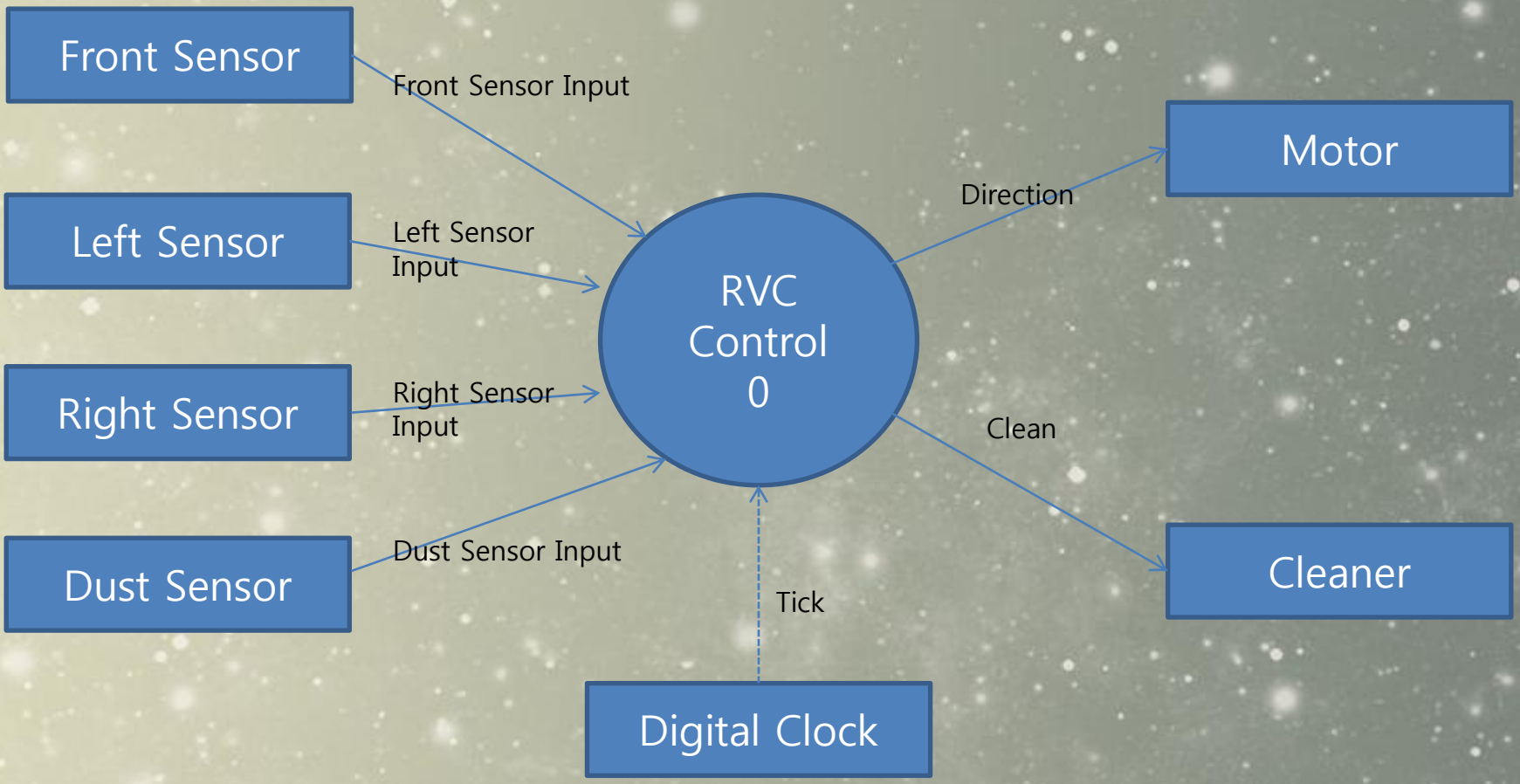
DFD Level 0

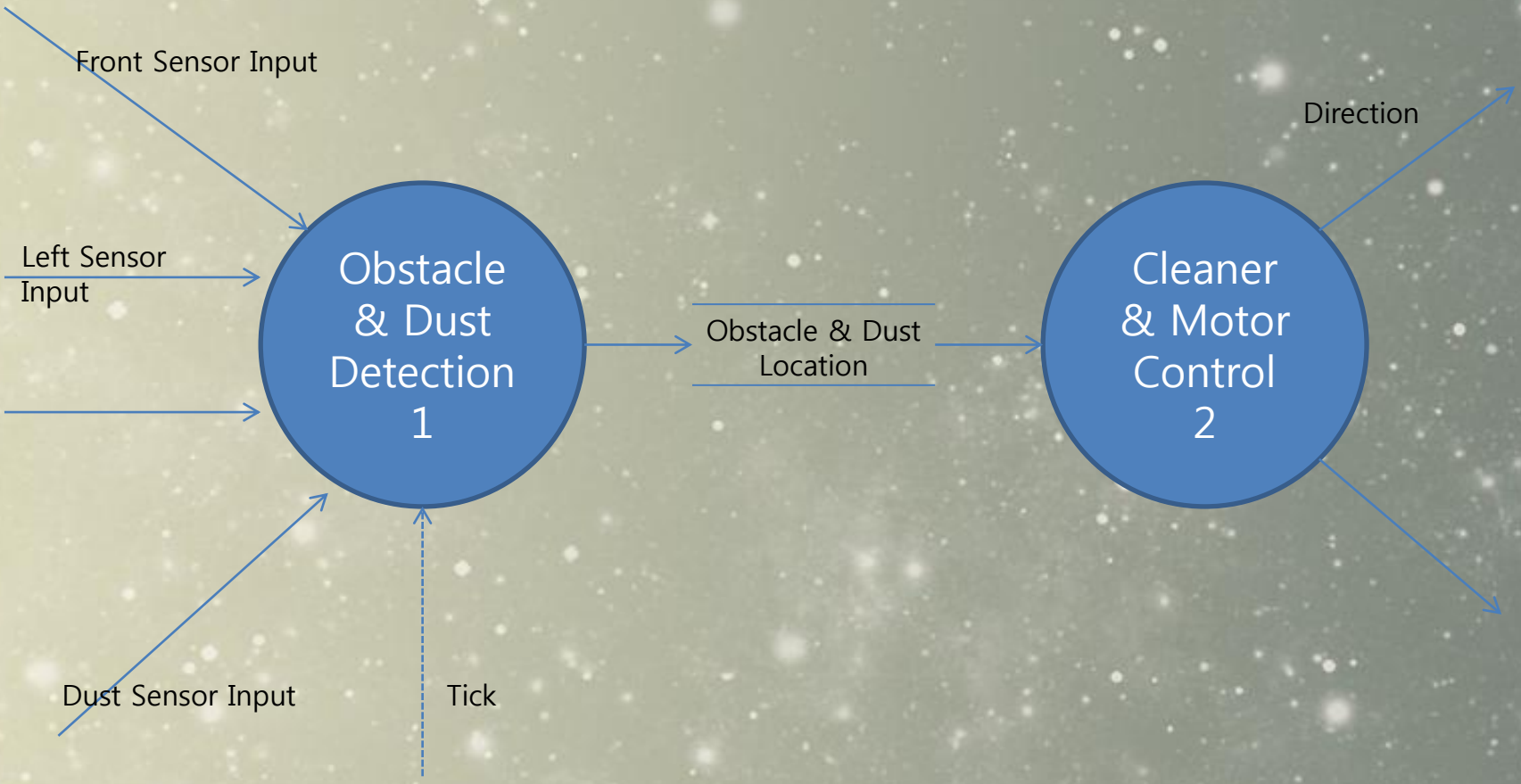

Front Sensor
Left Sensor
Right Sensor
Dust Sensor
Front Sensor Input
Left Sensor Input
Right Sensor Input
Dust Sensor Input
RVC Control 0
Direction
Clean
Tick
Motor
Cleaner
Digital Clock

DFD Level 0

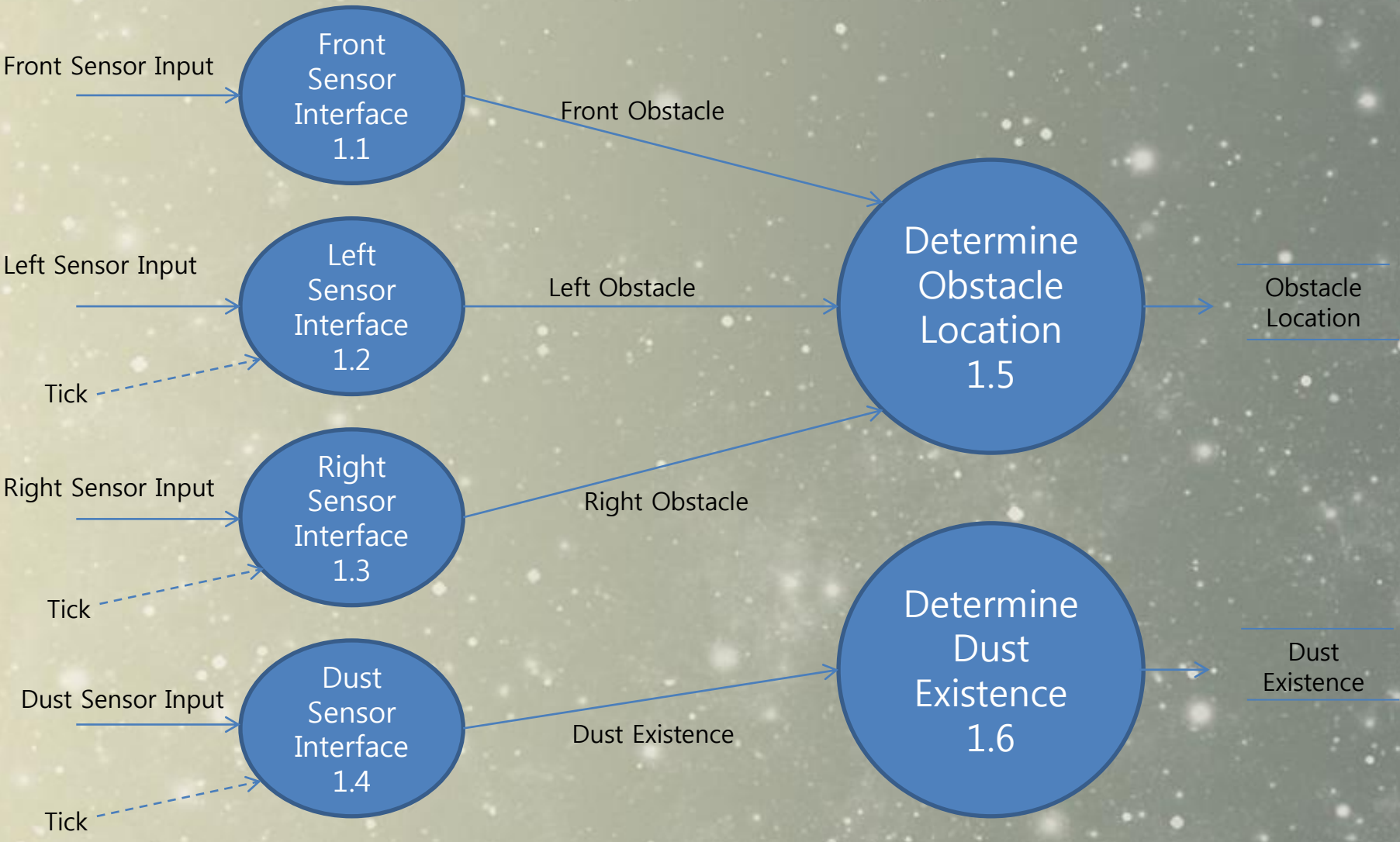
- Data Dictionary

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 / Left / Right / Stop
Clean	Turn off / Turn on / Power-Up	On / Off / Up

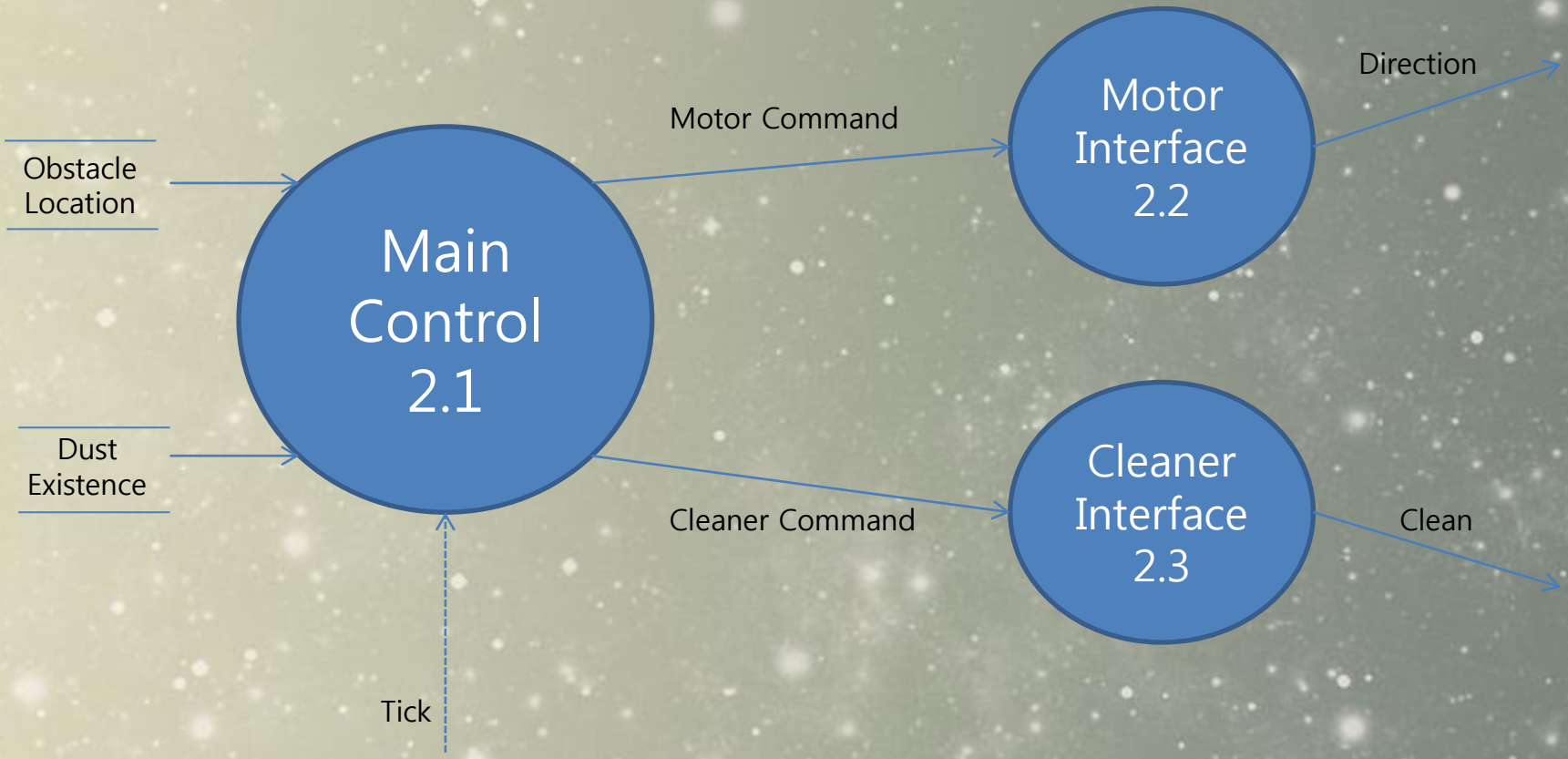
DFD Level 1


Front Sensor Input
Left Sensor Input
Obstacle & Dust Detection 1
Obstacle & Dust Location
Cleaner & Motor Control 2
Direction
Dust Sensor Input
Tick

DFD Level 2 – RVC Example



DFD Level 2

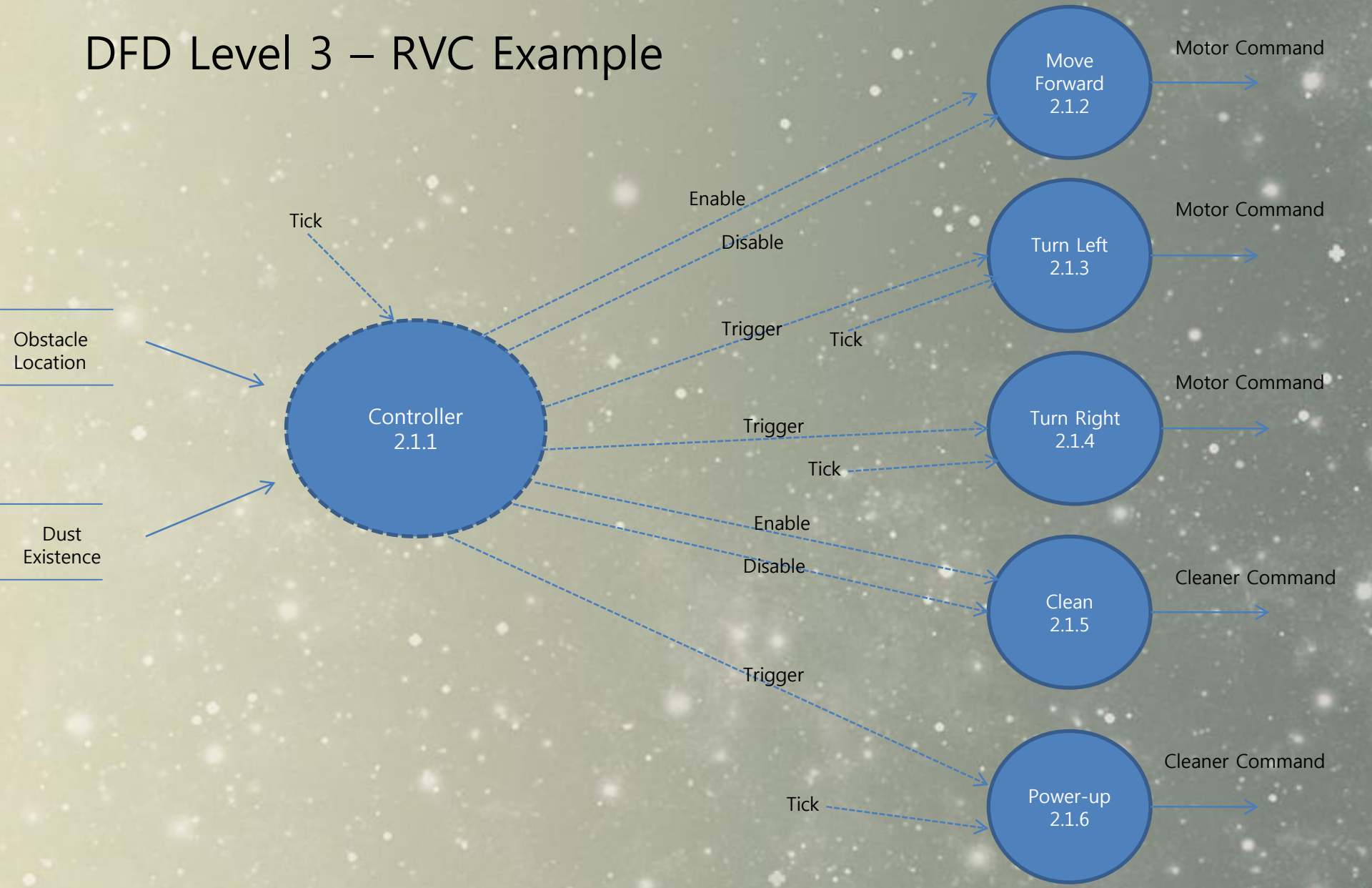

Obstacle Location
Dust Existence
Tick
Main Control 2.1
Motor Command
Cleaner Command
Motor Interface 2.2
Cleaner Interface 2.3
Direction
Clean

DFD Level 2

- Data Dictionary

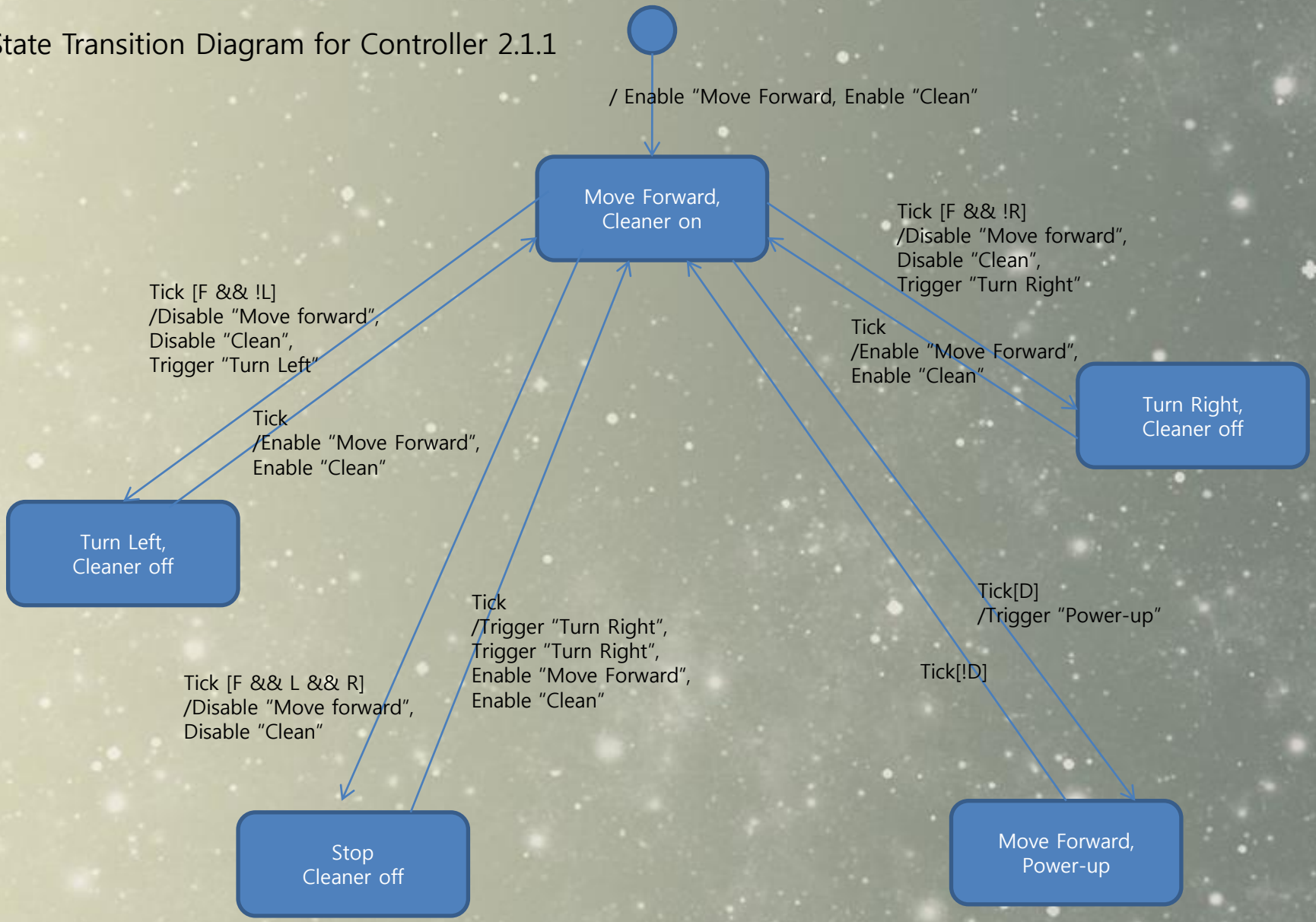
Input/Output Event	Description	Format / Type
Front Obstacle	Obstacle is detected in front of the RVC	True / False
Left Obstacle	Obstacle is detected in the left side of the RVC	True / False
Right Obstacle	Obstacle is detected in the right side of the RVC	True / False
Dust Existence	Dust is detected on the floor	True / False
Motor Command	Activate Motor Interface	Forward / Left / Right / stop
Cleaner Command	Activate Cleaner Interface	On / Off / Up

DFD Level 3 – RVC Example



DFD Level 4 – RVC Example

State Transition Diagram for Controller 2.1.1



Process Specification

Reference NO.	1.1
Name	Front Sensor Interface
Input	Front Sensor Input (+Data structure if possible)
Output	Front Obstacle (+Data structure)
Process Description	Front Sensor 로부터 Obstacle이 있는지를 받아들이고 이를 Digital Value로 변환한다

Process Specification (Cont.)

Reference NO.	1.2
Name	Left Sensor Interface
Input	Left Sensor Input (+Data structure if possible) , Tick
Output	Left Obstacle (+Data structure)
Process Description	Left Sensor 로부터 Obstacle이 있는지를 주기적으로 받아들이고 이를 Digital Value로 변환한다

Reference NO.	1.3
Name	Right Sensor Interface
Input	Right Sensor Input (+Data structure if possible) , Tick
Output	Right Obstacle (+Data structure)
Process Description	Right Sensor 로부터 Obstacle이 있는지를 주기적으로 받아들이고 이를 Digital Value로 변환한다

Process Specification (Cont.)

Reference NO.	1.4
Name	Dust Sensor Interface
Input	Dust Sensor Input (+Data structure if possible) , Tick
Output	Dust Obstacle (+Data structure)
Process Description	Dust Sensor 로부터 Obstacle이 있는지를 주기적으로 받아들이고 이를 Digital Value로 변환한다

Process Specification (Cont.)

Reference NO.	1.5
Name	Determine Obstacle Location
Input	Front Obstacle, Left Obstacle, Right Obstacle
Output	Obstacle Location
Process Description	Sensor 로부터 탐지된 Obstacle의 위치를 종합하여 이를 Main Control에 전달한다

Reference NO.	1.6
Name	Determine Obstacle Location
Input	Dust Existence
Output	Dust Existence
Process Description	Sensor 로부터 탐지된 Dust의 존재유무를 Main Control에 전달한다

Process Specification (Cont.)

Reference NO.	2.1.1
Name	Controller
Input	Obstacle Location, Dust Existence, Tick
Output	Enable, Disable, Trigger
Process Description	Obstacle Location과 Dust Existence를 전달받아 Motor Interface와 Cleaner Interface에 보낼 Command를 선택한다

Reference NO.	2.1.2
Name	Move Forward
Input	Enable, Disable
Output	Motor Command
Process Description	Controller로부터 Input을 받아 Motor Interface에 앞으로 움직이거나 멈추게 하는 Motor Command를 전달한다

Process Specification (Cont.)

Reference NO.	2.1.3
Name	Turn Left
Input	Trigger, Tick
Output	Motor Command
Process Description	Controller로부터 Input을 받아 Motor Interface에 상황에 따라 왼쪽으로 방향을 바꾸게 하는 Motor Command를 전달한다

Reference NO.	2.1.4
Name	Turn Right
Input	Trigger, Tick
Output	Motor Command
Process Description	Controller로부터 Input을 받아 Motor Interface에 상황에 따라 오른쪽으로 방향을 바꾸게 하는 Motor Command를 전달한다

Process Specification (Cont.)

Reference NO.	2.1.5
Name	Clean
Input	Enable, Disable
Output	Cleaner Command
Process Description	Controller로부터 Input을 받아 Cleaner Interface에 앞으로 청소를 하게 하는 Cleaner Command를 전달한다

Reference NO.	2.1.6
Name	Power-Up
Input	Trigger, Tick
Output	Cleaner Command
Process Description	Controller로부터 Input을 받아 Cleaner Interface에 상황에 따라 Power-Up을 실행케 하는 Cleaner Command를 전달한다

Process Specification (Cont.)

Reference NO.	2.2
Name	Motor Interface
Input	Motor Command
Output	Direction
Process Description	Motor Command를 받아서 RVC의 움직임을 결정한다

Reference NO.	2.3
Name	Cleaner Interface
Input	Cleaner Command
Output	Clean
Process Description	Cleaner Command를 받아서 RVC의 청소 실행 작동을 결정한다.