Automotive door control Dynamic Design Analysis

PROJECT 3: ADVANCED EMBEDDED SYSTEMS NANMODEGREE

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UDACITY | FWD

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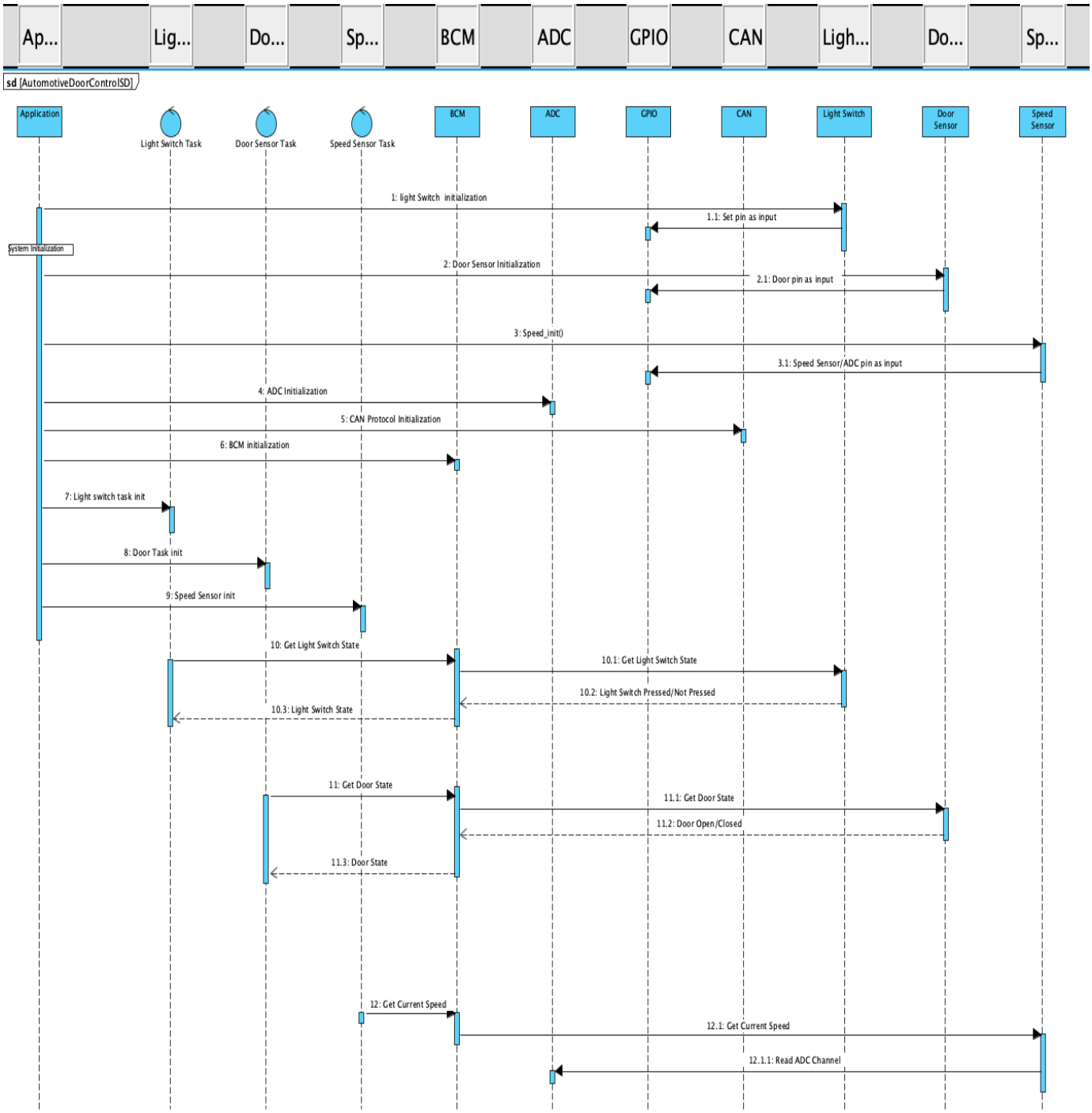
1- Sequence Diagram

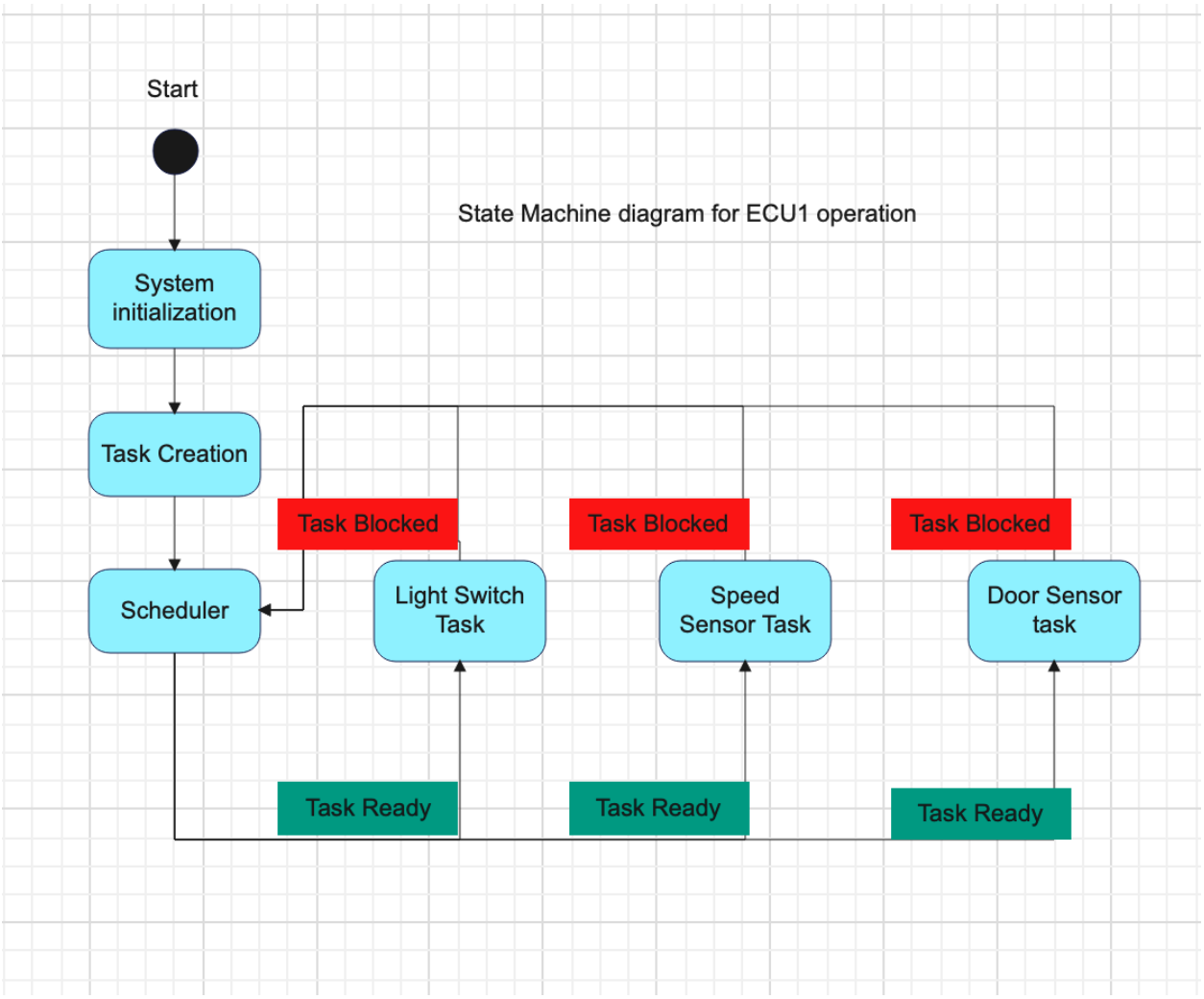
Using Visual Paradigm application



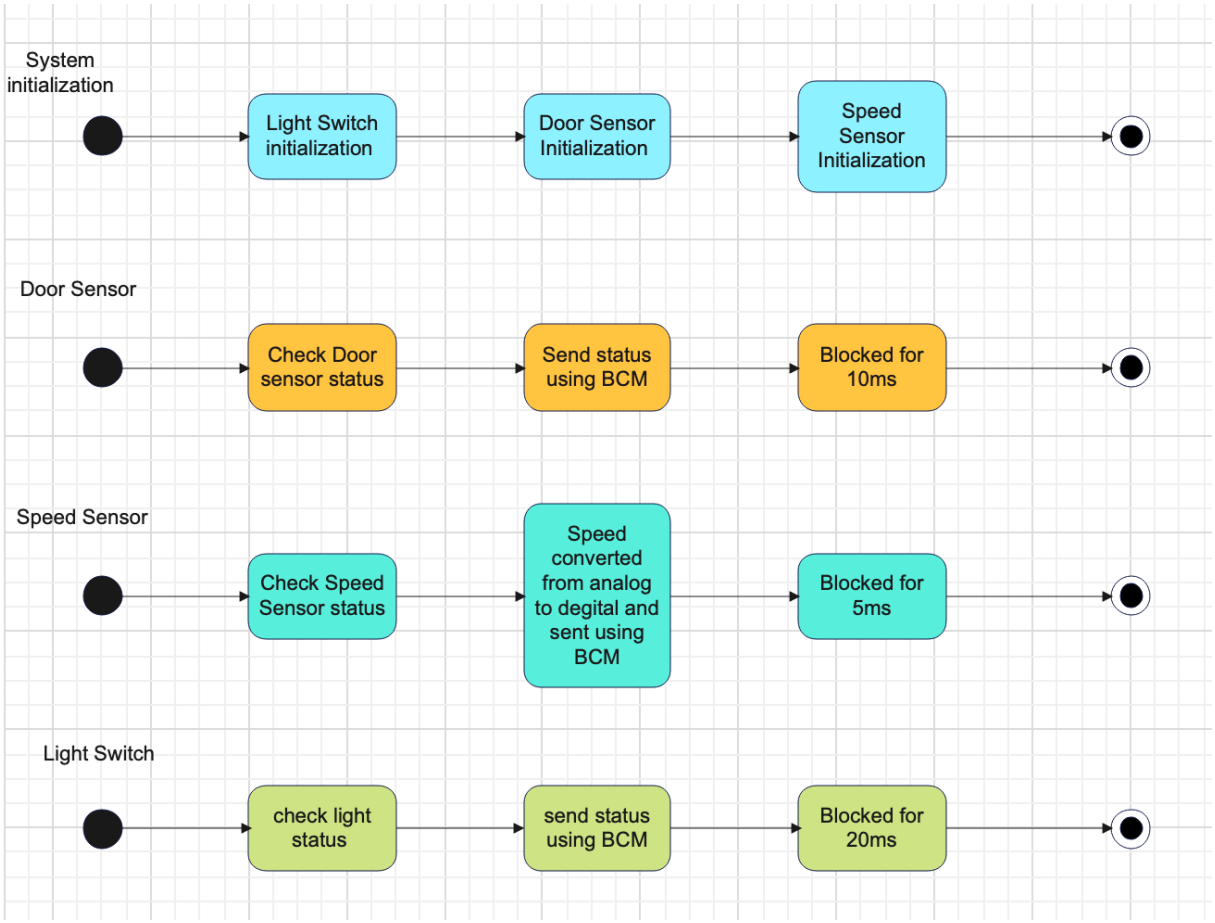
2- State Machine Diagram

Using Wondershare EdrawMAX application

1- State machine diagram for ECU operation



2- State Machine for each component



CPU Load

Light Switch Task execution time : 5ms

Door Sensor Task execution time: 2ms

Speed sensor Task execution time: 1ms

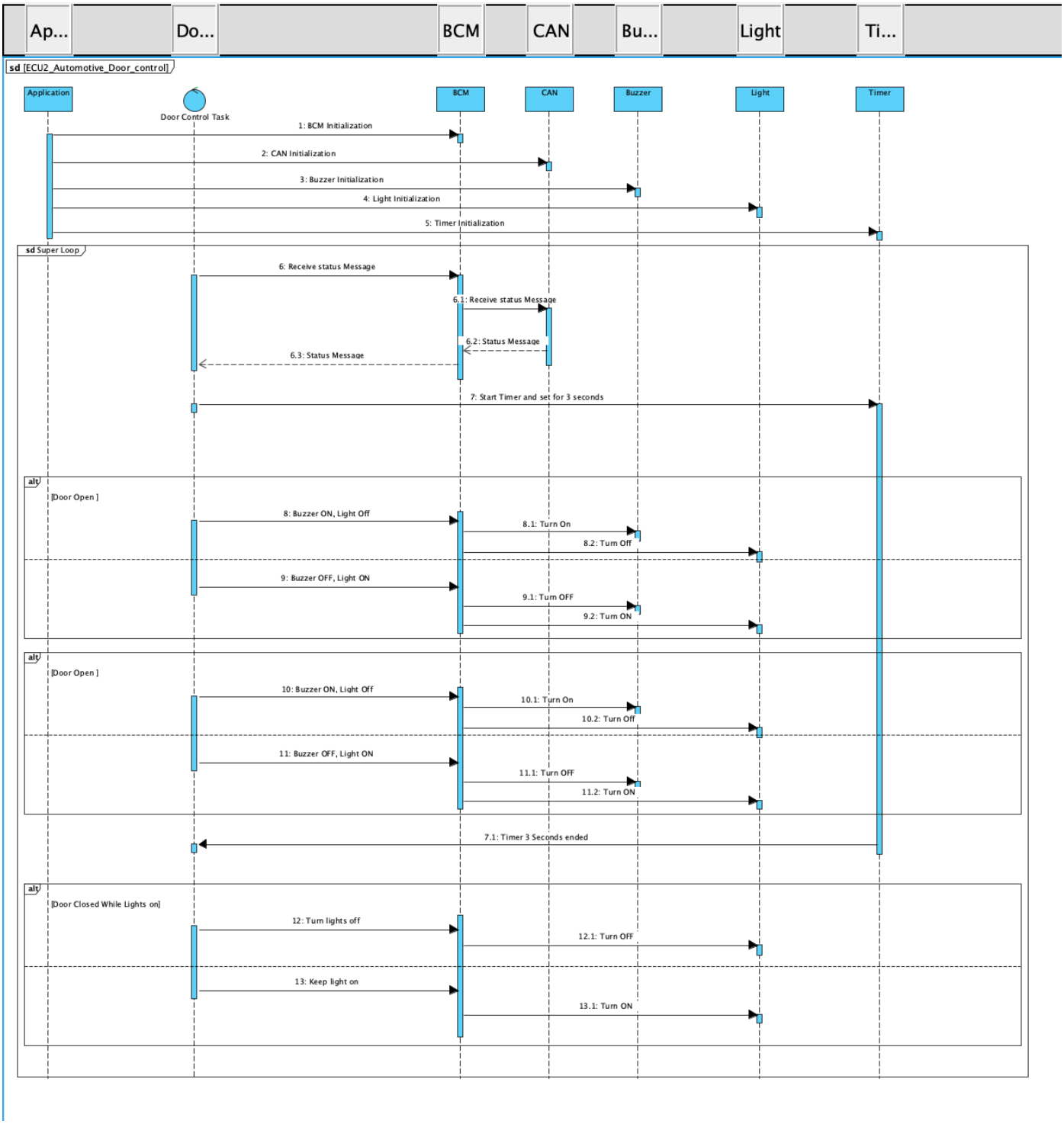
Task	Period	Execution time
Door sensor	10ms	2ms
Speed Sensor	5ms	1ms
Light Sensor	20ms	5ms

CPU Load = (8/20) *100 = 40%

2- For ECU2

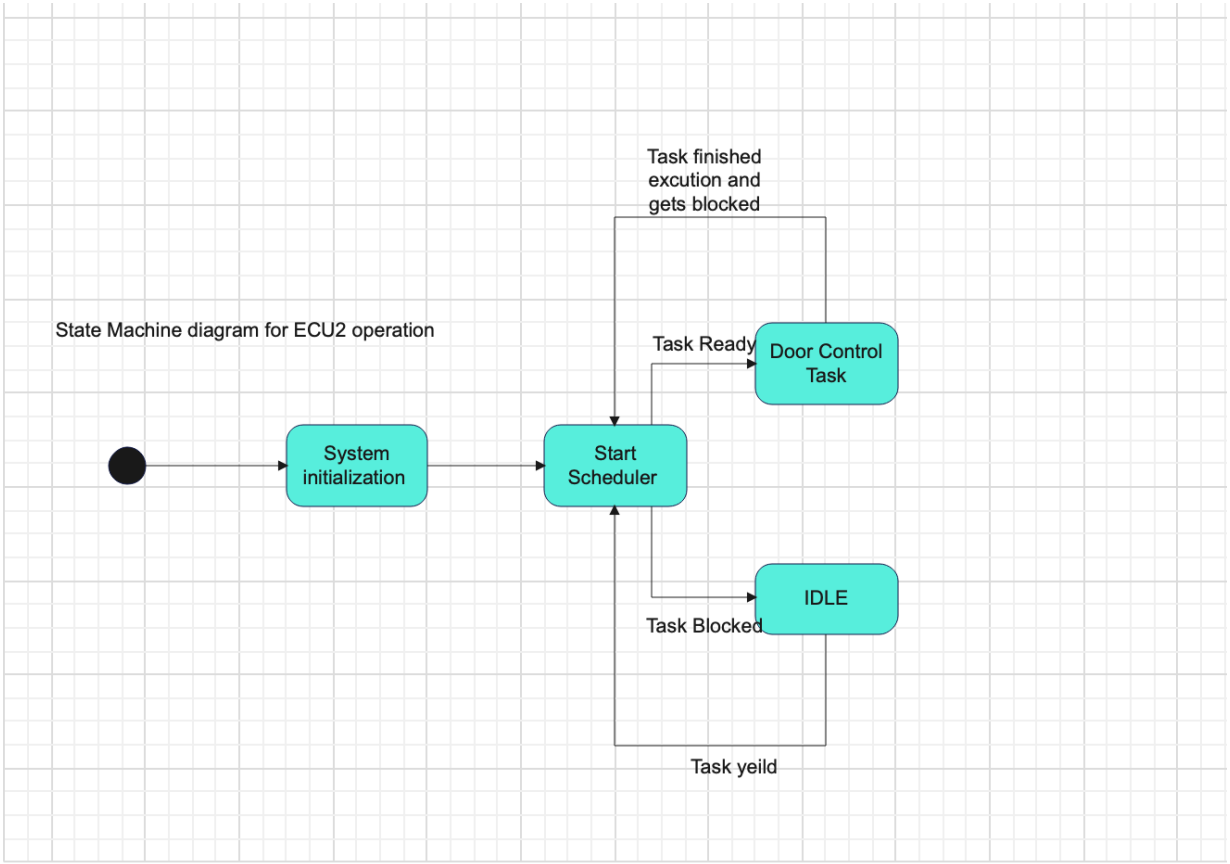
1 - Sequence Diagram

Using visual paradigm



2- State Machine Diagram

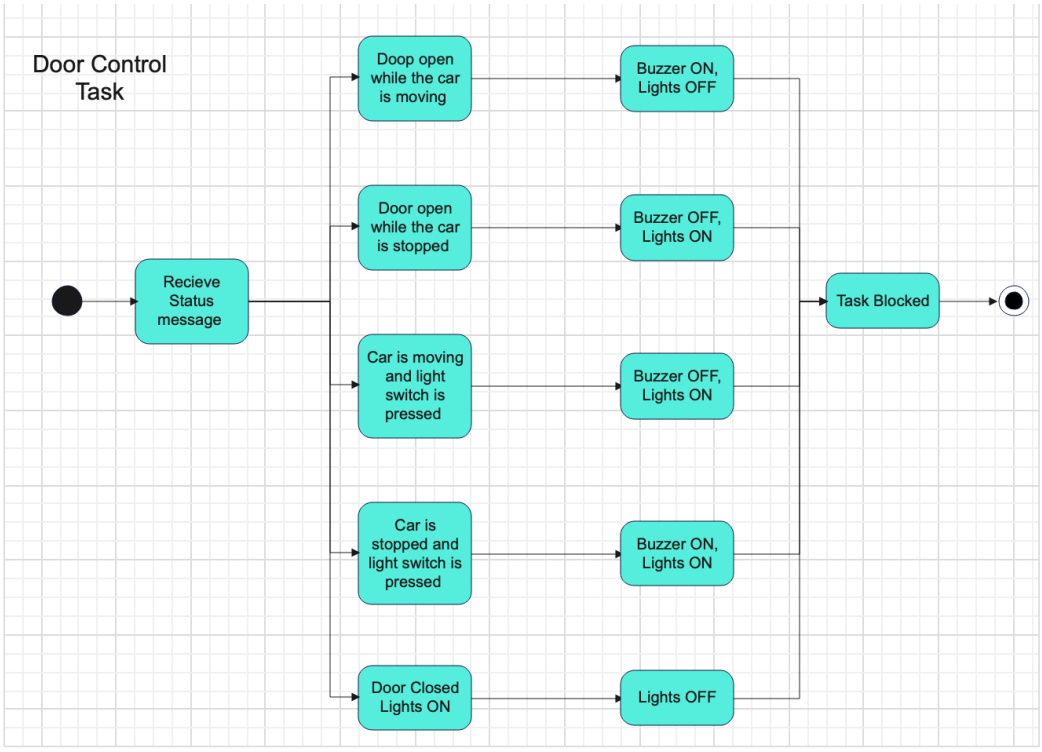
1- State machine diagram for ECU 2 operation



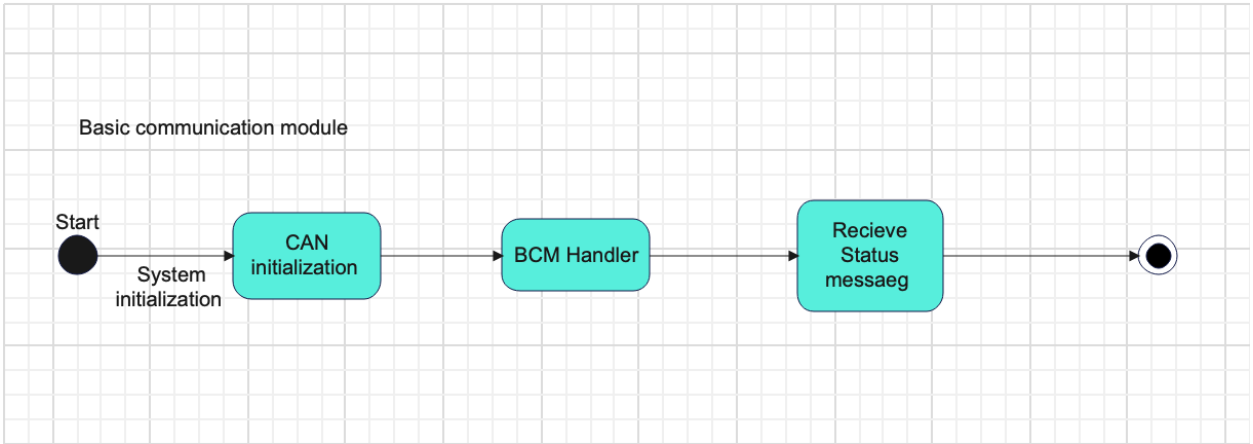
2- State Machine diagram for each Component

Using Wondershare EdrawMAX application

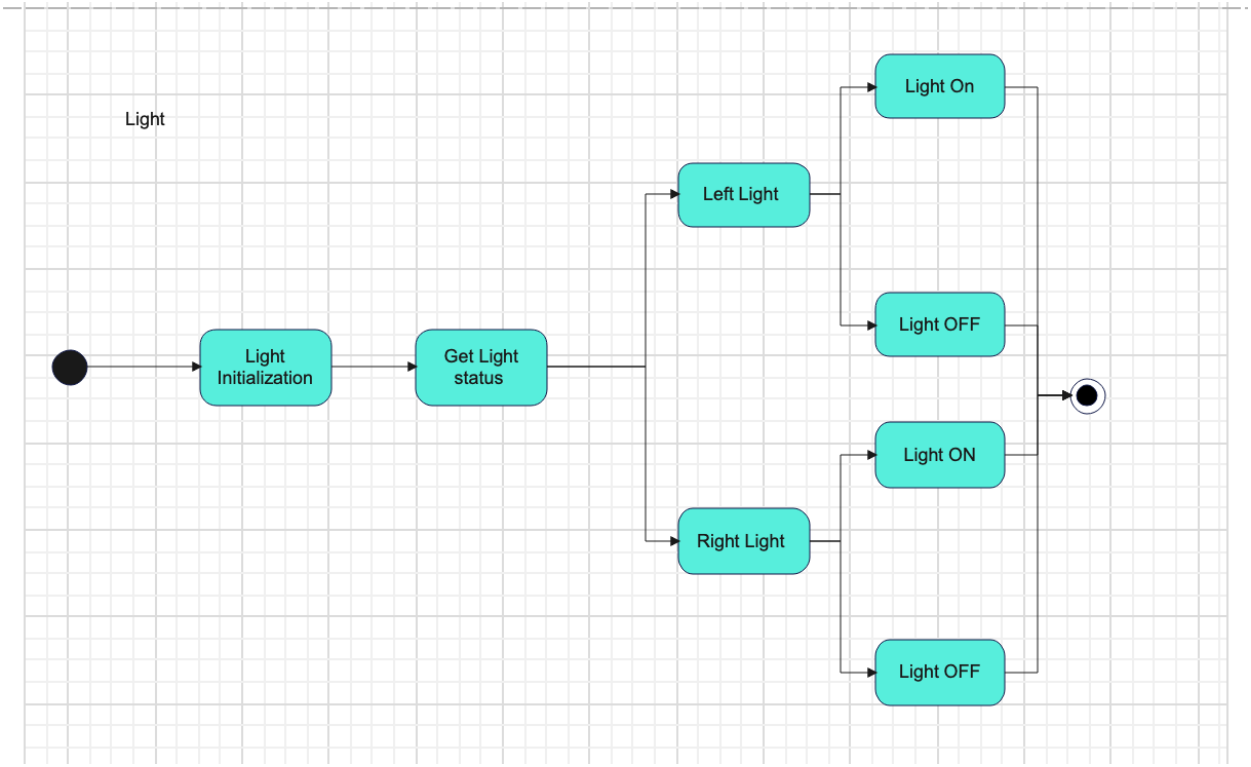
1- Door Control Task



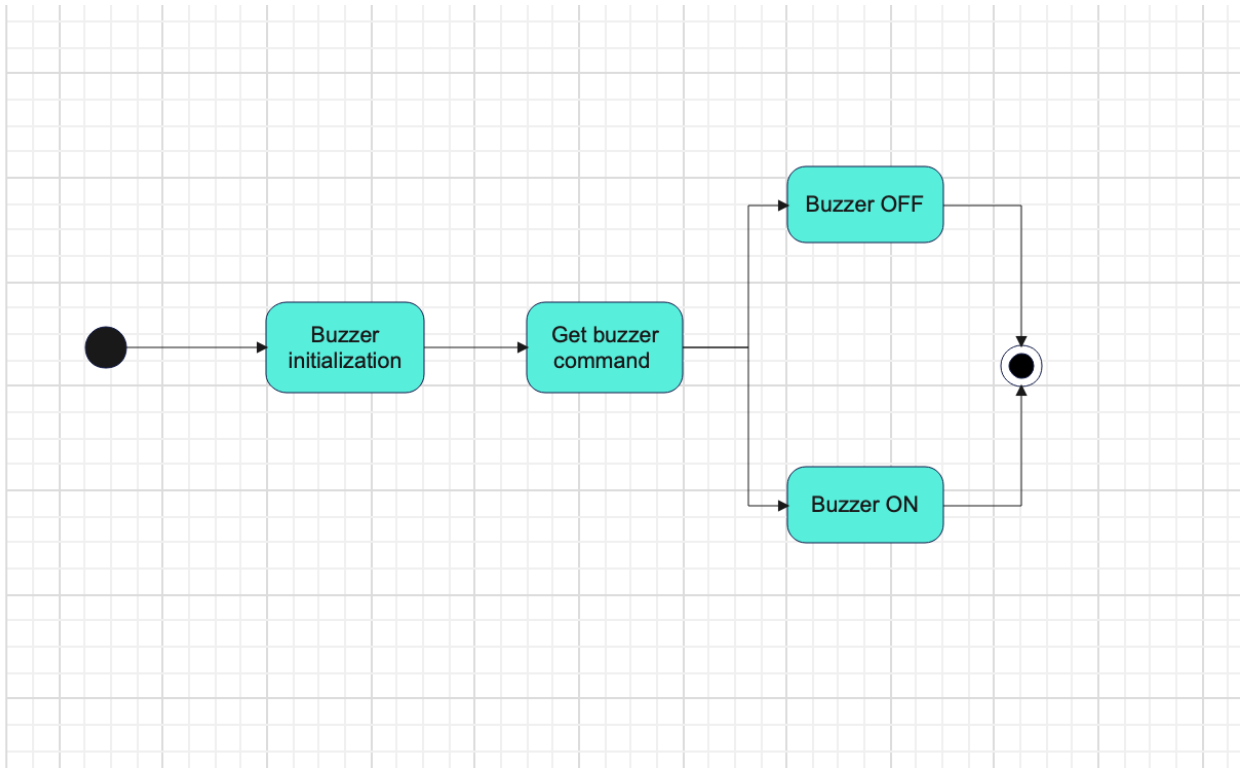
2- Basic communication module



3- Light



4- Buzzer



CPU Load

Door_Control_Task Execution time: 2ms

Task	Period	Execution time
Door_Control_Task	5ms	2ms

CPU Load = (2/5) *100 = 40%

Bus Load = (Data Transmitted in 1 Second) / (Maximum Data Transfer Rate of the Bus)

let's say the bit rate of the CAN bus is 500 kbps and 5000 bits are transmitted on the bus in 1 second. To calculate the bus load:

Total number of bits that can be transmitted on the bus in 1 second = (bit rate) x (time period) = 500 kbps x 1 second = 500,000 bits

Bus load = (number of bits transmitted / total number of bits that can be transmitted) x 1%
= (5000 bits / 500,000 bits) x 100%
= 1%