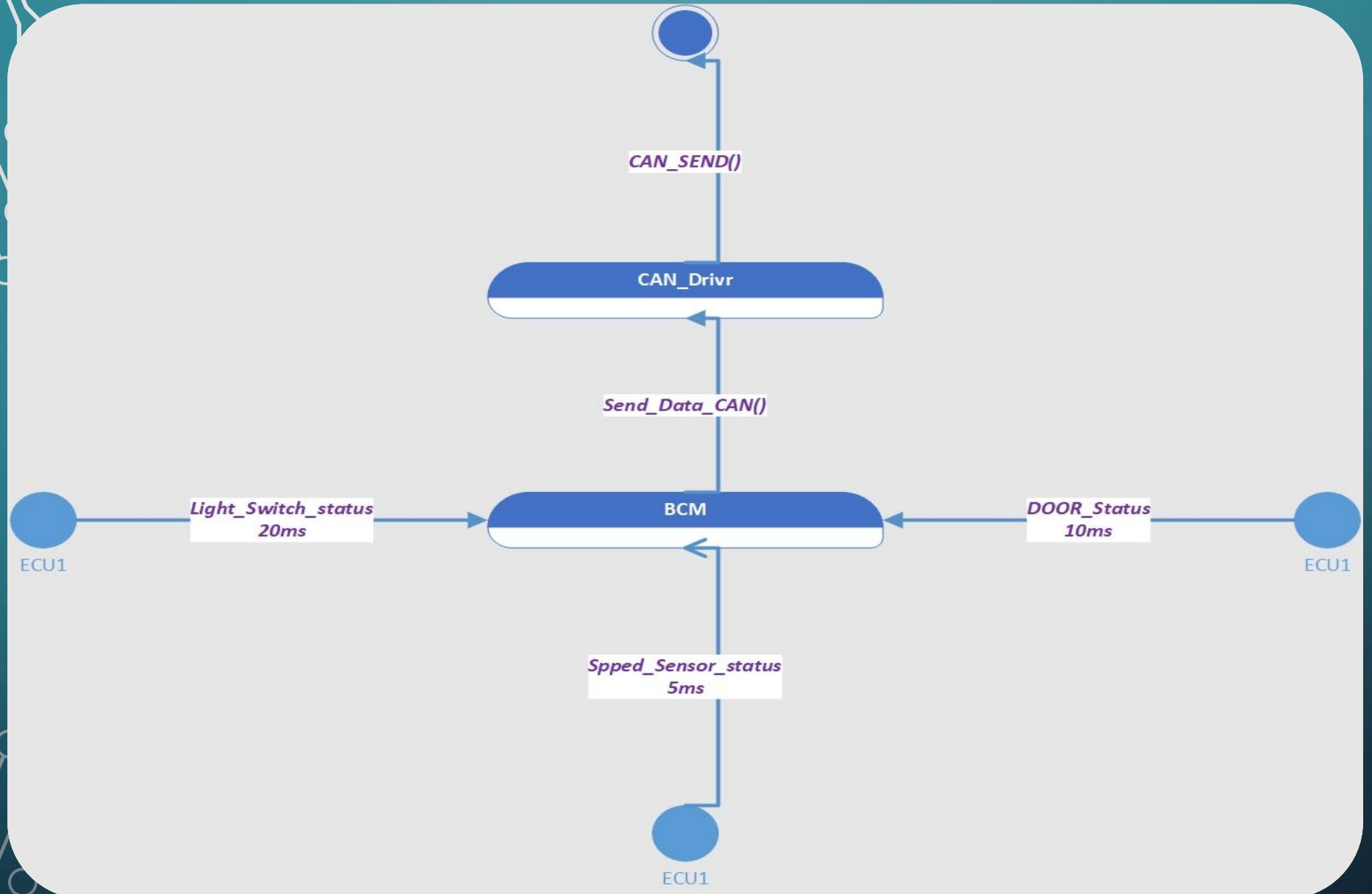
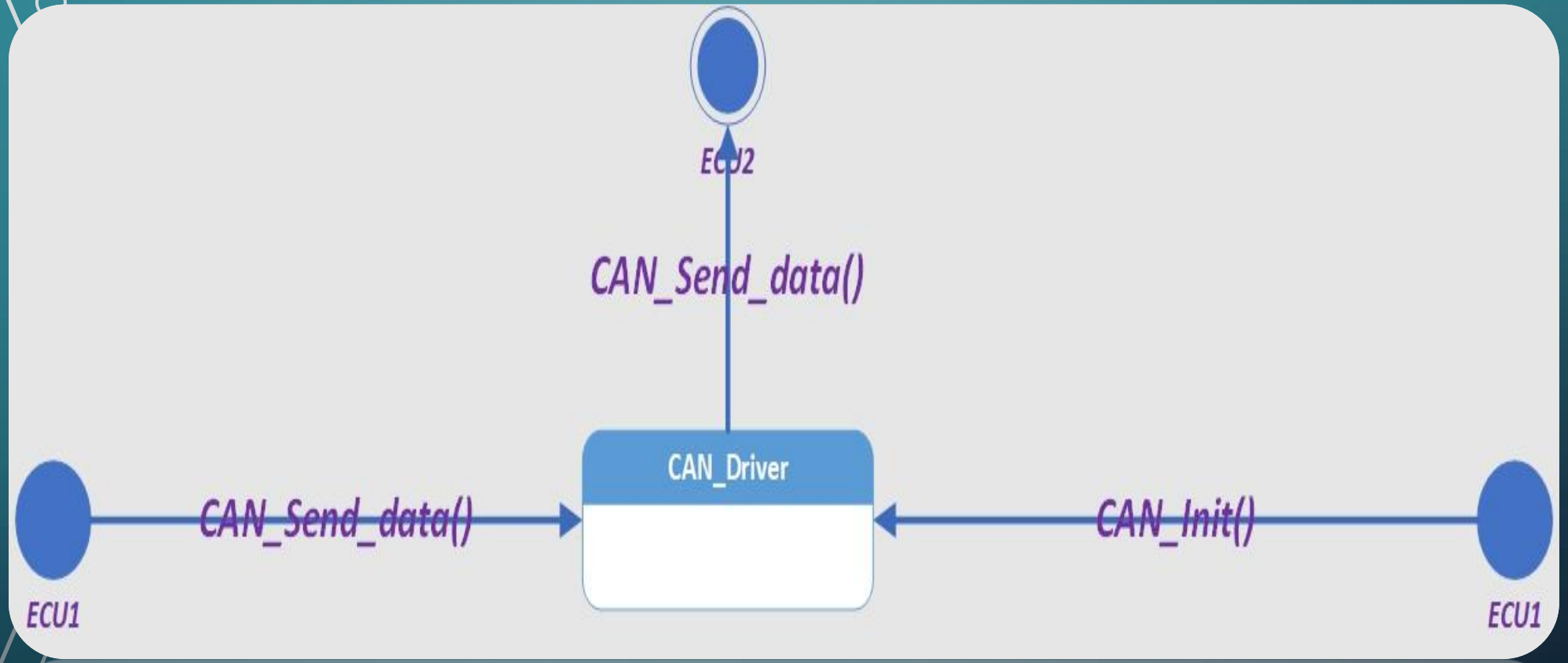
DYNAMIC DESIGN

OMAR HASAN SHAWKY

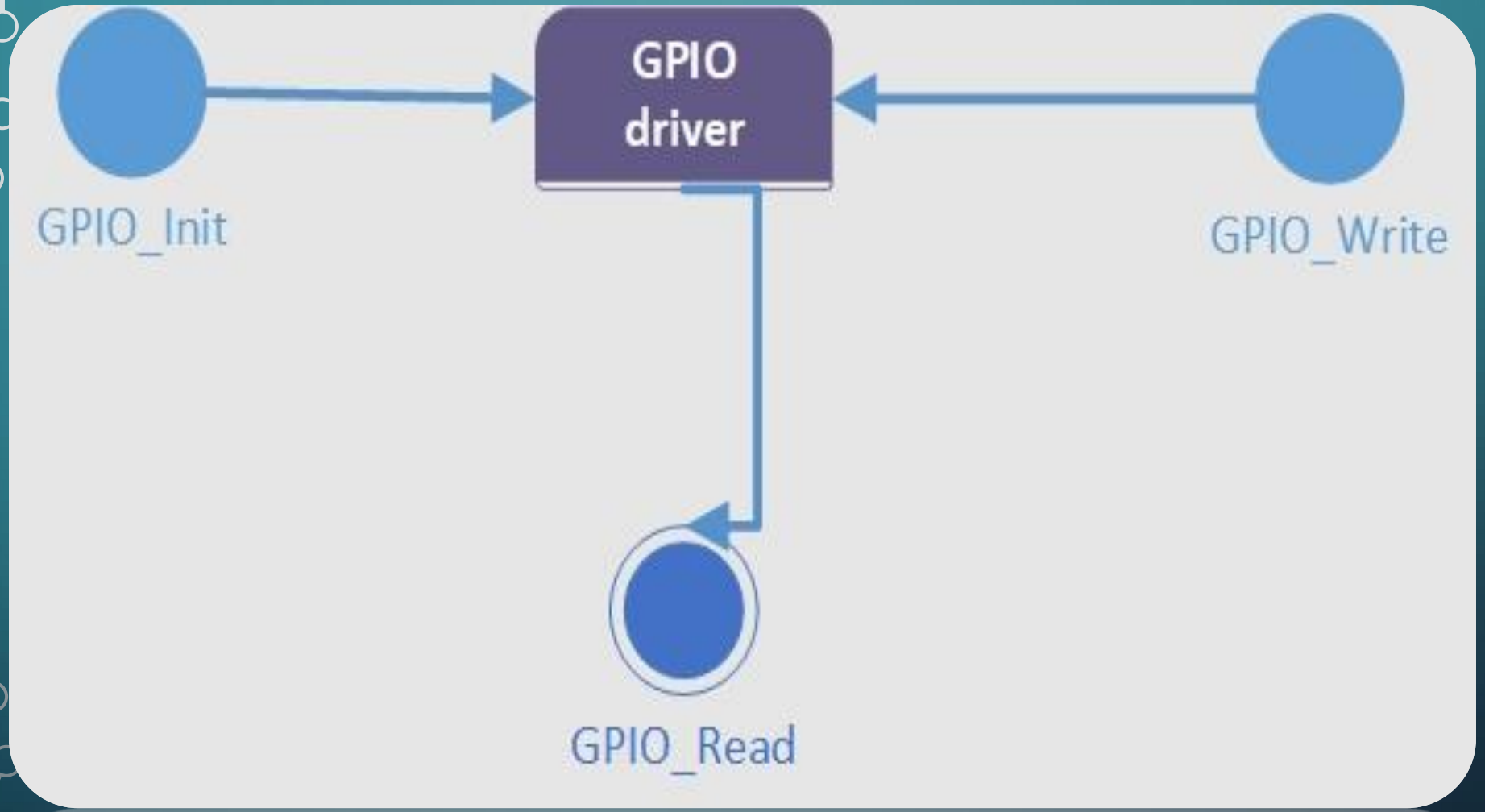
ECU1 STATE MACHINE


CAN_SEND()
CAN_Drivr
Send_Data_CAN()
Light_Switch_status
20ms
BCM
DOOR_Status
10ms
ECU1
ECU1
Spped_Sensor_status
5ms
ECU1

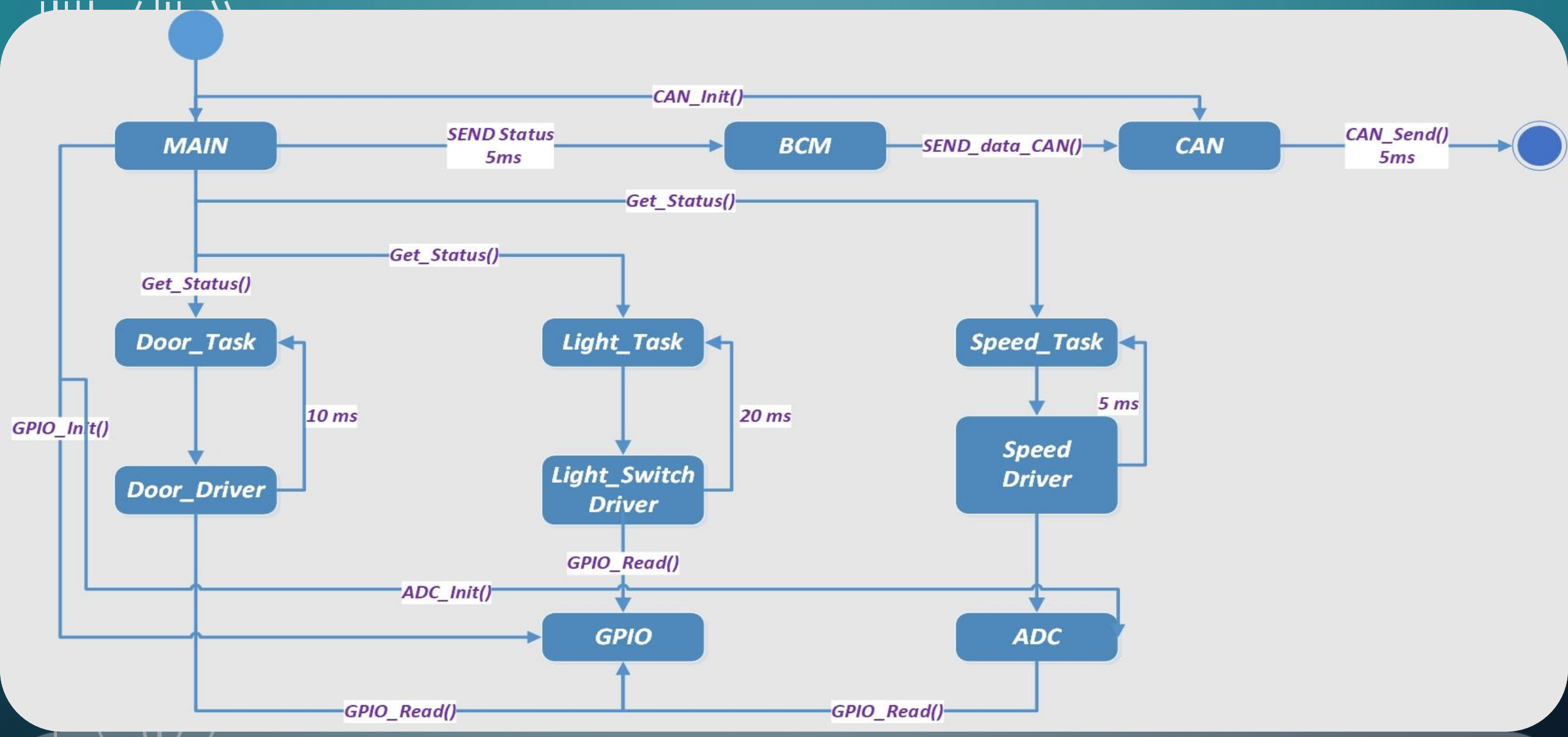
BCM DRIVER


ECU2
CAN_Send_data()
CAN_Driver
CAN_Send_data()
CAN_Init()
ECU1
ECU1

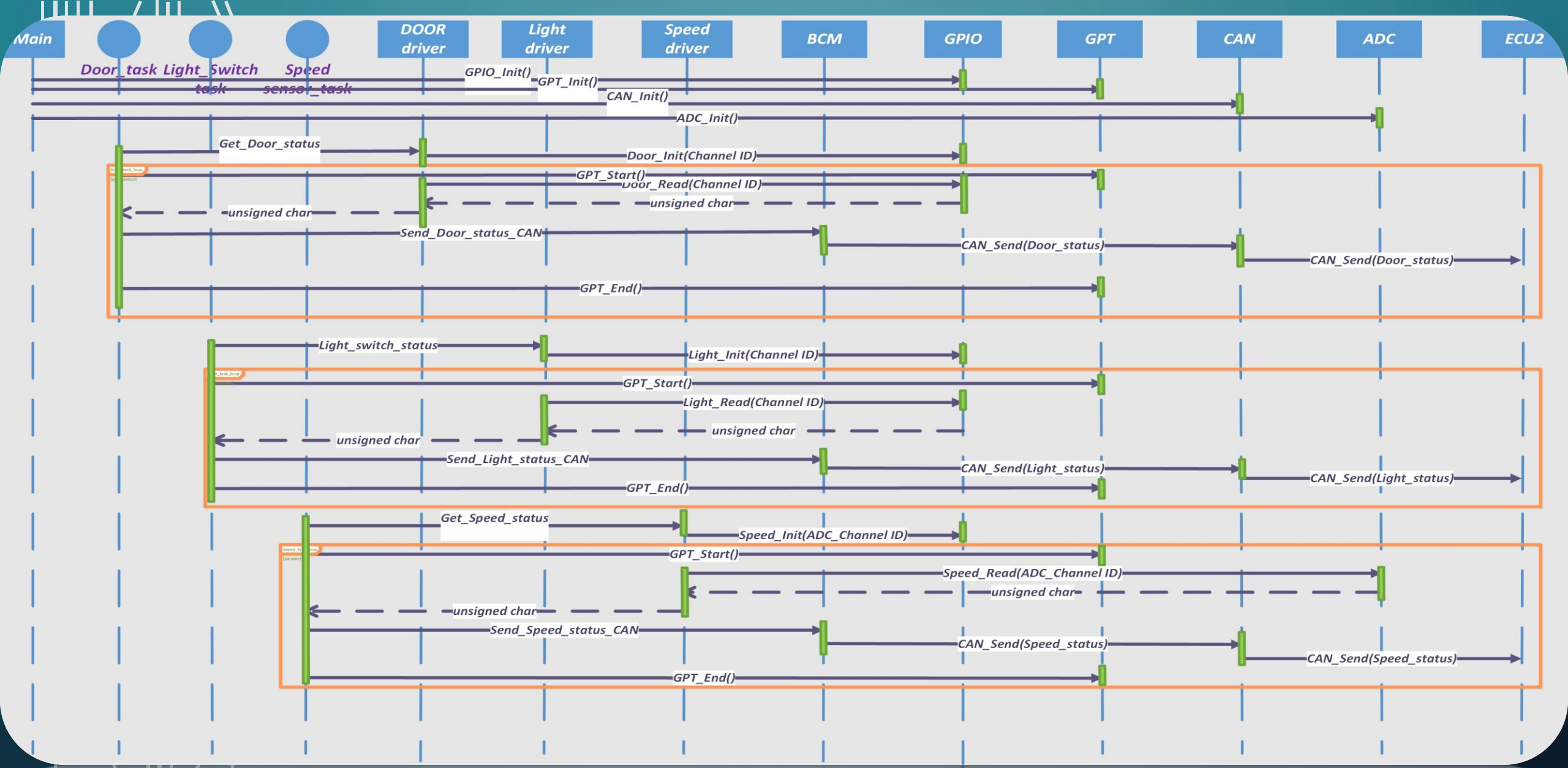
CAN DRIVER



GPIO DRIVER



TOTAL ECU1 STATE MACHINE



ECU1 SEQUENCE DIAGRAM

ECU1 CPU LOAD CALCULATION

there are three tasks running as below:

- Task1:Speed sensor reading => periodicity = 5ms
- Task2:Door sensor reading => periodicity = 10ms
- Task3:light switch reading => periodicity = 20ms

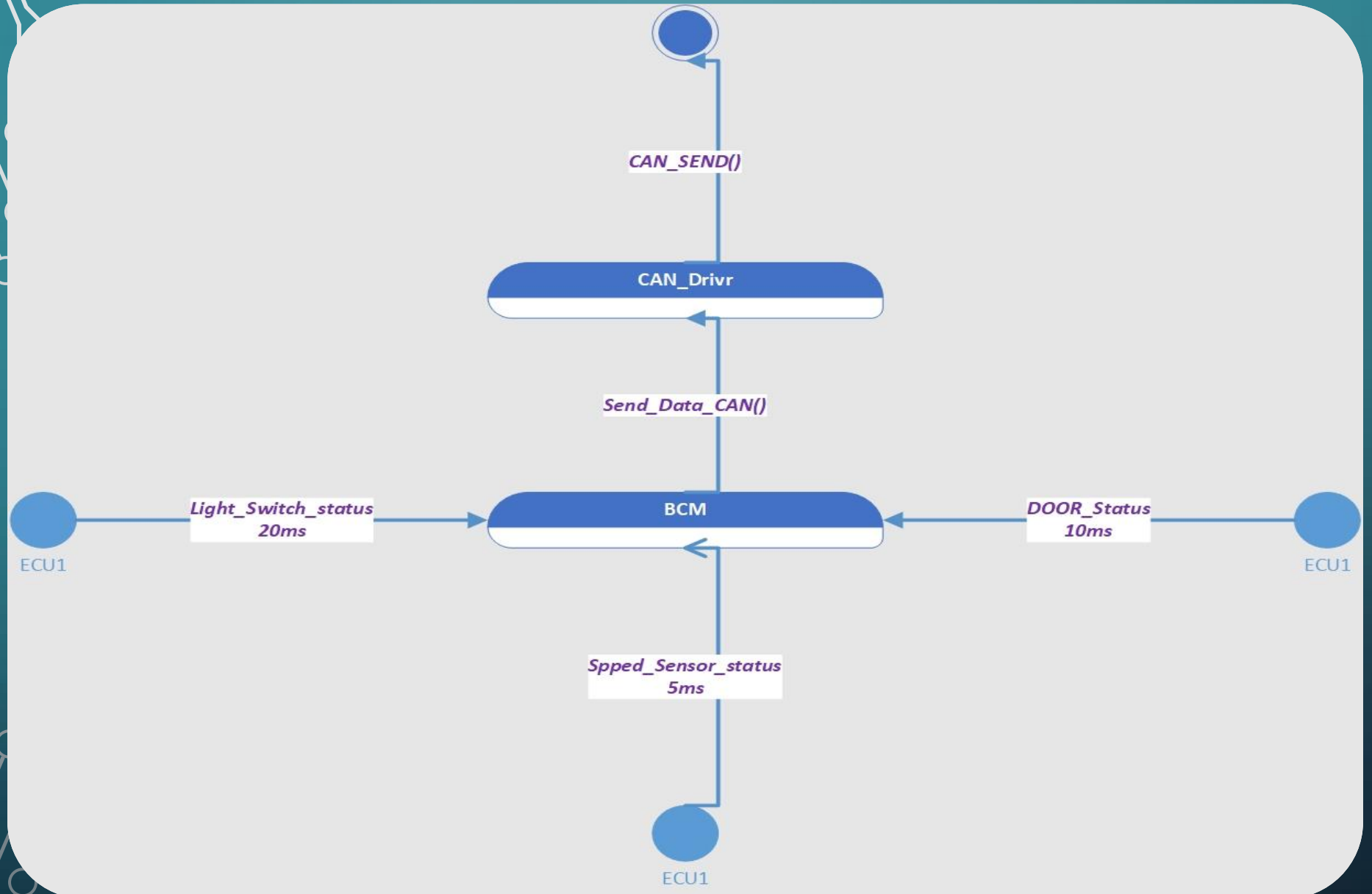
Assuming each task has an execution time of 0.5ms and the Hyper-period will be 20ms as it is the period which the system will repeat itself again So we could calculate the CPU load as fellow:

$$CPU\_load = total\ execution\ tasks\ time\ /\ Hyper\ period$$

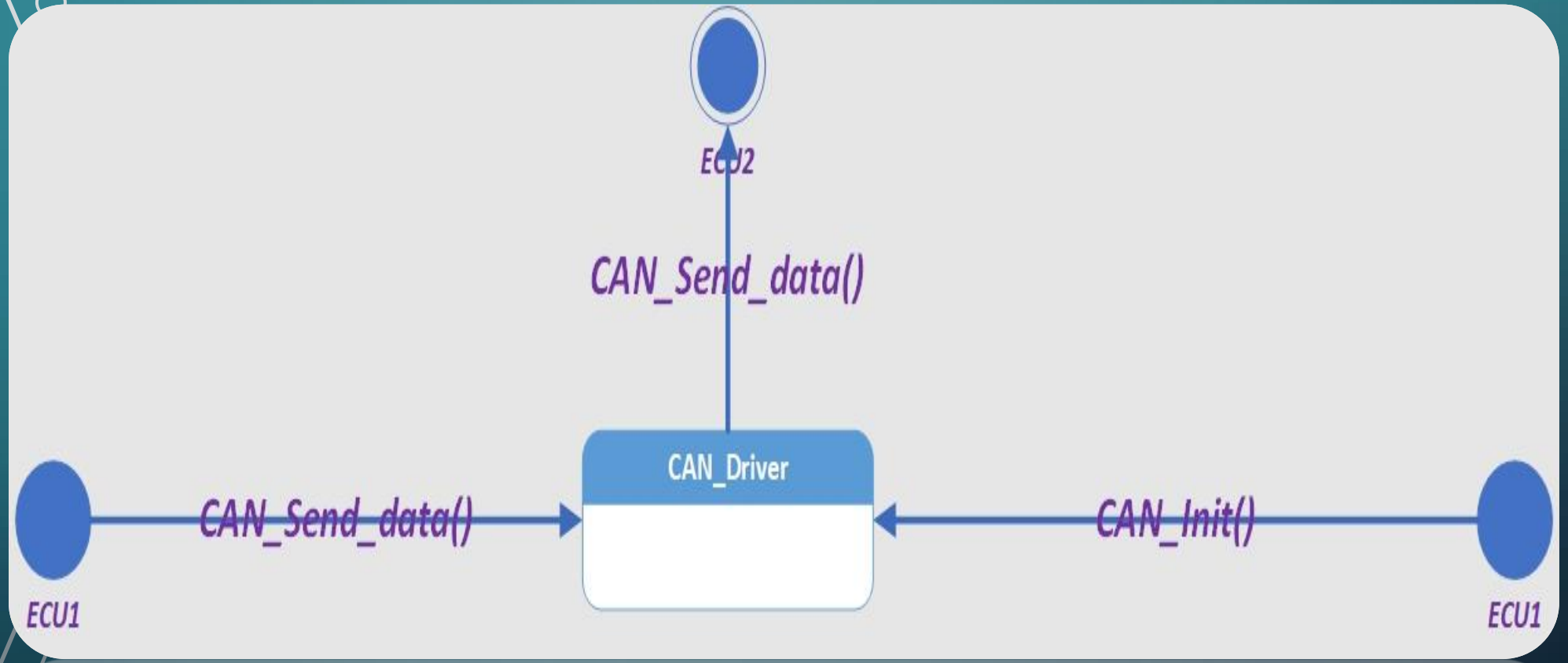
$$CPU\_load = ((0.5*20)/5) + ((0.5*20)/10) + ((0.5*20)/20) = 3.5\%$$

$$\underline{\boldsymbol{CPU\_load = 3.5\%}}$$

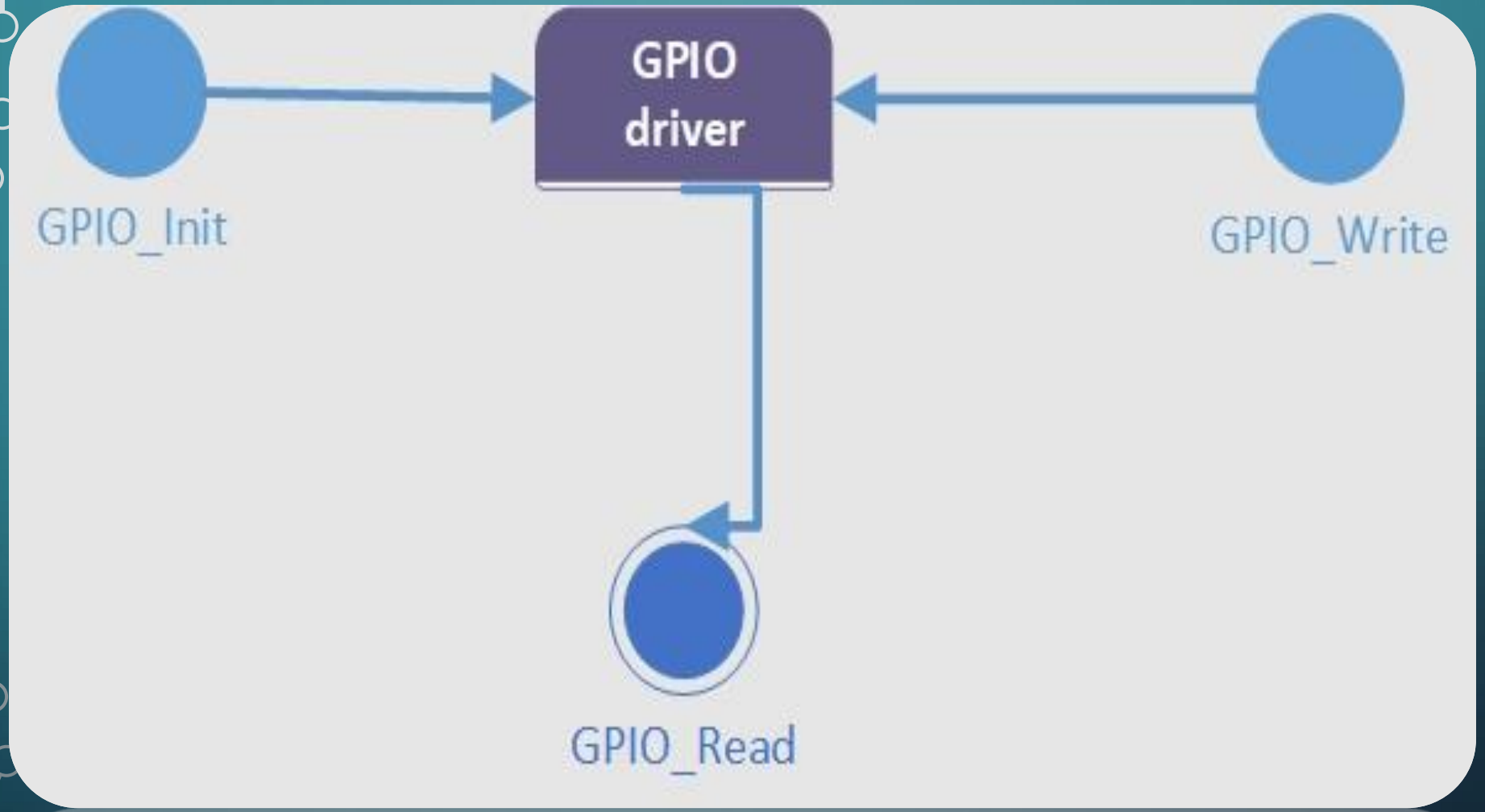
ECU2 STATE MACHINE


CAN_SEND()
CAN_Drivr
Send_Data_CAN()
Light_Switch_status
20ms
BCM
DOOR_Status
10ms
ECU1
ECU1
Spped_Sensor_status
5ms
ECU1

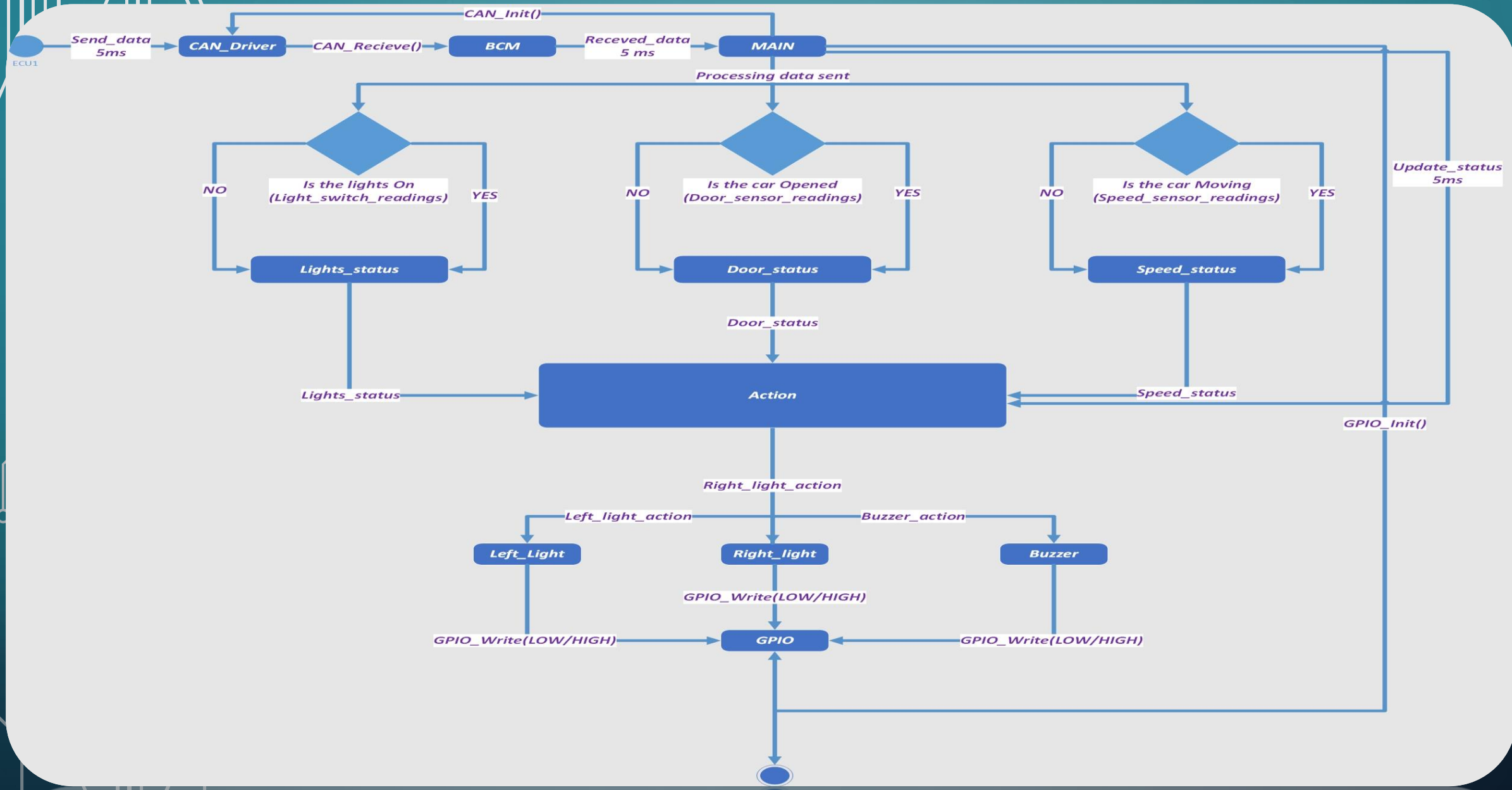
BCM DRIVER


ECU2
CAN_Send_data()
CAN_Driver
CAN_Send_data()
CAN_Init()
ECU1
ECU1

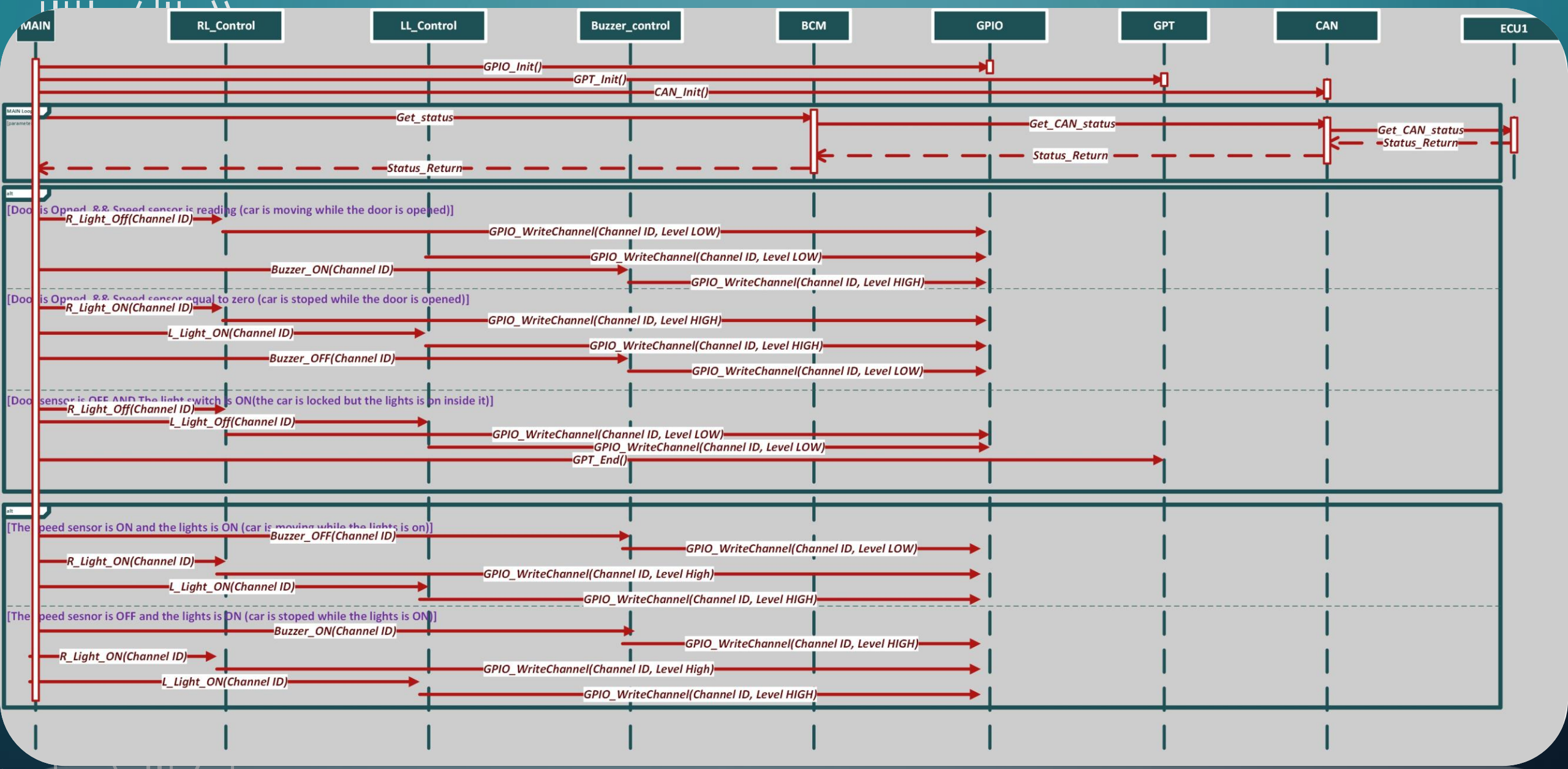
CAN DRIVER



GPIO DRIVER



TOTAL ECU2 STATE MACHINE



ECU2 SEQUENCE DIAGRAM

ECU2 CPU LOAD CALCULATION

there are three tasks running as below:

- Task1: lights_Task => periodicity = 10ms
- Task2: Buzzer_Control => periodicity = 10ms

Assuming each task has an execution time of 0.3ms and the Hyper-period will be 10ms as it is the period which the system will repeat itself again So we could calculate the CPU load as fellow:

$$CPU\_load = total\ execution\ tasks\ time\ /\ Hyper\ period$$

$$CPU\_load = ((0.3*10)/10) + ((0.3*10)/10) = 0.6\%$$

$$\underline{CPU\_load = 0.6\%}$$