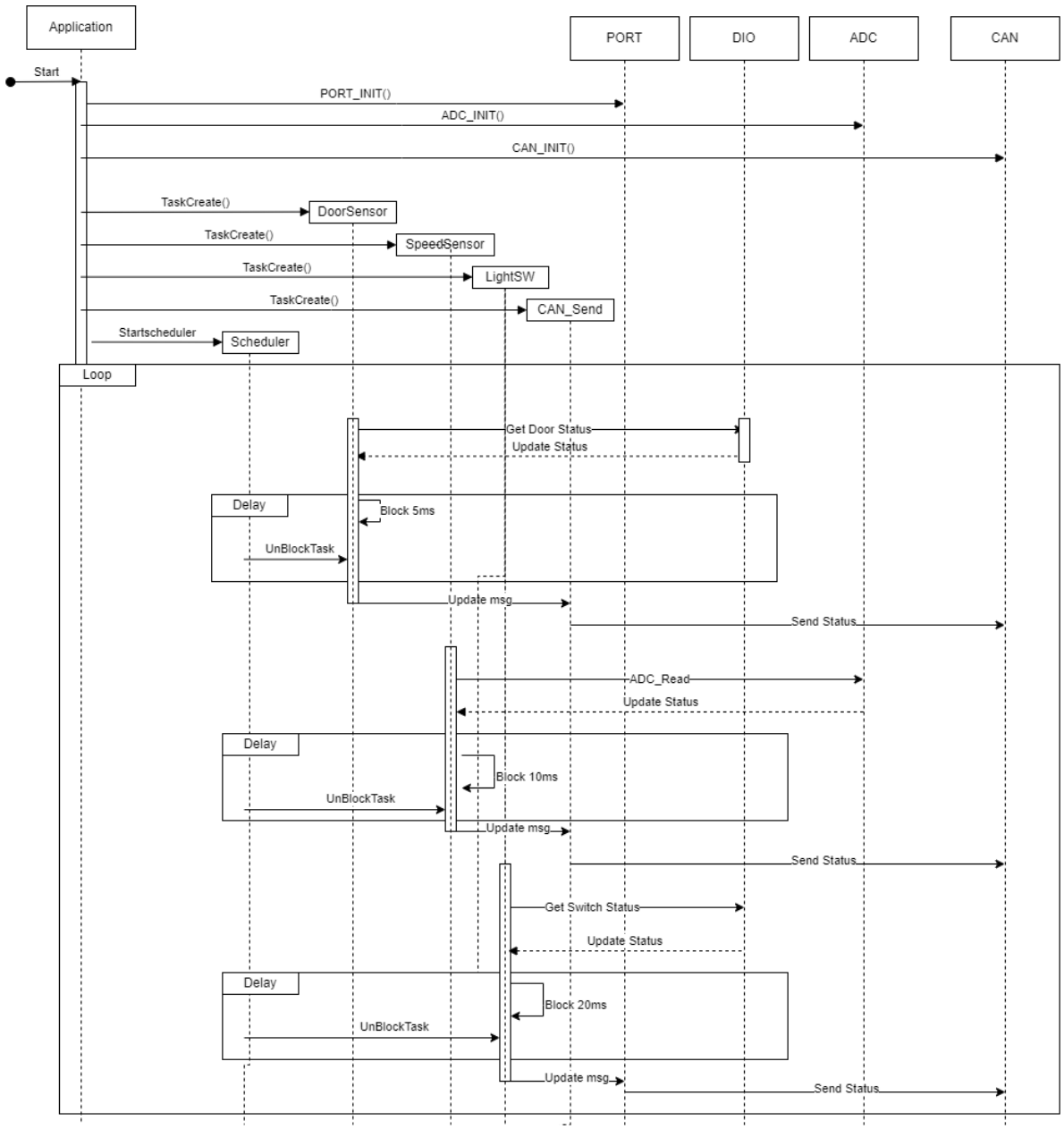
Dynamic Design

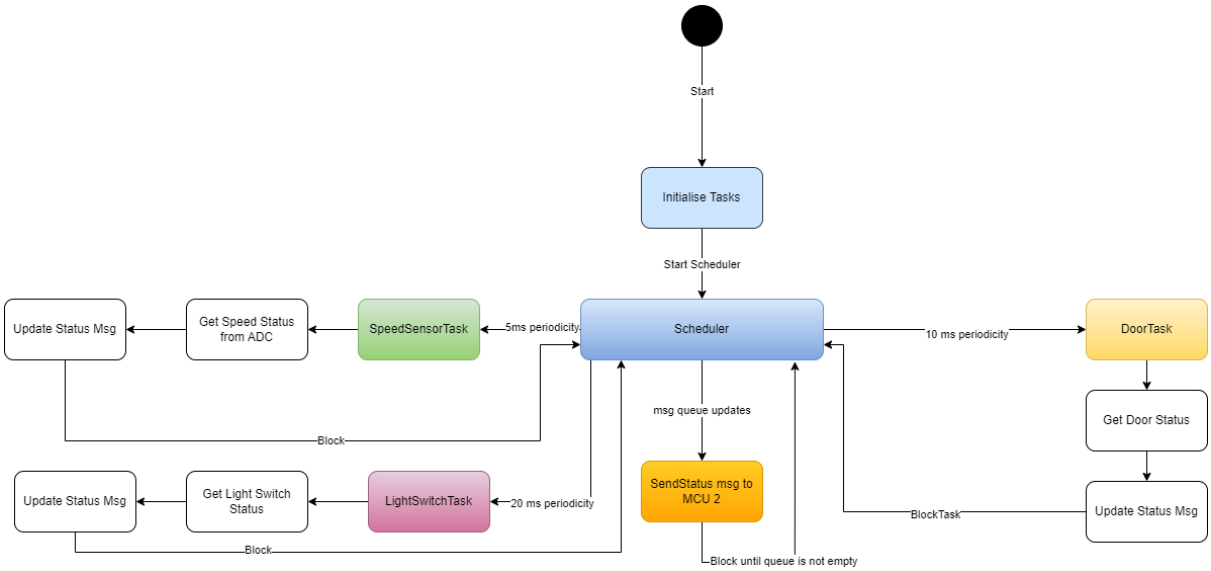
Automotive Door Control System Design

Contents

MCU 1 Sequence Diagram



MCU 1 State Machine

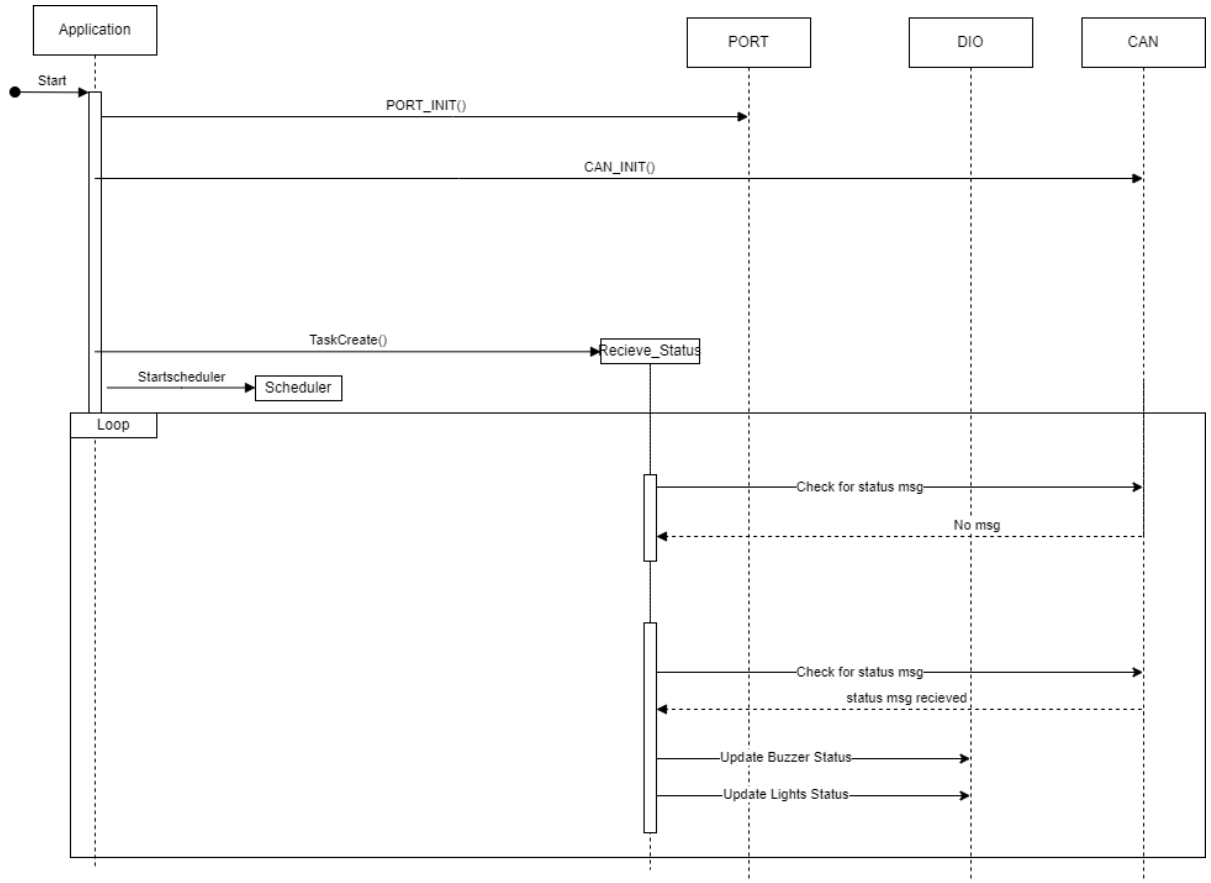


MCU 1 CPU Load (Assuming missing data)

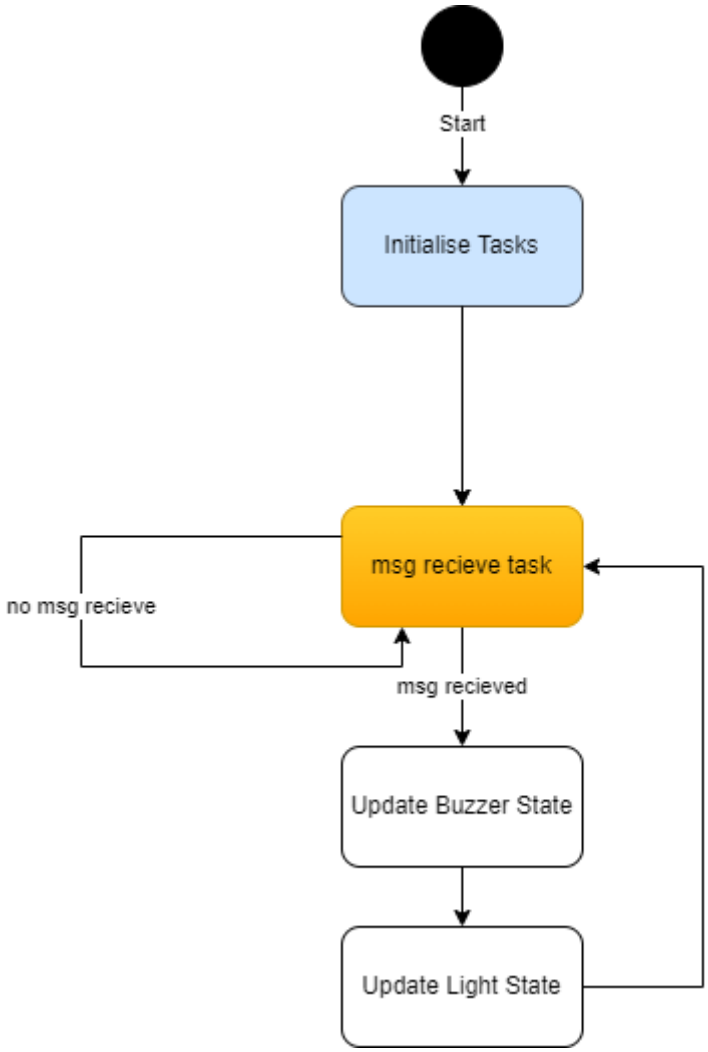
Task Name	Execution Time	Period
Door_Sensor	15 us	10 ms
Speed_Sensor	30 us	5 ms
Light_SW	15 us	20 ms
Send_Status	20 us	5 ms

CPU Load = ((0.015 x 2 + 0.030 x 4 + 0.015 + 0.020 x 4) / 20) x 100% = 0.925%

MCU 2 Sequence Diagram



MCU 2 State Machine



MCU 2 CPU Load (Assuming missing data)

Task Name	Execution Time	Period
Update LL state	15 us	10 ms
Update RL state	15 us	10 ms
Update Buzzer State	15 us	10 ms

CPU Load = ((0.015 + 0.015 + 0.015) / 10) x 100% = 0.45%

Bus Load

Sensor	Period	Message Rate
Speed Sensor	5 ms	200 messages/s
Door Sensor	10 ms	100 messages/s
Light SW Sensor	20 ms	50 messages/s

Total messages on bus = 350 message/second

Assuming simple can protocol with a 125-bit frame length at a speed of 500kbit/s:

Bus Load = ((Total Messages / 1000) * (Frame Length / 125)) x 100%

Bus Load = ((350 / 1000) * 250 / 125) x 100% = 7.0%

Therefore, the bus load of the system is 7.0%, indicating that the system has sufficient bandwidth to handle the message traffic without any significant performance issues.