

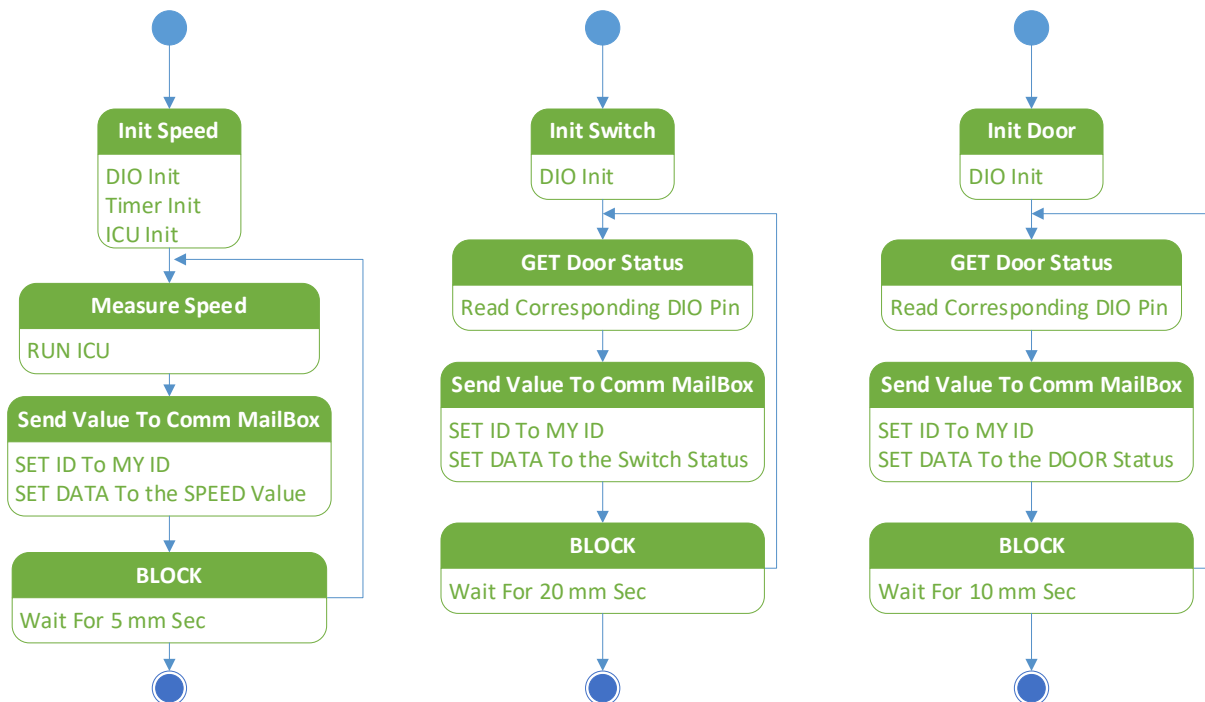
Project #3

Embedded Software Design

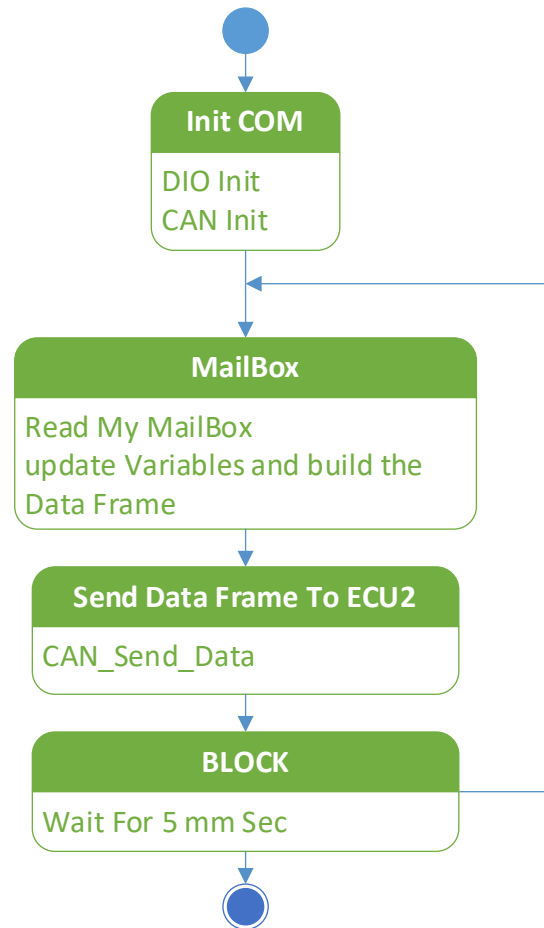
2. Fully Dynamic Design.

- ECU1 Components State Machine

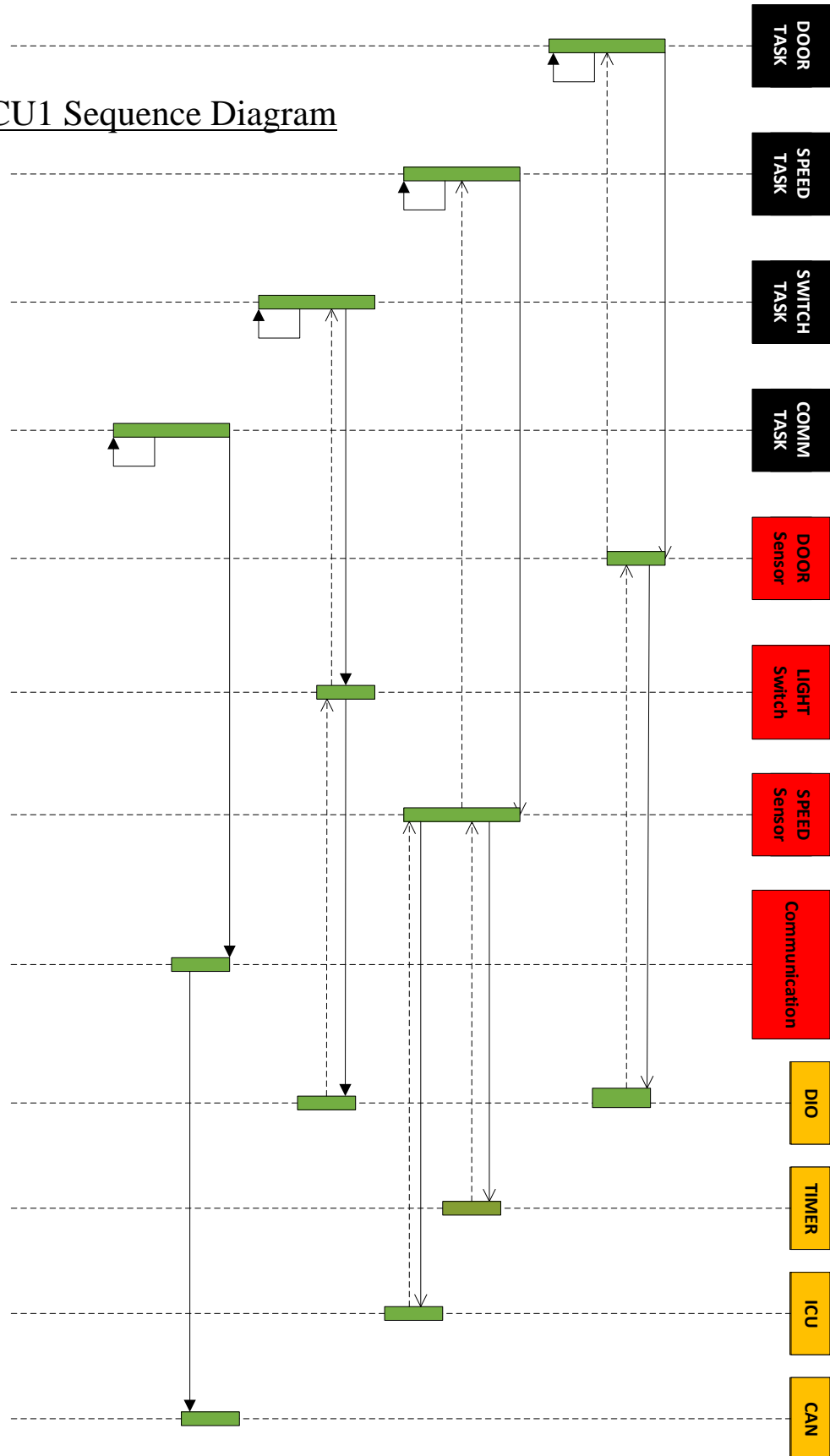
- Speed
- Switch
- Door



➤ Communication



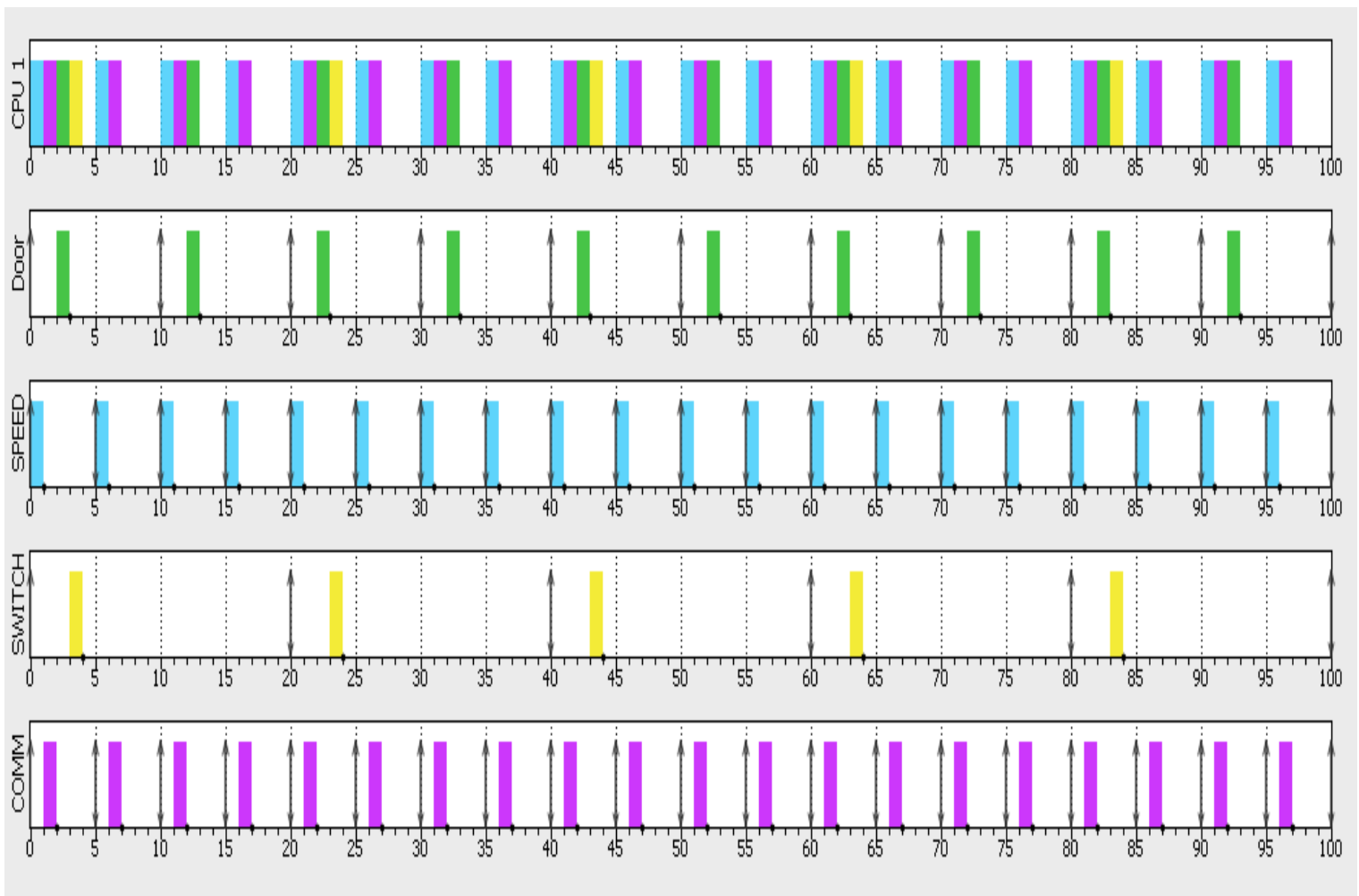
- ECU1 Sequence Diagram

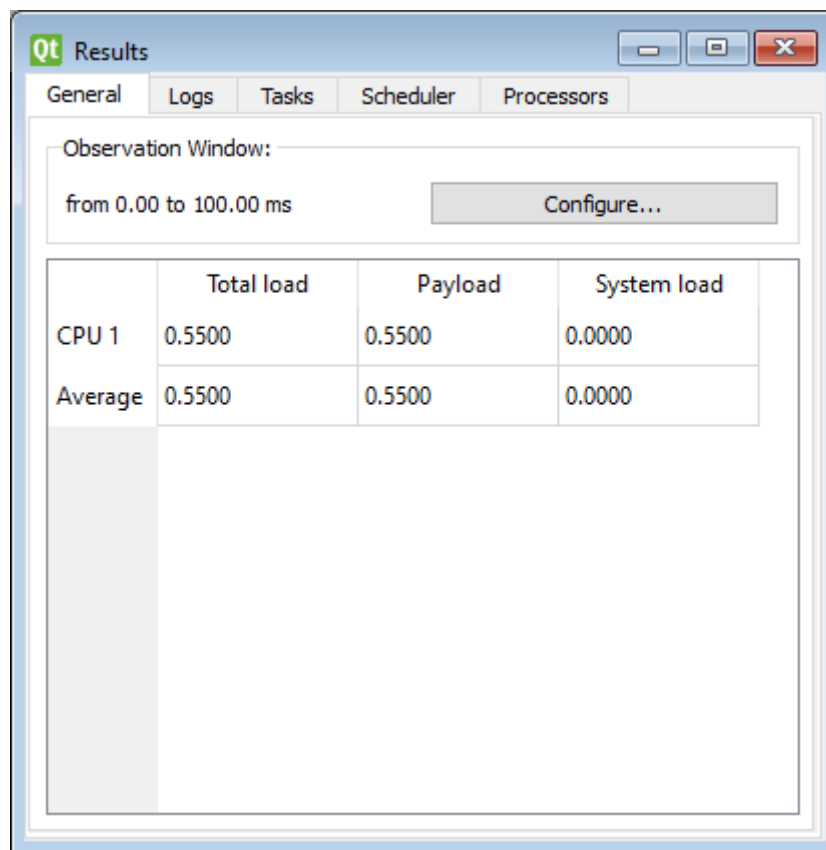


• ECU1 CPU Load

- CPU will be calculated offline using simso
 - EDF schedule
 - Tasks Execution time (Assumed for all tasks):
 - ➔ Assume all tasks take 1ms for execution.
- CPU Load = $((4*1) + (4*1) + (1*1) + (2*1)) / (20)$
= 0.55
= 55%

- ECU1 SIMSO Gantt Chart & CPU Load

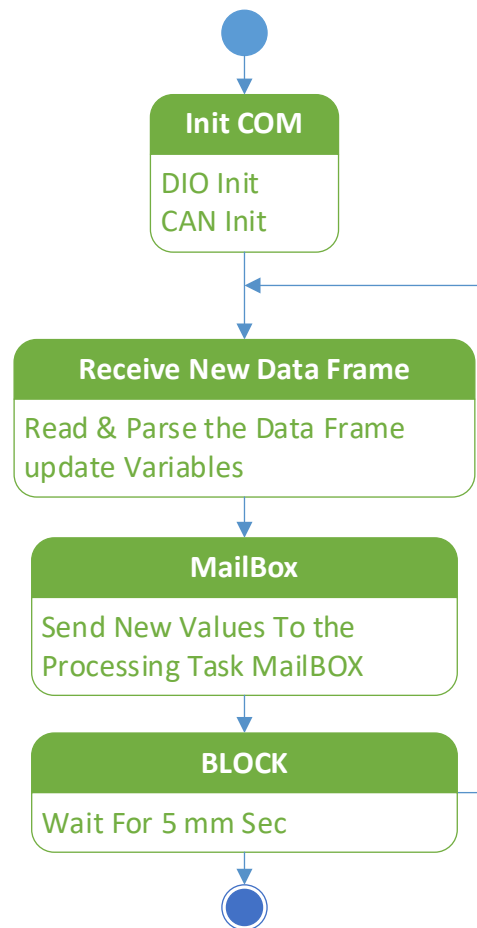


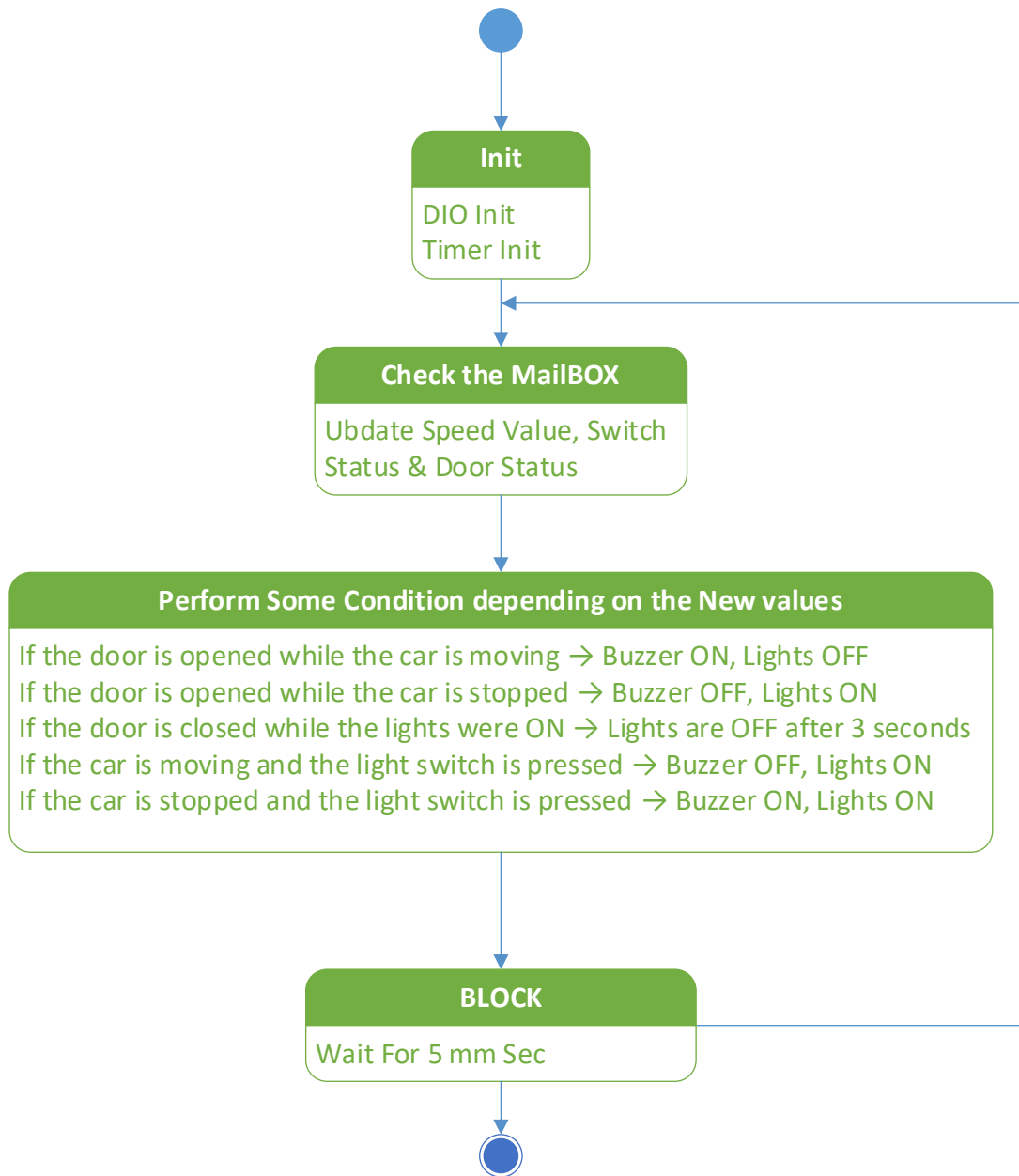


- ECU2 Components State Machine

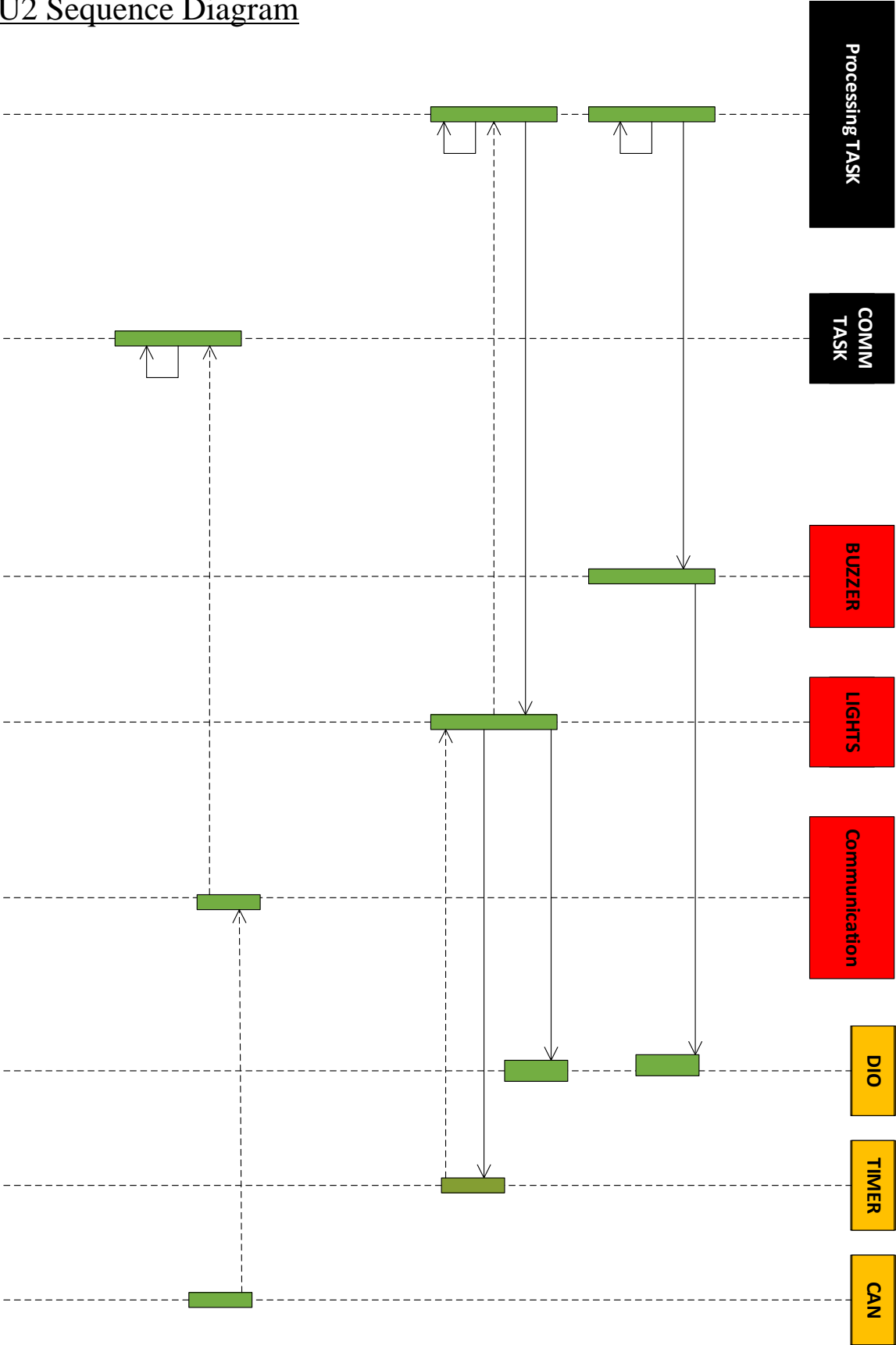
- Communication

- Processing





• ECU2 Sequence Diagram



- CPU will be calculated offline using simso
- EDF schedule
- Tasks Execution time (Assumed for all tasks):

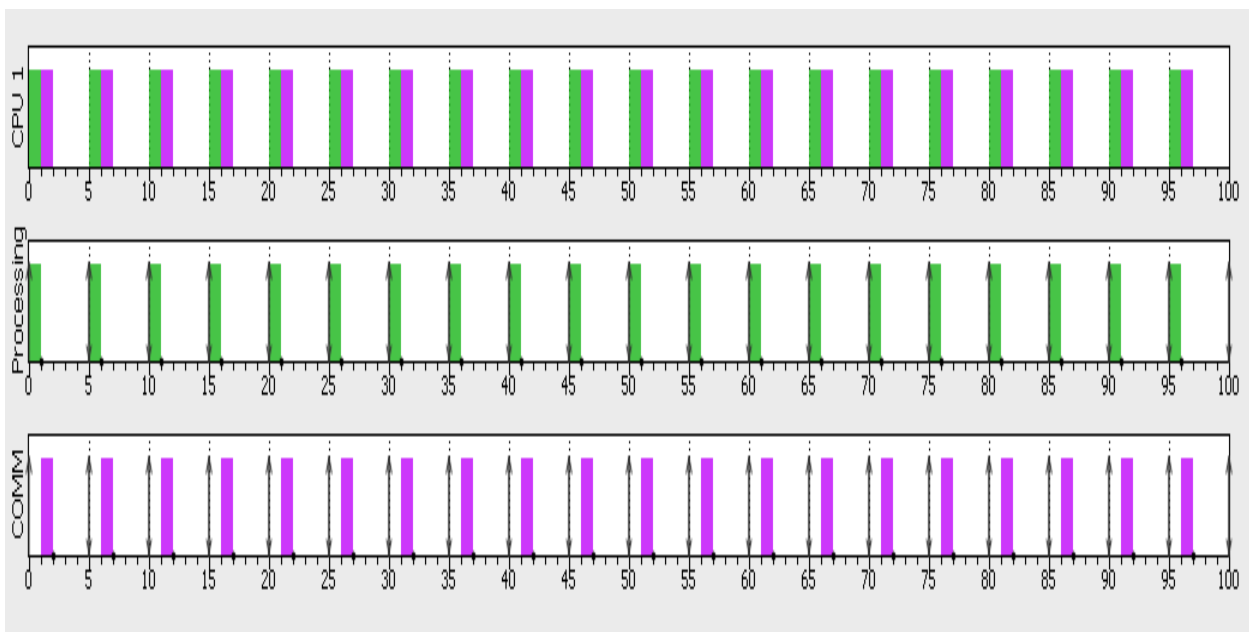
→ Assume all tasks take 1ms for execution.

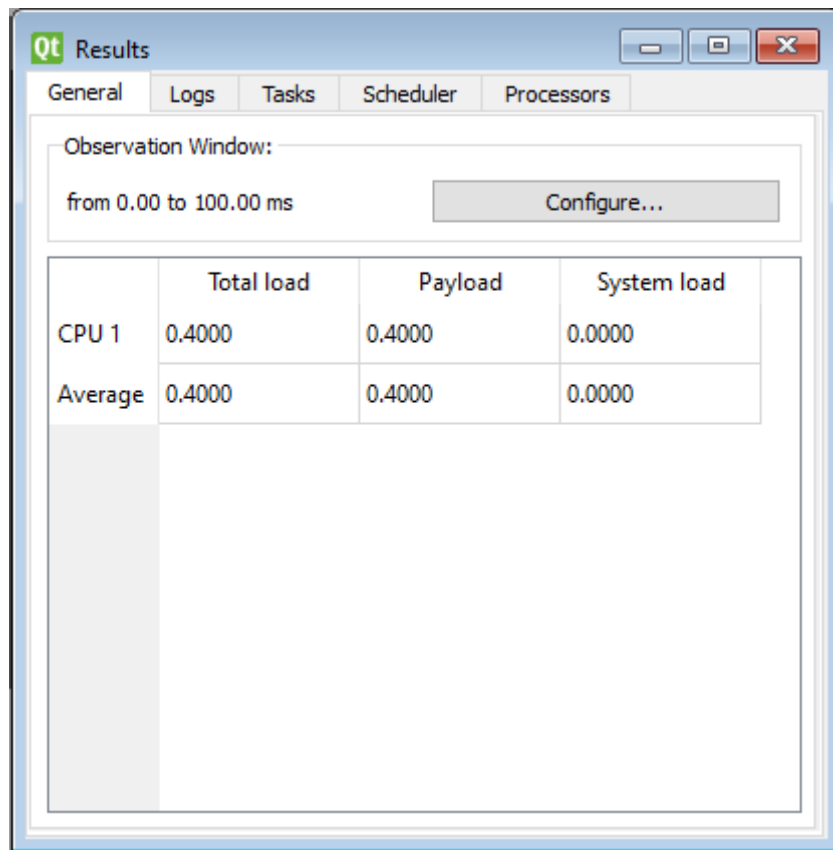
$$\text{CPU Load} = ((1*1) + (1*1)) / (5)$$

$$= 0.4$$

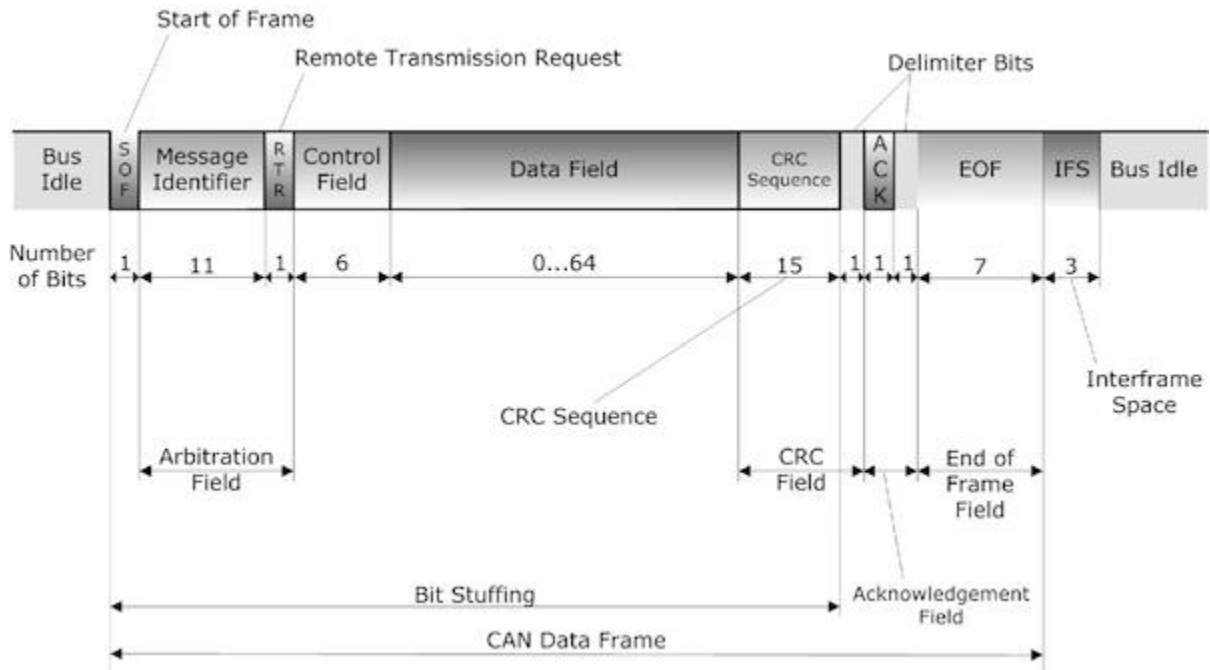
$$= 40\%$$

- ECU1 SIMSO Gantt Chart & CPU Load





- CAN BUS Load Calculation:



the entire frame has a length between 47 and 111 bits, depending on the length of the data field, which can be between 0 and 8 bytes (0 and 64 bits).

At a baud rate of 1 MBit/sec

Therefore, total number of bits sends via the bus in 1 second =
 Message Rate * Message Size = 200 * 111 = 22,200 bits/s

Bit sending time = $(1 / (1024 * 1024))$ sec

Frame sending time = $22200 * (1 / (1024 * 1024)) = 0.021171\text{sec}$

Therefore, Bus Load in one second = 2.12 %