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Nanodegree

Automotive door control design

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**Dynamic design**

**Introduction:**

In this document, we present the dynamic design of the automotive door control system. This design features state machine diagrams for each component in the system, as well as complete state machine diagrams for both ECUs. Additionally, we include sequence diagrams and calculations for CPU loads.

**ECU 1:**

🡪 State machine diagram for full operation of ECU 1Diagram

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**🡪** State machine diagrams for each component in the system

Text

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Diagram

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Diagram

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**ECU 2:**

**🡪** State machine diagram for full operation of ECU 2

A picture containing text, meter, parking

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🡪 State machine diagrams for each component in the system

A screenshot of a computer

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Text

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Graphical user interface

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**CPU load for the ECU**

**ECU 1**

Every 20 milliseconds, all tasks within the system are scheduled. The hyperperiod for ECU 1 is 20 milliseconds, and if it's assumed that all tasks take an equal amount of time to execute, with a duration of 1 millisecond.

**CPU Load ECU 1** =(E1+E2+E3)/Hyperperiod= (1\*1+1\*2+1\*4)/20=35%

**ECU 2**

MCU 2 is triggered every 5 milliseconds by the CAN driver, which results in the Communication task also being scheduled at this interval. As a result, the DataHandling task is activated every 5 milliseconds as well. The overall cycle time for the system is set at 5 milliseconds. Assuming all tasks have equal execution time and that time is 1millisecond.

**CPU Load ECU 2** = (E1+E2)/H=(1\*1+1\*2)/5=40%