

**Dynamic Design for Door Control System**

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**ECU 1**

1. **Components State Machine Diagram**

Diagram, schematic

Description automatically generated

Diagram, schematic

Description automatically generated

Diagram, schematic

Description automatically generated

1. **ECU Operation State Machine Diagram**

Diagram

Description automatically generated

1. **Sequence Diagram**

Chart

Description automatically generated with medium confidence

1. **CPU Load Calculations**

The system contains three tasks assuming worst case scenario that the execution time of task is **500 µs.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Task** | **Periodicity** | **Task Frequency** | **Execution Time** |
| **SpeedSensorTask** | **5 ms** | **4** | **2 ms** |
| **DoorSensorTask** | **10 ms** | **2** | **2 ms** |
|  |  |  |  |
| **LightSwitchTask** | **20 ms** | **1** | **1 ms** |

Hyper Period is 20ms  
CPU Load =2= 65 %

**ECU 2**

1. **Components State Machine Diagram**

Diagram

Description automatically generated

Diagram

Description automatically generated

Diagram

Description automatically generated

1. **ECU State Machine Diagram**

Diagram

Description automatically generated

1. **ECU Sequence Diagram**

A picture containing diagram

Description automatically generated

1. **ECU Load Calculations**

|  |  |  |  |
| --- | --- | --- | --- |
| **Task** | **Periodicity** | **Task Frequency** | **Execution Time** |
| BuzzerTask | 5 | 2 | 1 ms |
| LeftLightTask | 10 | 1 | 1 ms |
| RightLightTask | 10 | 2 | 1 ms |
| ReceiveDataTask | 5 | 2 | 2ms |

Hyper Period is 10 ms  
CPU Load = = 80%

**CAN Bus Load Calculations**

Assuming CAN Frame is 125bits with 64bits Data Frame  
Given that CAN Bus Speed is 500kb/s

Speed Sensor Task Load per second =

Door Sensor Task Load per second =

Light Switch Task Load per second =

CAN Bus Load per second=0.05+0.025+0.0125= 0.0875ms = 8.75%