

# Test of RTOS in Viking's car Master Controller

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# 1 Introduction

The purpose of the experiment is to test the RTOS in the car. And check if the States in the state machine is running correct.

## 2 Setup and Execution of the Experiment

The Master Controller is turned on and the test program is flashed to the PicoZed. The program is going to cycle through each state while the tasks are running in the background.

The software used to program and test the PicoZed is listed below:

- Vitis Unified 2024.1
- Vivado 2024.1
- PuTTY version 0.81

### 2.1 List of functions to test

The following list shows all the functions that needs to be tested.

- PS\_allive\_task
- LVS\_measurement\_task
- Sensor\_measurment\_task
- main\_state\_machine\_task
  - state\_init
  - state\_idle
  - state\_lv\_systems\_active
  - state\_precharging
  - state\_tractive
  - state\_drive
  - state\_shutdown
  - state\_error

## 3 Data Collection & Results

The result is shown in a terminal as the one shown in figure 1. All the resluts are also pasted into the report. The results are summed up in a table below the results.

```
PuTTY (inactive)
SW voltage: 0.013 V.
SW angle: 4294967296.000 V.
BP0 sensor value: 13.000.
BP0 voltage: 0.016 V.
BP0 percentage: -24.312
BP1 sensor value: 12.000.
BP1 voltage: 0.017 V.
BP1 percentage: -24.250
TP0 sensor value: 12.000.
TP0 voltage: 0.016 V.
TP0 percentage: -129.533
TP1 sensor value: 13.000.
TP1 voltage: 0.015 V.
TP0 percentage: -129.642
TPs out of range
Idle state
PS_allive task
Idle state
Idle state
Idle state
LVS_Current_messurment
SW sensor value: 13.000.
SW voltage: 0.013 V.
SW angle: 4294967296.000 V.
BP0 sensor value: 14.000.
BP0 voltage: 0.016 V.
BP0 percentage: -24.375
BP1 sensor value: 12.000.
BP1 voltage: 0.017 V.
BP1 percentage: -24.250
```

Figure 1: Data collected in terminal.

### 3.1 States

The following printout is from the test:

```
Master controller software initializing
init state
init state
init state
init state
init state
init state
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init state
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```

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Idle state  
Idle state  
Idle state  
LV systems active state  
LV systems active state  
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init state  
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init state  
init state  
init state

The collected data is showing that the program is running in all the states the Master Controller has

## 3.2 Tasks

The following results is the tasks running.

Idle state  
PS\_allive\_task  
LVS\_Current\_messurment  
SW sensor value: 12.000.  
SW voltage: 0.013 V.  
SW angle: 4294967296.000 V.  
BP0 sensor value: 12.000.  
BP0 voltage: 0.015 V.  
BP0 percentage: -24.250  
BP1 sensor value: 11.000.  
BP1 voltage: 0.017 V.  
BP1 percentage: -24.188  
TP0 sensor value: 13.000.  
TP0 voltage: 0.013 V.  
TP0 percentage: -129.533  
TP1 sensor value: 11.000.  
TP1 voltage: 0.015 V.  
TP0 percentage: -129.316

```

TPs out of range
Idle state
Idle state
Idle state
Idle state
LVS_Current_messurment
SW sensor value: 12.000.
SW voltage: 0.013 V.
SW angle: 4294967296.000 V.
BP0 sensor value: 13.000.
BP0 voltage: 0.016 V.
BP0 percentage: -24.312
BP1 sensor value: 12.000.
BP1 voltage: 0.017 V.
BP1 percentage: -24.250
TP0 sensor value: 12.000.
TP0 voltage: 0.016 V.
TP0 percentage: -129.533
TP1 sensor value: 13.000.
TP1 voltage: 0.015 V.
TP0 percentage: -129.642
TPs out of range
Idle state
PS_allive_task

```

This result is slightly more chaotic. This is due to the fact that many of the tasks are happening at the same time. The following list is listing the results:

- PS\_allive\_task → There is a LED flashing on the Master Controller, there is however also a printout in the terminal to ensure that the task is running.
- LVS\_measurement\_task → This is indicated via the LVS\_Current\_messurment printout.
- Sensor\_meurment\_task → This task is seen through all the measurment readouts. (The readouts are not correct the master controller is not connected to anything.).
- main\_state\_machine\_task → This readout is whenever a state is printed.

### 3.3 Results

The results has been summed up in the following tabels:

Task	Passed / failed
PS_allive_task	Passed
LVS_measurement_task	Passed
Sensor_meurment_task	Passed
main_state_machine_task	Passed

State	Passed / failed
state_init	Passed
state_idle	Passed
state_lv_systems_active	Passed
state_precharging	Passed
state_tractive	Passed
state_drive	Passed
state_shutdown	Passed
state_error	Passed

## 4 Conclusion

Based on the results is the conclusion that the task and state machine is working as intended in the RTOS.