Inlämningsuppgift #2

Realtime systems

Publishing date: 2022-11-26

Due date: 2022-12-03 kl 23:59

Every modern car has at list 6 cars computers connected to each other over CAN protocol and collect info from tenth of sensors and process need data. A part of this data is critical and the other is just collected to be processed upon frequent service that every car needed.

Our part for this question is motor part that we need to simulate it as next:

1- We need to simulate a ***motor controller embedded board***, that sends a message **every second** over **queue or queue set** to 2 other simulations (ventilation and fuel) asking if all ok or there are errors and collect info from them. This controller does self-check to motor and gearbox on the same frequency (every second), and it is also responsible to write info on the **shared dashboard** (here will be Arduino Serial monitor) and output are like next table: **(30 points)**

table#1:

message	Upon sending	output upon success	output upon fail
Self-check motor and rpm	"Checking motor"	"M.G is ok, speed xx and rpm is yyyy"	"x01:Error: M.||Gb."
To ventilation	"Checking vent."	"Vent. Is ok"	"x02:Error: Vent"
To Fuel	"Checking Fuel"	"Fuel.is xx.yy%"	"0x3: low fuel" if less than 10.00%" "0x4 good fuel" if more than 10%

2- The 2nd simulation is ***ventilation system***:

a. that respond to motor simulation as per table#1 through same Queue set or Queue!
b. as well as write to the shared dashboard: *"Y*Y*"* if ventilation is ok, or *"N*N*"* if not!

(20 points)

3- The 3rd Task is ***fuel system***:

a. that respond to motor task as per table#1 through same Queue set or Queue!
b. as well as write to the shared dashboard: *"hh "* if fuel more than 10.00%, *"UU"* if less than 10.00%
(20 points)

the Questions are:

a. What are the best message structures and what are the optimal data types? **(5 points)**
b. What is the best FreeRTOS Technik to grant access to Shared Dashboard? **(5 points)**
c. After programing these simulations in FreeRTOS In Arduino IDE please show outputs of your program upon these scenarios:
    1) Motor is OK, speed 90, RPM 2500, Ventilation is not ok and fuel 50.03% **(10 points)**
    2) Motor is OK, speed 90, RPM 2500, Ventilation is ok and fuel 09.30% **(10 points)**

Betyg :

<70 IG

>70 G

>85 VG