CAN Lab 1

Version 2016-09-21

Aim

Getting started with CAN, CANking and MCP2515.

Literature

Document "Getting started with CAN", data sheet for MCP2515, can.h, can.c

Brief summary

Setup the hardware according to the Getting started with CAN manual. There are also some example programs provided.

Reporting

Demonstrate all programs for the teaching assistants. The last exercise should be submitted on KTH Social.

0. Introduction

In this lab we are going to work with CANking and the combination EVK1100+MCP2515. A guide how to use CANking can be found in "Getting started with CAN"

1. CAN questions

Exercises

1. Describe a CAN message, draw a picture. What is the maximum data amount that you can send in one package?
2. What is NRZ? How does it work?
3. What is bit stuffing? What is the worst case message to send in terms of extra added stuff bits? Show one example.
4. How does the bit timing in CAN work?
5. What is CRC? What is a parity bit?

6. Why do we need termination resistors? How does the cable length affect the maximum bus speed?
7. If two messages are being send one the same time on the CAN bus, let us say, id 010101 and id 101010, which one will be received and why?
8. Describes the different "Frames".

2. CANking + CANking

Connect the Kvaser Can dongle to the lab PC and start the software "CANking". The aim is to send messages from one computer to another.

Use the **Green CAN bus**. Partner with your neighboring PC lab team.

Exercises

2.1 Send one standard id message to another computer using CANking over the CAN bus.

2.2 Send an extended id message

When you are familiar with CANking, sending and receiving messages, move to the **YELLOW CAN bus** and experiment with the Scania dashboard. Please refer to the dashboard manual for specific CAN ID numbers and specifications.

Exercises

2.3 Experiment with the dashboard. Make sure that you are able to move the tachometer and engine speed.

3. CANking+MCP2515

Now we turn to use the EVK 1100 and the CAN controller, MCP2515. Connect according to the instructions in "Getting started with CAN".

Use the files **can.c**, **can.h** and **regs2515.h** that can be found on the homepage and create one project. Use the example program in "Getting started with CAN".

First, connect the MCP2515 module directly to the CAN dongle.

Exercises

3.1 Are you sure the termination resistance is correctly configured? Measure the resistance between CAN_H and CAN_L. How much?
3.2 Now, adapt the example CAN program so that you can send and receive CAN messages between the AVR32 and the CAN dongle.
3.3 Connect the MCP2515 to the yellow CAN bus and write a program that reads values from the dashboard.

3.4 Adapt the program so that you can control the dashboard with the EVK 1100

Final Exercise

3.1 Write a program that reads the value of the potentiometer on the EVK1100 and controls the speedometer of the dashboard. Max turn to the left should show 0 km/h, and max turn to the right should show 100 km/h on the dashboard. Make sure that all team members are mentioned in the code, and submit the code to the teaching team upon completion on KTH Social.