Automotive Technology

VE/TI Lab

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Experiment 2

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2. Introduction to CANoe

CANoe is a software component for development, testing and analysis of control unit networks. In the automotive industry, this tool is a tool of common use for the simulation of communication networks.

By the means of CANoe, the developer has the possibility to monitor the bus communication between distributed systems, and respectively, for simulating different states.

All the files requested for this experiment are shared online.

2.1 Introduction

The software component CANoe published by the enterprise Vector is available as free download for the work in the lab.

- As a first step, learn how to use the user surface of the program and use the sample configurations as well as the online tutorials (there are tutorials published by Vector available online) for getting familiar with the program after proceeding on this second experiment.
- Get familiar with these notions: CANdb++ editor (signals, messages), trace window, CANoe panel, network node, database, communication matrix.

It is necessary to be well prepared for this experiment!

2.2 Bosch rotation rate sensor

Rotation rate sensors belong to the group of inertial sensors and they measure, besides the lateral acceleration in x, y and z direction, the rotation speed of vehicles in relation to the vehicle's vertical axis (z axis).

The sensor is connected to the working space in the lab and is sending cyclically different signal values, via two CAN messages on the lab's CAN. For observing this, watch the video "VE TI Lab 2.2" available online.

2.3 CANoe configuration

Therefore, consider the video related to experiment 2.3 available online.

The hardware VN1630 is getting connected to the PC and a new CANoe configuration is getting created. Afterwards, a measurement is being proceeded.

a) How many messages are visible in the Trace window?

= 2 messages

b) What are their identifiers?

= CAN1-100 & CAN2-200

c) What is the DLC you can see in the messages?

= DLC – 8

d) What is the cyclic time (Δ t) the messages are send with?

= 10 ms

2.4 Database

By the means of databases, the different signals contained in the messages can be filtered and decoded. Usually, the signal and message information is defined by the producer of the control unit or the sensor/actuator.

According to the data sheet of the present rotation rate sensor, you can find the following information concerning the messages and the signals:

Drehgeschwindigkeit

Identifier:	0x100
Byte:	0 und 1
Min-Wert:	-163.84 ◦/s = 0x0
Mittel-Wert:	0 ◦/s = 0x8000
Max-Wert:	+163.84 ◦/s = 0xFFFE Quantisierung:
Quantisierung:	0.005 ◦/s/digit

Querbeschleunigung in Y-Richtung

Identifier:	0x100
Byte:	4 und 5
Min-Wert:	-4.1768 g = 0x0
Mittel-Wert:	0 g = 0x8000
Max-Wert:	+4.1768 g = 0xFFFE
Quantisierung:	0.000127465 g/digit

Drehbeschleunigung

Identifier:	0x200
Byte:	0 und 1
Min-Wert:	-4096 $\circ/s^2$ = 0x0
Mittel-Wert:	0 $\circ/s^2$ = 0x8000
Max-Wert:	4095 $\circ/s^2$ = 0xFFFE
Quantisierung:	0.125 $\circ/s^2$/digit

Querbeschleunigung in X-Richtung

Identifier:	0x200
Byte:	4 und 5
Min-Wert:	-4.1768 g = 0x0
Mittel-Wert:	0 g = 0x8000
Max-Wert:	+4.1768 g = 0xFFFE
Quantisierung:	0.000127465 g/digit

Pay attention: all the messages are sent in intel format.

- Watch the 3 corresponding videos available online.
- Open the database editor by *Tools -> CANdb++ Editor*
- Create a new database by a CANoe template and save the file using the name Drehratensensor.dbc
- On the left hand of the editor, you can add networks, control units, messages and signals etc. Create the four measurands seen above (in the tab "signals", by using right-hand click).
  Take into consideration the correct *transformation formula*, as well as the units.
  (Note: in the tab definition -> inertial value)
- By using the tab Layout in the message properties, you can connect the signals already defined to the databytes of the CAN message, according to the information in the data sheet. Save all the settings.

Now add the database you created before to the CANoe simulation setup (simulation -> simulation setup). On the right hand (figure 2.1) you can find a network overview where you can add databases by right-hand clicking on databases -> add). You can see the running simulation in the video.

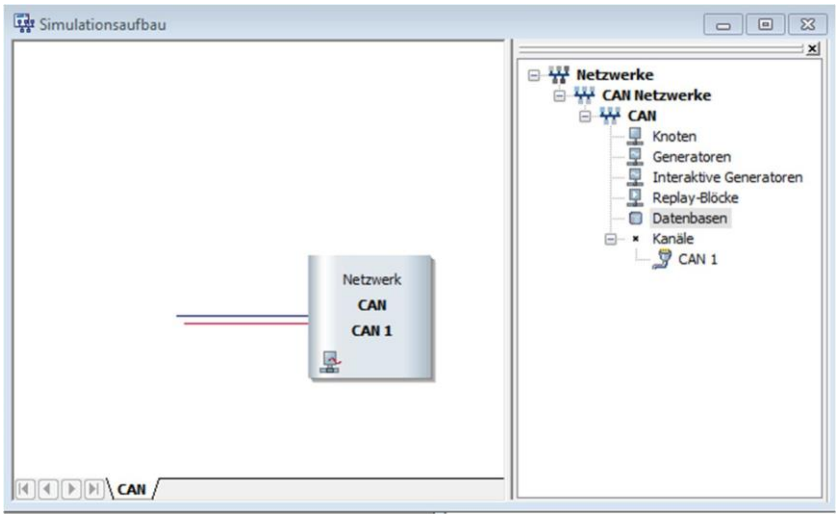

Figure 1: simulation setup

e) What is different when looking at the message in the Trace window now?