AutoPlug: Hardware requirements and setup

Before heading to this part, see the readme.txt file for the software setup and the Autonet2010.pdf report in the documentation folder to get an idea of what AutoPlug is.

1 Hardware requirements

- **Freescale HCS12 microcontrollers**: We need **4** of them (the setup has 4 ECUs).
- **Peak Systems PCAN-USB**: While **1** of these is enough for the setup, if you will write your own code and will need to see messages on the CAN bus, you should get **2** of these. We have not worked with any other CAN-USB adapter, so we recommend using this (`http://bit.ly/YF7TLs`). You will need to download (to the machine running TORCS) the drivers (on the same link) to use the adapter and also download the PCAN monitor (also on the same link) to view messages on the CAN bus (if you are using 2 adapters).
- **USB-USB cables for the HCS12**: **4** of them, one for each controller (to program the microcontrollers and power them).
- **Serial-USB cables for the HCS12**: **2**. One for the MATLAB ECU and one for the TORCS ECU.
- A linux machine running TORCS.
- A machine running MATLAB (can be the same machine, but we will call it the MATLAB PC for the rest of the document).
- A WiiMote for the driver input.
- A bluetooth adapter (connected to the TORCS machine) to use the WiiMote as input to TORCS.

2 Hardware setup

Figure 1 shows the ECU network that is the main part of the testbed. The 4 ECUs are connected over the CAN bus. The connections to/from every component are as follows

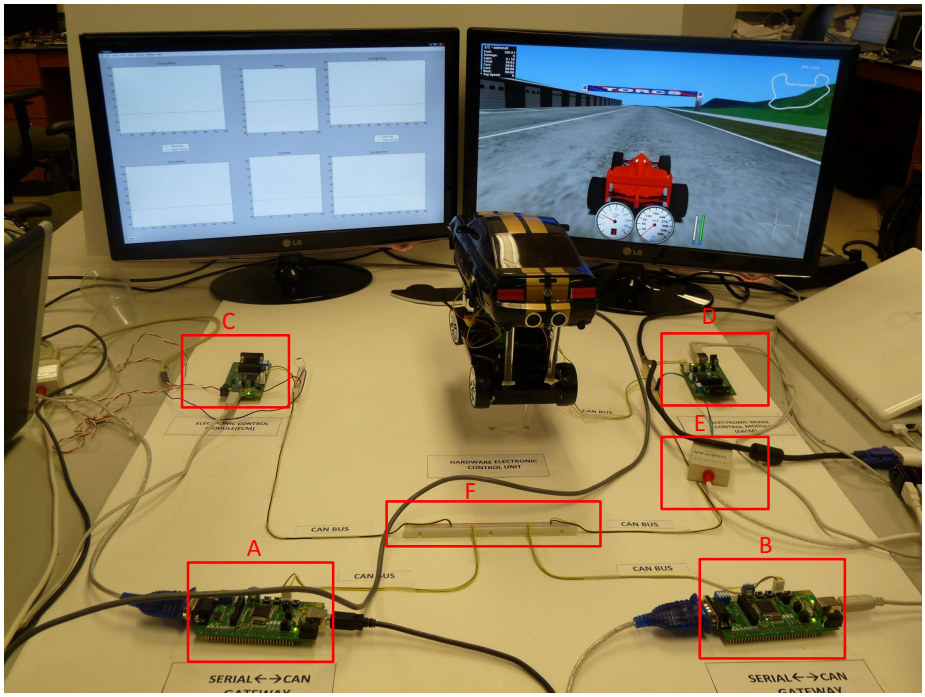

Figure 1: The AutoPlug testbed. A: MATLAB gateway B: TORCS gateway C: Engine ECU D: Brakes ECU E:PCAN-USB Adapter F: The CAN bus

2.1 MATLAB gateway

1. **USB-USB cable:** Is powered (from any machine with free USB ports) via the USB-USB cable connected to it.
2. **Serial-USB cable:** Connects the microcontroller to the MATLAB PC.
3. **CAN connector:** The two wires from the CAN module on the HCS12 connect the MATLAB ECU to the CAN bus.

2.2 TORCS gateway

1. **USB-USB cable:** Is powered (from any machine with free USB ports) via the USB-USB cable connected to it.
2. **Serial-USB cable:** Connects the microcontroller to the TORCS PC.
3. **CAN connector:** The two wires from the CAN module on the HCS12 connect the TORCS gateway to the CAN bus.

2.3 Engine ECU

1. **USB-USB cable:** Is powered (from any machine with free USB ports) via the USB-USB cable connected to it.
2. **CAN connector:** The two wires from the CAN module on the HCS12 connect the Engine ECU to the CAN bus.

2.4 Brakes ECU

1. **USB-USB cable:** Is powered (from any machine with free USB ports) via the USB-USB cable connected to it.
2. **CAN connector:** The two wires from the CAN module on the HCS12 connect the Brakes ECU to the CAN bus.

2.5 PCAN-USB Adapter

1. Is connected to a free USB port on the TORCS machine.
2. **CAN connector:** Two wires (see the PCAB-USB pin connection on the link above) connect the PCAN-USB adapter to the CAN bus.

2.6 WiiMote driver input

1. Is connected to the TORCS machine via the bluetooth adapter connected to a USB port on the TORCS machine.