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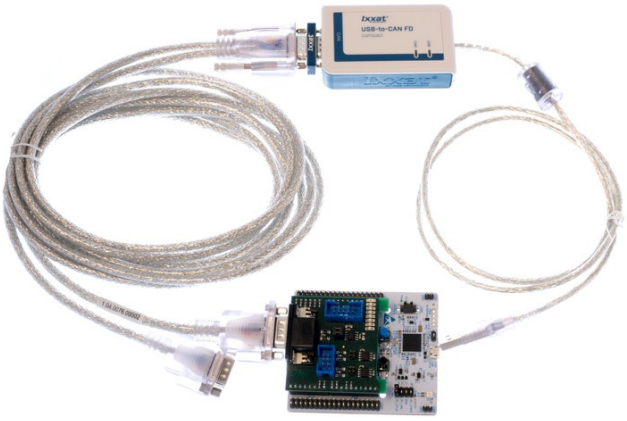
CAN NEWSLETTER MAGAZINE

CANopen FD starter kit: Hardware and software

Emotas' CANopen FD starter kit provides a CAN FD micro-controller board, an extension board with CAN FD transceiver, and a CAN FD USB interface to start with CANopen FD immediately.



CANopen FD starter kit hardware (Source: Emotas)

The complete article is published in the June issue of the CAN Newsletter magazine 2020. This is just an excerpt.

CANopen FD as specified in the CAN in Automation (CiA) specification 1301 uses the new features of CAN FD such as a higher data bit-rate and longer frames up to 64 bytes. Most principles of classic CANopen are reused, but some are extended or modified. The most notable improvement is the new USDO service that provides arbitrary access to CANopen FD objects. Compared to the SDO service of classic CANopen it is not only faster but also provides a broad cast mechanism. The other major improvement is the extended PDO length supporting 64 bytes instead of only 8 bytes in one PDO. Last but not least the Emergency messages have been extended as well to provide more detailed information about errors detected by the device. Unfortunately, the number of CANopen FD devices available on the market is currently limited. This is also a problem for developers who would like to evaluate the new features of the improved protocol. In order to provide a cost-effective solution to get started with CANopen FD, Emotas embedded communication, a German company well-known for its CAN and CANopen FD expertise, offers a CANopen FD starter kit.

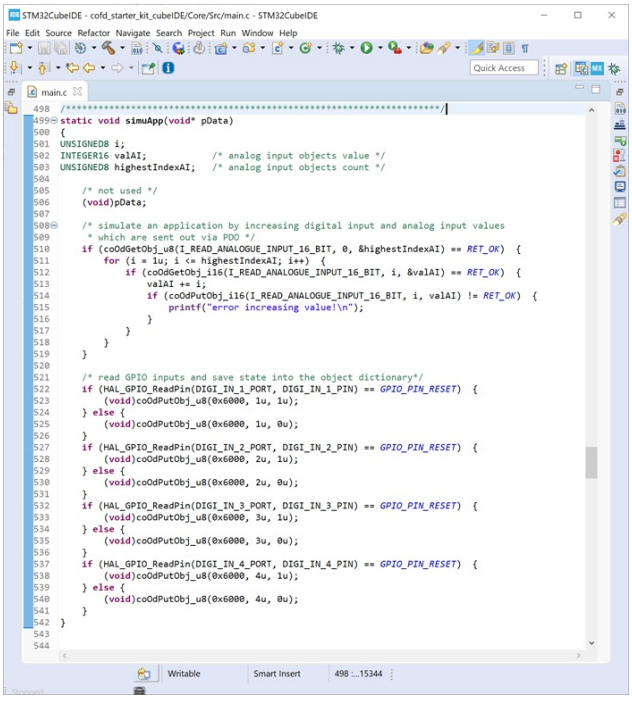
The starter kit unboxed

The CANopen FD starter kit is based on an STM32 Nucleo-64 board with a powerful STM32G4 micro- controller that internally uses an CAN FD controller that supports both Classical CAN and CAN FD. To connect the CAN controller to a CAN FD network a CAN FD transceiver is required. Emotas has developed a specific expansion board with a CAN FD transceiver and DSUB-9 connector to connect the CAN FD network conveniently. The CAN FD transceiver TJA1051 supports up 5 Mbit/s in data phase. In addition to CAN Y-cables to connect also additional devices and two termination resistors the starter kit comes with an Ixxat USB-to- CAN FD interface that supports these bit-rates as well. In addition to the hardware components, the CANopen FD starter kit also includes software: A CANopen FD slave stack to run on the STM32G4 and a CANopen FD tool with CANopen FD master and CAN FD analyzer capabilities.

CANopen FD slave stack

As reported on the CAN Newsletter Online, the Emotas CANopen FD stack was already published in 2017. Based on already three years of CANopen FD experience and recognizing the demand for smaller micro-controllers, the CANopen FD slave stack has been ported to the STM32G4 recently. An evaluation version of Emotas' CANopen FD slave stack runs inside the STM32G4. It is a binary library of the companies source code stack and to limit the use case to evaluation purposes, the run-time is limited to one hour after reset. Nevertheless, it comes with the following CANopen FD features:

- NMT Slave
- USDO server with simultaneous connections (expedited unicast and broadcast, segmented unicast and bulk transfer)
- multiple PDO producers and PDO consumers
- Sync consumer
- Heartbeat producer
- 1 Heartbeat consumer
- Emergency producer



Screenshot application code in STM32CubeIDE (Source: Emotas)

An example application is included as STM32CubeIDE project and it simulates a digital/ analog I/O device with real and simulated values mapped into longer PDO . Several data objects exceeding the length of 54 bytes are included to show the USDO segmented transfer or USDO bulk transfer as well. By default the bit-rate pair of this example is set to 500 kbit/s nominal bit-rate and 2 Mbit/s data bit-rate.

If you would like to read the complete article you can download it free-of-charge or you download the entire magazine.

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