

Abstract

This document contains the description sensor emulator, utilizing **SENT** and **SPC** communication protocols, which among other fields of applications are used by the automotive industry. The purpose of the emulator to emulate various sensors in a test environment, while providing means to control the operational parameters of the aforementioned sensors. The emulation is done by a Texas Instruments **TivaC** microcontroller unit, while the configuration is done over the network on Ethernet. Due to its complexity the system runs **TiRTOS** realtime operating system.

The device is 4 channeled, so the simulation of redundant, safety critical sensor configurations (like the ones used by the automotive industry) is possible. The device is controllable over the network, since its basic function is to unburden the test process, making it part of an automated test-environment. To facilitate this kind of application the device can be operated on various access levels. A low level access operates it as a digital signal generator, synthesizing a digital signal. Mid level access enables building the protocol signals from their parametrized building blocks, thus fault injection is possible, without the knowledge of the physical layer signals. High level access allows the mapping of real-world measurable quantities to a **SENT/SPC** signal, according to a user defined sensor configuration.

After a short introduction to sensors and transducers, I overview the protocols needed to be implemented. The subsequent chapters describe the emulator hardware and software, while explaining the various design considerations. Lastly the presentation of the communication protocol and encoding takes place, which is used to control the device, while presenting the used control messages.