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CAN data logger case studies

CSS Electronics offers complete CAN data logging solutions. Here are three data logging case studies from more than 40 provided on the company's website.



Ducati Diavel, the focus of Mr. Cobb's reverse engineering efforts (Source: CSS Electronics)

The [complete article](#) is published in the [December issue](#) of the CAN Newsletter magazine 2021. This is just an excerpt.

CSS Electronics (Denmark) develops CAN data loggers and sensor-to-CAN modules. The two-channel CANedge CAN/LIN data loggers (Figure 2) are used by automotive OEMs (original equipment manufacturers) in CAN (FD), CANopen, J1939, OBD2, NMEA 2000, and LIN applications. CANedge1 records data to an industrial SD card, while the CANedge2 also enables automatic log file upload via Wifi/4G to the end user's server. The recent CANmod sensor-to-CAN modules include the CANmod.gps and CANmod.temp. The first is a GPS-to-CAN module with a 3D IMU (inertial measurement unit). The second is a four-channel thermocouple-to-CAN sensor module. An input module with eight analog channels is under development.

In addition, CSS offers three widely-used DBC files (data base CAN), including J1939 DBC, NMEA 2000 DBC, and OBD2 DBC. The files make it possible to decode CAN data to human-readable form. The company's software tools are free and open source. Tools for the CANedge include the MF4 converters for turning MF4 log files into other formats (CSV, ASC, TRC, etc.). Another example is the Asammdf GUI (graphical user interface) for general-purpose analysis, DBC decoding, and plotting. Data from the CANedge can also be processed via the free Python API (application programming interface) and integrated with telematics dashboards (e.g. Grafana) for visualization. The MF4 data can be also processed in 3rd party tools such as the Matlab Vehicle Network Toolbox.



CANedge is a series of two-channel CAN/LIN data loggers (Source: CSS Electronics)



Havelsan's CAN-based unmanned ground vehicle (Source: CSS Electronics)

CAN data logger use cases span heavy duty, automotive, agriculture, electric vehicles, and marine industries. Applications include trucks, buses, cars, tanks, drones, submarines, and more. Offline logging, USB streaming, Wifi, and cellular telematics are the possible data acquisition options.

CAN dashboards and telematics for military UGV

Havelsan (Turkey) offers end-to-end technology solutions within defense, simulation, IT, homeland security, and cybersecurity. The company needed to record and collect data from unmanned ground vehicles (UGV). Normal data acquisition systems were too heavy (and expensive) for UGVs. Adding external sensors was not feasible. Hence a compact CAN data logger was required to collect all the data for analysis.

Realized solution: The CANedge2 Wifi CAN logger was deployed to measure the general vehicle health as well as to benchmark different scenarios based on data changes. Havelsan installed the logger on the UGV, where it collected data during field operation to the SD card. When the UGV returned to the workplace, the data logger came into the range of a stationary Wifi router and automatically offloaded the log files to Havelsan's server. For some tests, Havelsan deployed the logger with a 4G cellular network router on the vehicle. Grafana/Influx dashboards software tools were used for visualizing of CAN data in the browser. If abnormal data patterns were detected, the relevant MF4 log files (found via CANcloud) could be analyzed in detail. This was possible via the

Asammdf GUI (graphical user interface) using the appropriate DBC file.

Benefits and choosing reasons: Sezer Kiral, Systems Engineer at Havelsan, explained: "The device helps us increase test/evaluation capability and enables us to take immediate action in response to technical parameters of the vehicle. The CANedge2 is an autonomous way to collect, transfer, and analyze data. Set it up - and watch the data from your office." Regarding the CANedge choice, he answered: "We were using Vector tools in the previous main battle tank project. During our search for an alternative and easy solution we found the CANedge. If we have any questions, the technical support is so fast and helpful."

Reverse engineering a motorcycle's CAN

Thomas Cobb (a private person) used the CL2000 logger for CAN reverse engineering. Thus, he has been one of the first testers of the CSS' recent CLX000-SavvyCAN integration. The challenge for Mr. Cobb was to tune his Ducati Diavel 2015 motorcycle. To do so he needed to log CAN data, decode the messages, and make changes based on real data.

Realized solution: Mr. Cobb reported: "Over all it was a steep learning curve when I started with Wireshark, but seeing the real-time data was great for identifying the relevant messages. SavvyCAN was my preferred software tool (also before it was supported by CSS Electronics), even if there was originally no support for a live data connection. I would log data and play it back in SavvyCAN, and the graphs and flow of data made it possible to slowly identify and interpret the changing bytes and bits. Now we have a CLX000-SavvyCAN integration that works great! Further, support has been great and any questions get answered very quickly."

Benefits and choosing reasons: The mentioned tools have allowed Mr. Cobb to learn more about CAN data and to appreciate the work that goes into the reverse engineering process. Further, he has managed to decode most of the important messages of interest. "The CL2000 is compact, feature rich, and highly configurable. I chose the CL2000 as it had good reviews, the price was reasonable, it offered plug-and-play features, it required minimal configuration, and came with a real-time clock (RTC). Now, I often look at the CANedge ...", added Mr. Cobb.

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