Loop detectors for traffic light systems

Traffic lights have been around for exactly 100 years. While the first ones were operated by hand, some of today's traffic lights communicate via CAN and can measure data of passing cars.

Swarco has developed loop detector devices, which communicate via CAN networks. The IG746 detects road vehicles, in order to classify them or to measure the speed. The IG946CAN is a four-channel loop detector and can be mounted on a DIN-rail. The Loop-Master software is used to put the detectors into operation and for diagnostic and service purposes.

The IG746 is an inductive loop detector for the connection of up to four inductive loops and was specifically developed for traffic applications. It comes with a CAN interface. The bit-rate is automatically recognized in the range of 10 to 500 kbit/s when the traffic light controller starts sending CAN messages. The node address is assigned by means of pins on the terminal strip.

The CAN protocol is specifically designed for traffic control applications. Typically transmitted data includes detection status, error status, and detection edges with occupancy time respectively time gap. In the optional version for double loop systems additional data such as vehicle speed, length, and direction are transmitted. Via the CAN interface parameterization of the detector and firmware updates are also possible.

The detector processes the loops one after the other in a predetermined sequence (multiplex mode); i.e. there is always only one loop switched as inductance L to the LC oscillating circuit of the detector. Since at any time only one loop has current flow, the channels of a detector cannot interfere with each other.

Figure 1: One of the first electric traffic lights in Germany: Installed in 1924, the five-edge semaphore tower in Berlin was equipped with lamps from Siemens operated by hand by policeman in the tower

If a metallic object is located within the range of action of the connected induction loop, the frequency of the LC oscillator also changes owing to reduction in the loop inductance. This change is determined by the detector evaluation circuit and, if the turn-on threshold is exceeded, a busy signal occurs on the switching outputs of the channel (electronic relay and open collector). Different output functions, e.g. presence signal and pulse signal are possible.

The detector is configured using the serial EIA 232 interface on the front of the unit. The PC service software Loop-Master provides an operator interface for modifying and displaying all parameters and diagnostic values. The configured parameters are stored in a non-volatile memory (EEPROM).

The IG946CAN is used for signal output in traffic light installations via CAN and switching outputs as well as for traffic counting. The detector is designed for DIN-rail mounting and includes an overvoltage protection module for the inductive loops. It is an inductive loop detector for the connection of up to four inductive loops and was specifically developed for traffic applications. CAN bit-rate and node address setting is the same as with the IG746. Also the transmitted data is similar to the above-mentioned detector. Of course, the same PC service software can be used. Optionally the four-channel detector provides, when using a double-loop configuration, data on the speed, length, and driving direction of the detected road vehicle.

The detectors are also connectable to the Actros. compact traffic light controller via CAN. The compact device is designed for smaller junctions and pedestrian crossings. Due to further developments of the Actros controller technology, the compact version features all original properties. Control cores and peripheral modules such as fault sensors and audible ▷

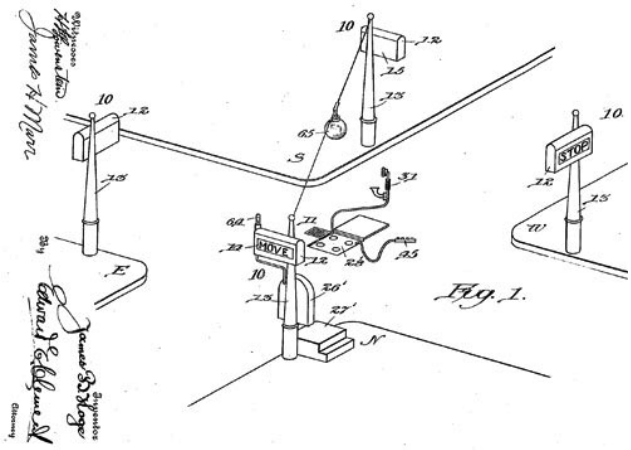

Figure 2: In 1918, James Hoge was granted a patent on a municipal traffic control system consisting of four pairs of red and green lights (US 1 251 666)

100 years of traffic lights

On August 5, 1914, the American Traffic Signal company installed an electrical traffic signal system on the corner of East 105th Street and Euclid Avenue in Cleveland, Ohio. It had two colors, red and green, and a buzzer, based on the design of James Hoge. The design allowed police and fire stations to control the signals in case of emergency.

Various competing claims exist as to who invented the world's first traffic signal. In 1868 in London, a two-semaphore arm was installed that extended horizontally to signal "stop" and at a 45-degree angle to signal "caution". In 1912 in Salt Lake City, Utah, Lester Wire, a police officer, mounted a hand-made wooden box with colored red and green lights on a pole, with the wires attached to overhead trolley and light wires.

Nowadays, modern traffic lights are part of traffic monitor and management systems. Some of them use embedded CAN networks, e.g. to connect loop detectors and other devices to the cross-section controller.

"green light" signals for blind pedestrians can be integrated. The unit provides 24 outputs, which can be toggled and monitored independently of each other. Information can be imported and requests can be toggled via 12 inputs and four outputs. The control panel is directly integrated into the front panel (as a default set-up) where program and error information is displayed. Operation via durable touch sensors enables switching on/off and the changeover of programs and control levels. Traffic engineering is generated via Lisa+, the company's programming language, or via Java programming.

Other products using CAN connectivity includes the "Life" LED tunnel signs. Another CAN-connectable device is the SCC-Air processing unit. The ARM-based controller runs Linux and can be combined with the Swarco Motorway Controller software. The KSR public transport priority system is also equipped with an embedded CAN network.

Expanding business

The Austrian enterprise recently acquired Technical Traffic Solutions (TTS), a Danish 35-employees company. The activities of TTS will be integrated with Swarco's operations in Denmark. Hans Petter Ødegaard, Oslo-headquartered Swarco Nordic's managing director, regards the acquisition as an important step to consolidating and expanding the position in Denmark and beyond: "With the acquisition of TTS we have reinforced our presence and prepared for further long-term growth in the Danish market. We have achieved a constant annual growth in the Nordic ITS market over the past 10 years and are convinced that the acquisition of TTS will further contribute to this development". Swarco has also acquired the British APT group based in Harrow (Middlesex). The 170-staff company is focused on parking access control and payment systems, electric vehicle charging, etc.