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*Secure Electronic Control Units (SECU) To Add Security to Now Insecure Intra-Vehicle Networks*

AUTO SECURITY VULNERABILITIES

The Controller Area Network (CAN) is a widely used industry standard intra-vehicle network connecting the Electronic Control Units (ECUs) that control most car systems. Recent developments in automotive technology, particularly the use of wireless interfaces opens new attack vectors for the CAN. The CAN lacks security, leaving the vehicle vulnerable to physical and wireless attacks via the cellular data link to the ECUs. Malicious messages delivered to the CAN bus can give a third-party control of the ECUs and the vehicle. Existing solutions require installation of special CAN+ transceivers in every ECU in one's car and do not provide real-time solutions. *These types of vulnerabilities pose great risks to a car's occupants, as even small disruptions of a car's control can cause lethal results.*

THE SECU SOLUTION

The SECU is a secure hardware module added to the CAN bus. It provides a real-time authentication mechanism for securing in-car CAN bus communications. The hardware module performs key distribution and message authentication and destroys malicious messages before they are fully received by ECUs. The technology uses message compression to reduce the message size such that the message and the message authentication code (MAC) will fit in one CAN frame, enabling fast authentication. The MAC also ensures a zero false positive. While a false negative might be possible, the chances are less than 2%, which is acceptable as such a small number would have minimal to no effect on the vehicle control system. The SECU solution has been implemented on a realistic testbed using industry standard MCP2551 CAN transceivers and Raspberry Pi embedded systems. Experimental results show real-time message authentication on the CAN bus with minimal latency.

ADVANTAGES

- Compatible with existing CAN protocol
- No need to change deployed ECUs or CANs
- Easy Deployment & Maintenance
- Real-time Solutions
- Low-cost, low-key distribution overhead
- After SECU installation, all updates accomplished via software only
- Excellent performance data on false positives and negatives