Cyber Security Threats in Connected and Automated Vehicles

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ELECTRICITY MAY BE THE DRIVER. One day your car may speed along an electric super-highway, its speed and steering automatically controlled by electronic devices embedded in the road. Travel will be more enjoyable. Highways will be made safe – by electricity! No traffic jams . . . no collisions . . . no driver fatigue.
SYNERGY POTENTIAL

AUTOMATION & ELECTRIFICATION

ACTIVE SAFETY-MECHANISM

SMALL & LIGHTWEIGHT CONSTRUCTION

ENERGY EFFICIENCY
SYNERGY POTENTIAL

AUTOMATION & ELECTRIFICATION

ROBOT-TAXIS

SELF-DRIVING SHUTTLES

DELIVERY ROBOTS
DISRUPTING MOBILITY

Electrification

- reduces total cost
- manages re-charging

Sharing

- optimizes energy
- simplifies controls

Automation

- reduces service cost
- provides use cases

OPERATING MODEL IS THE „GLUE“
WHAT NEEDS TO BE DONE WHEN IN ORDER TO GET SYSTEMS WORK

European Technology Platform on Smart Systems Integration,
European Roadmap Smart Systems for Automated Driving, 2015
CONTROL ARCHITECTURE

HIGHER AUTOMATION LEVELS REQUIRE MORE SENSORS

Source: SAE
COMMUNICATION

FOR LEVEL 4/5 COMMUNICATION IS A MUST

Source: NXP
E/E-ARCHITECTURE

Driver assistance and automation

ADAS\(^1\) vertically integrated

ADAS horizontally integrated with strategy level

Partially automated driving

e.g. zero accidents with intervening decision

Revenue stream

- ICT
- Software/Apps

E/E architectures

Smart eCar autonomous driving

Electro mechanical integration

New ergonomic concepts through integrated modules

Revenue stream

- Mechatronic
- Mechanical compon.

AUTOMATION AND POWER FUNCTIONS MERGE

E-Motor
Brake
Damping
Steering

Source: Siemens
INTEGRATION

VULNERABILITY OF THE NETWORK ARCHITECTURE IS INCREASING

Normal Function
Safety-Critical Function

Source: AVL
POTENTIAL ATTACKS

Logical attack
e.g. protocol fuzzing

Observative attack
e.g. power analysis

Manipulative attack
e.g. probing

Semi-invasive attack
e.g. laser fault injection

Source: Infineon
TO BE KEPT OVER A VEHICLE’S LIFETIME

Source: Infineon
MORE TRANSFORMATION

YOUR PERSONAL "FLYING CARPET" Step into it, press a button, and off you go to market, to a friend’s home, or to your job. Take off and land anywhere; no parking problems. Plug in to any electric outlet for recharging. They’re working on it!