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SOLUTIONS

Where innovation
drives development

Software – Validation – Mechatronics

cmore-automotive.com



Software

From functional software requirements to final software release

Our strengths are in the development of embedded software for electronic control units in vehicles and mobile working machinery, the development of algorithms and functions for autonomous driving as well as industrial automation.

We have experience in various development processes such as V-Model or recent approaches, e.g. Agile, Test-Driven Development and Acceptance Test-Driven Development. Our objective is to support you competently throughout all product phases, from requirements analysis up to integration, validation, verification and maintenance. With that, we ultimately ensure software of consistently high-quality.



Embedded Software Development

- Automotive embedded software for series applications
- Software requirements management
- Software architecture definition
- Issue and defect management
- Integration and configuration of AUTOSAR stack
- Diagnostics (KWP/UDS): standard services, customer specific requirements (diagnosis, calibration, inspection), data recorders, variant coding, country coding, fusion of radar and camera
- Automotive network communication (CAN, Ethernet, LIN, FlexRay, MOST)
- Bootloader development
- Functional safety strategies (ISO 26262)
- Automotive SPICE process assessment support
- Automation of integration process

Verification and Validation

- Concepts for automation of software tests
- Implementation of automated software testing
- Implementation of software verification (static tests, white box tests)
- Automated sensor testing
- Automated integration testing: continuous integration
- Software validation
- Experience in standard software tooling

Algorithm Development

- Image processing: traffic sign detection and recognition, pedestrian, motorcycle, lane detection and more
- Detection and tracking optimization for radar/lidar sensors
- Active Learning Loop for optimization of training data sets and reduction of labeling costs
- Image pre-processing: Canny edge detection, Hough transform
- Feature extraction: HoG, Aggregated Channel Features, LBP
- Classification using machine learning algorithms such as: SVM, AdaBoost, decision trees
- Deep Learning (convolutional neural networks)

Tooling and Measurement Development

- Measurement software development
- Customized tooling
- Tool development and scripting for analysis
- Driver development for new hardware interfaces



Validation

From system requirements to approval of series production

The area of test and validation plays a crucial role in automotive and industrial development processes. Thanks to our expertise, we make significant contributions, ensuring high quality systems and optimization of costs.

We create complete validation concepts for all project phases and, based on these, conduct standardized and customer-specific tests in the laboratory, on the test track as well as on the open road.



Test Management

- Consultation and definition of test strategies
- Test planning; from prototyping to series production
- Specific consulting services for validation of ADAS sensors
- Planning and definition of test cases, test criteria and final KPIs
- Planning of tool chains and specification of tools
- Coordination of tests and data analysis
- Documentation and controlling of test process
- Reporting of test results

Test Drives

- Planning and conduction of worldwide endurance test drives for data acquisition
- Conduction of in-vehicle algorithm performance tests on public roads (special driving maneuver)
- Fleet management

Analysis

- Definition of performance scorecards (KPIs) for specific functionalities and algorithms
- Analysis of data according to customer specific test specification
- Problem Resolution Management
- Evaluation of test results according to test criteria
- Summary of results, generation of KPIs
- Preparation of final reports for release recommendation
- Development of specific tooling for analysis

System Testing

- Conduction of laboratory SIL/HIL tests
- Conduction of system tests on public roads or proving grounds (using vehicle and pedestrian soft targets)
- Planning and conduction of standardized tests according to EuroNCAP/NHTSA (AEB City, AEB inter-urban)
- Conduction of benchmarking tests (e.g. radar performance tests)
- Conduction of sensor calibration tests
- Evaluation of radar properties and performance

Labeling

- Generation of ground truth data using in-house or customer-specific label tools
- Assembly of flexible labeling teams to suit volume and complexity of data
- Optimization of labeling process
- High-quality labeling with the best price-performance ratio
- Data quality control and management

Simulation

- Conduction of online and offline simulations
- Coordination of experienced teams for analysis of simulation results (definition of KPIs, reports, releases)

Data Management

- Local, in-vehicle storage solutions
- Database and data warehouse
- Big Data solutions for large amounts of videos and images
- In-memory computing solutions for fast access and processing of complex measurements



Mechatronics

From initial idea to product realization

We engineer customized components as well as equip prototype vehicles for the testing of new electronic systems.

Our extensive knowledge ranges from individual measurement components, such as special mechanical solutions for in-vehicle mounts, to the complete wiring and fitting of prototype vehicles.



Prototype Vehicles

Definition of vehicle architecture and measurement concepts

Complete equipping and preparation of prototype vehicles for endurance tests, standardized tests, electronic systems tests

Build-up and maintenance of prototype vehicles and test fleets

Design of special concepts for wiring and fitting as well as for prototype modifications to ensuring the best sensor integration for challenging in-vehicle positions

Functional and mechanical sensor integration

Measurement Systems

Design and development of intelligent measurement concepts

Measurement and diagnostic systems (e.g. PODBOX), data management systems, data acquisition systems, reference systems, ECU flashing systems

Development, design and assembly of LED/HMI systems

Test automation using standard or customized frameworks

Design and construction of custom test benches in the laboratory or in-vehicle (e.g. HIL test benches, endurance test)

Measurement Equipment

Design and construction of customer-specific components for every use case

Design and construction of special components, ensuring highly support in testing activities, such as measurement and diagnostic devices, various camera mounts, hard drive and SSD mounts, adaptable seat wedges, etc.

Re-lay of special cables and production of wiring harnesses

Crash Target Systems

Design and construction of custom crash targets and propulsion systems for prototype vehicle tests

Pedestrian crash targets

Vehicle crash targets

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