

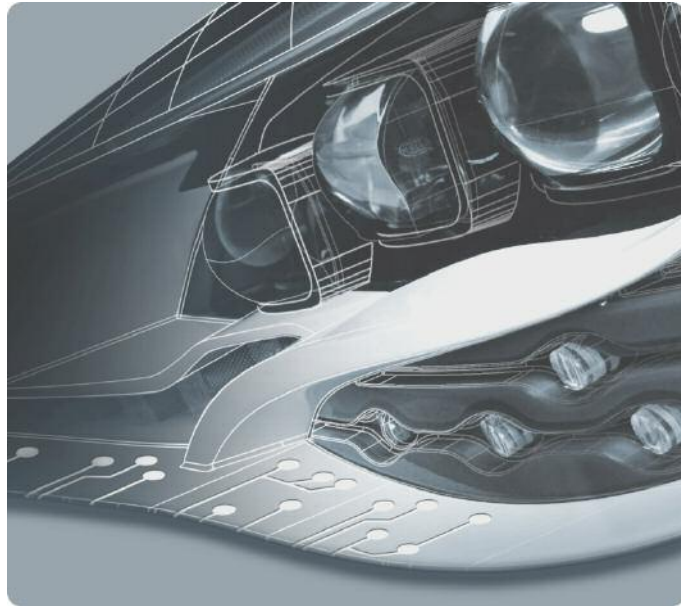


Development of a scalable multi-controller ECU for a smart, safe and efficient Battery Electric Vehicle

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- Architecture overview
- Electronic control unit
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Development of a scalable ECU for a smart, efficient BEV

Introducing eFuture: a European Project



- Funded by the European Commission
- project term
2010-09-01 ... 2013-08-31
- Budget ca. 7 Mio. Euro
- 6 partners from 4 countries
 - 4 industry
 - 2 research institutes
- Coordinator:
Intedis, Würzburg



Development of a scalable ECU for a smart, efficient BEV

Introducing eFuture: Safe and Efficient Electrical Vehicle

- Safety

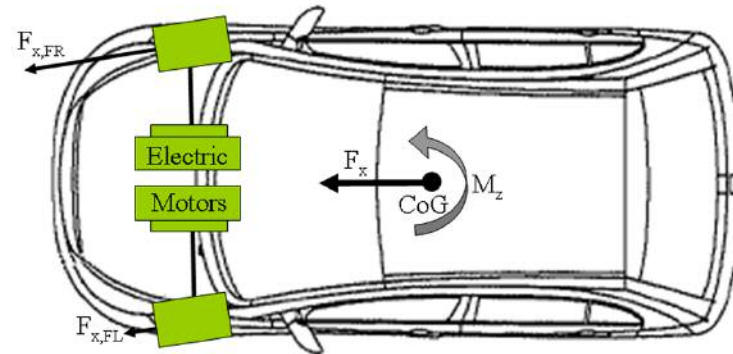
- 2 front electric motors
- Agility vs. controlling risk
- Functional safety (ISO 26262)

- Efficiency

- Enhancing the driving range by intelligent and anticipatory functions with inclusion of the driver („virtual range extender“)

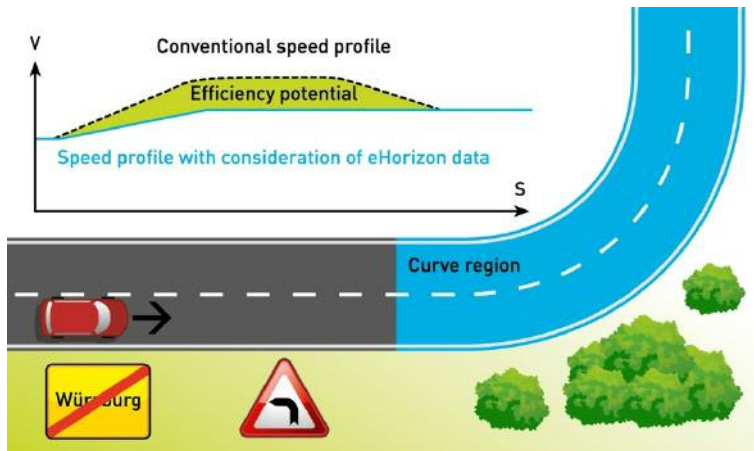
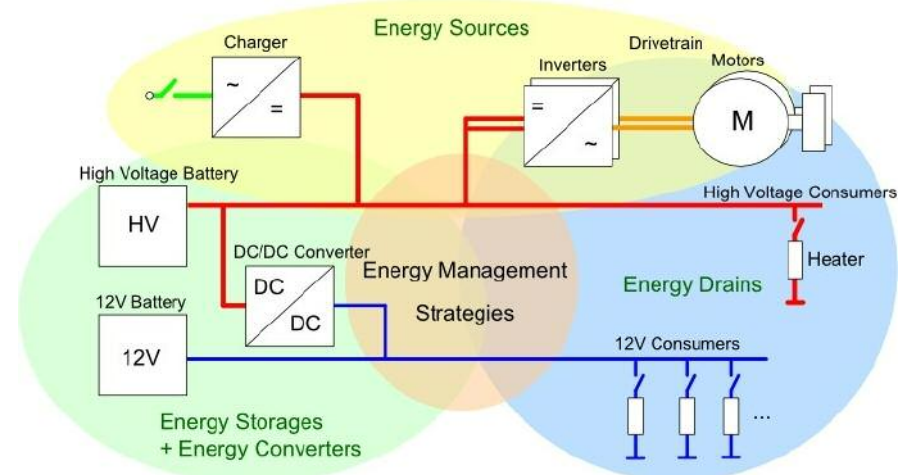
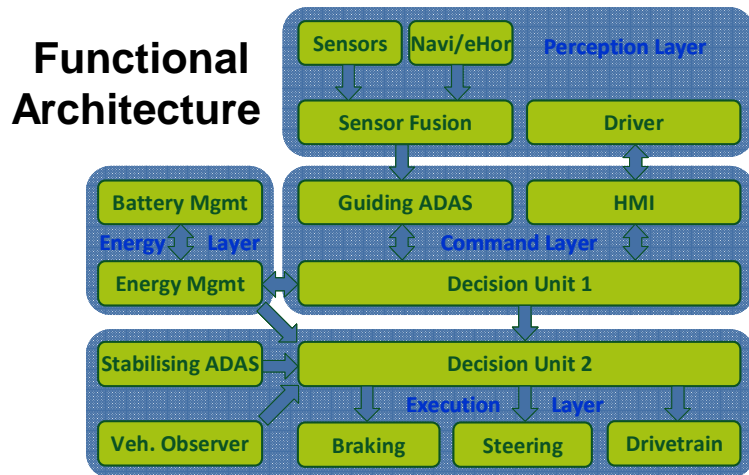
- Intelligent functional architecture

- Support of Safety by hierarchic composition and clear task sharing
- Support of Efficiency by green functions and green parameters



Development of a scalable ECU for a smart, efficient BEV

Introducing eFuture: Safe and Efficient Electrical Vehicle



Green Assistance Systems

Energy management

Driver Coaching



Development of a scalable ECU for a smart, efficient BEV

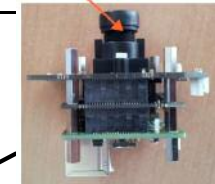
Introducing eFuture: newly Developed Vehicle Components



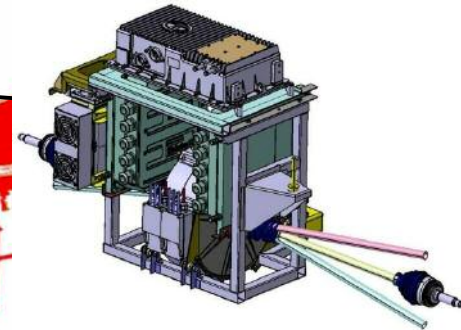
Updated HMI



Optimised Miljøbil battery with **HELLA BMS**



Front and rear cameras



Twin Yasa Motors – delete gearbox



Radar



Updated Power distribution

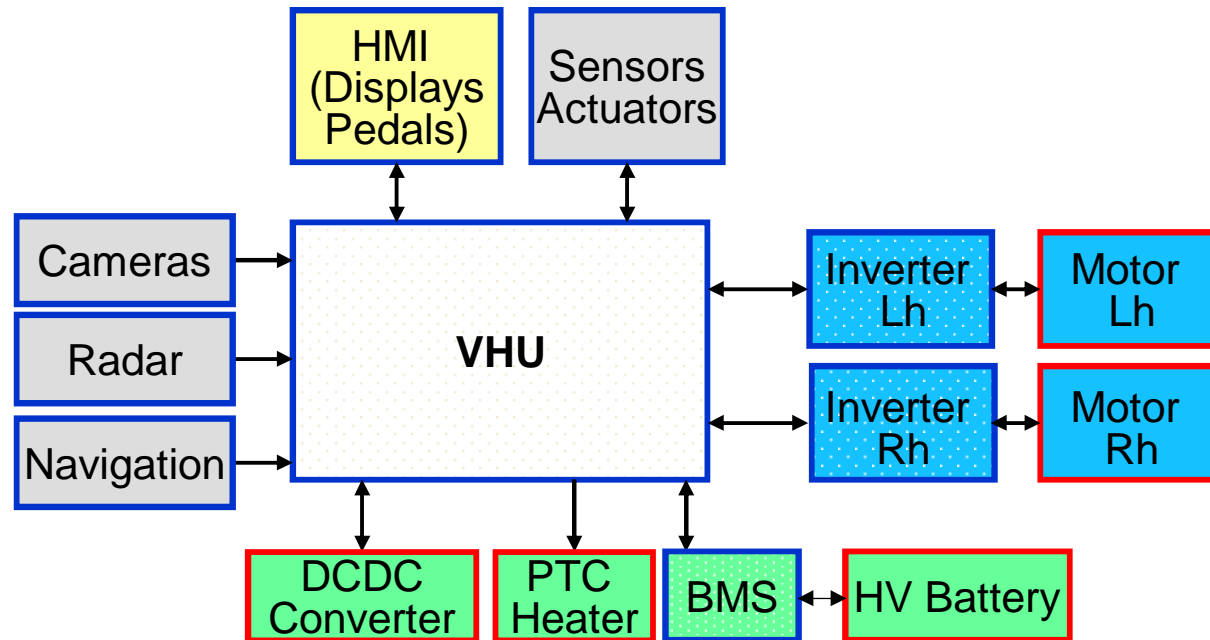


HELLA VHU



Development of a scalable ECU for a smart, efficient BEV

Vehicle Head Unit : an Overview



→ Central position in the E/E architecture:

- drivetrain control
- energy control
- HMI input
- sensor input
- peripheral actuators

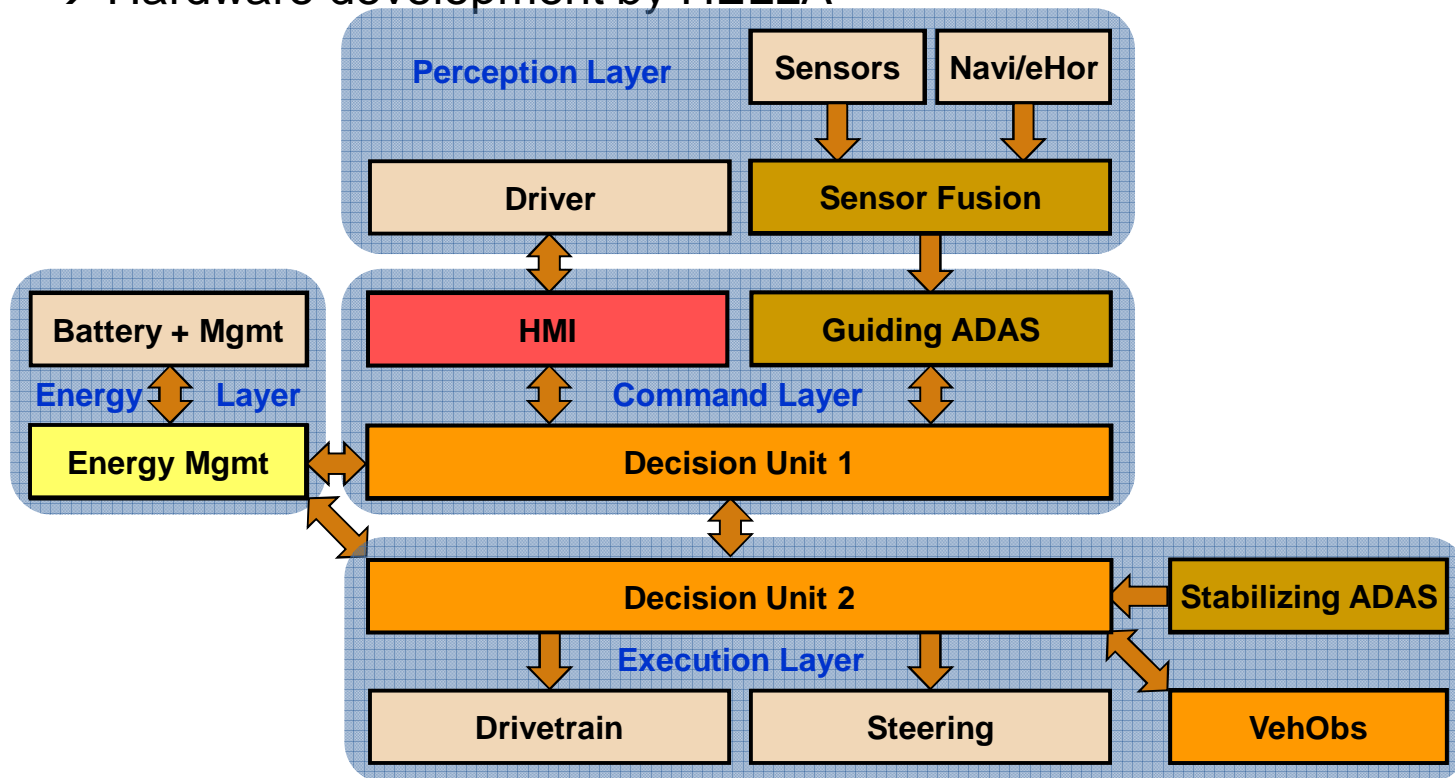
→ Control function for HV and LV systems

□ LV
□ HV

Development of a scalable ECU for a smart, efficient BEV

Software Architecture boundary Conditions

- Different domains (Decision units, ADAS, HMI, Energy Management)
- Applications contributed by 4 partners
 - responsibility by domain
 - Base SW by HELLA
- Hardware development by HELLA



Development of a scalable ECU for a smart, efficient BEV

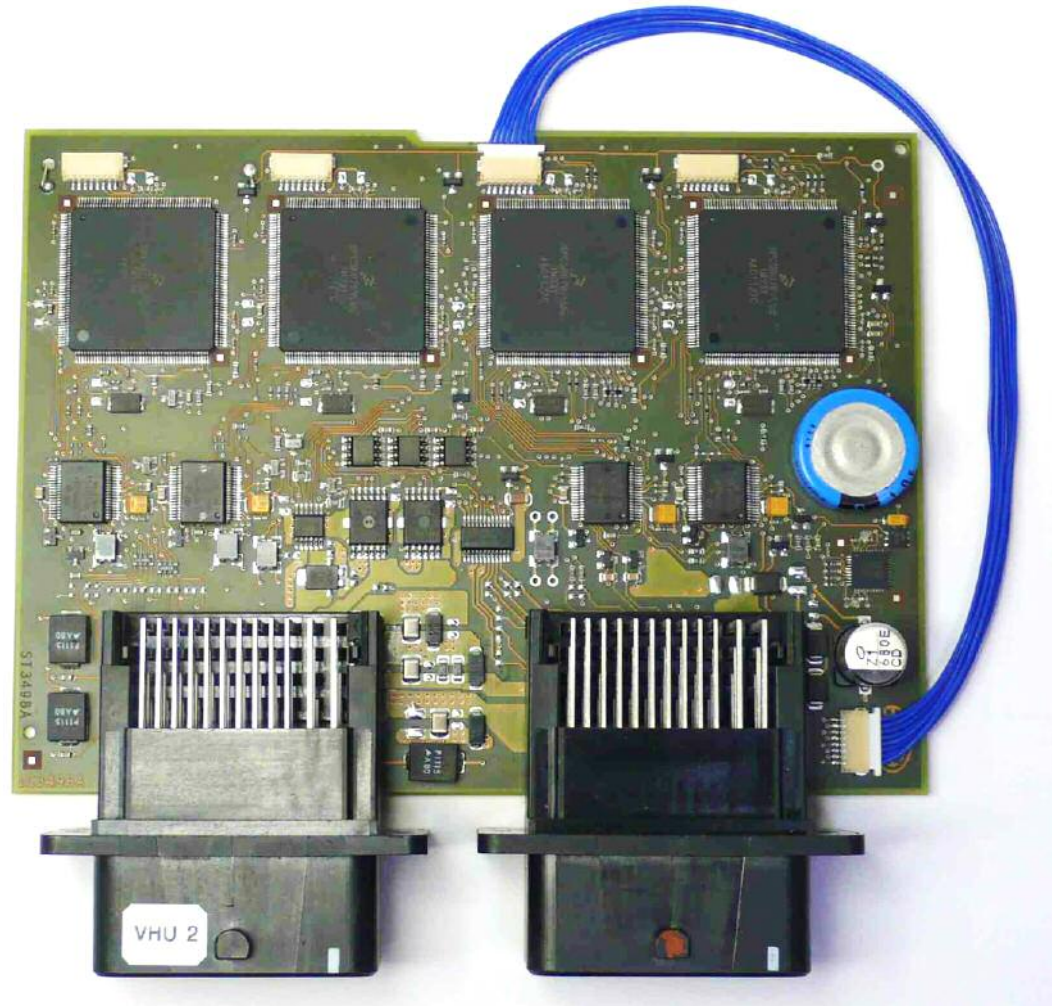
VHU solutions (1): scalable multi-controller ECU

- 4 micro controllers
 - distribution of function domains
 - independence
 - monitoring
 - choice of controller
 - standardization
 - scalability
 - interconnected via private CAN

- Choice of peripherals
 - real time clock
 - system basis chips
 - inertial measurement unit

- Reprogrammable

- Connectors



Development of a scalable ECU for a smart, efficient BEV

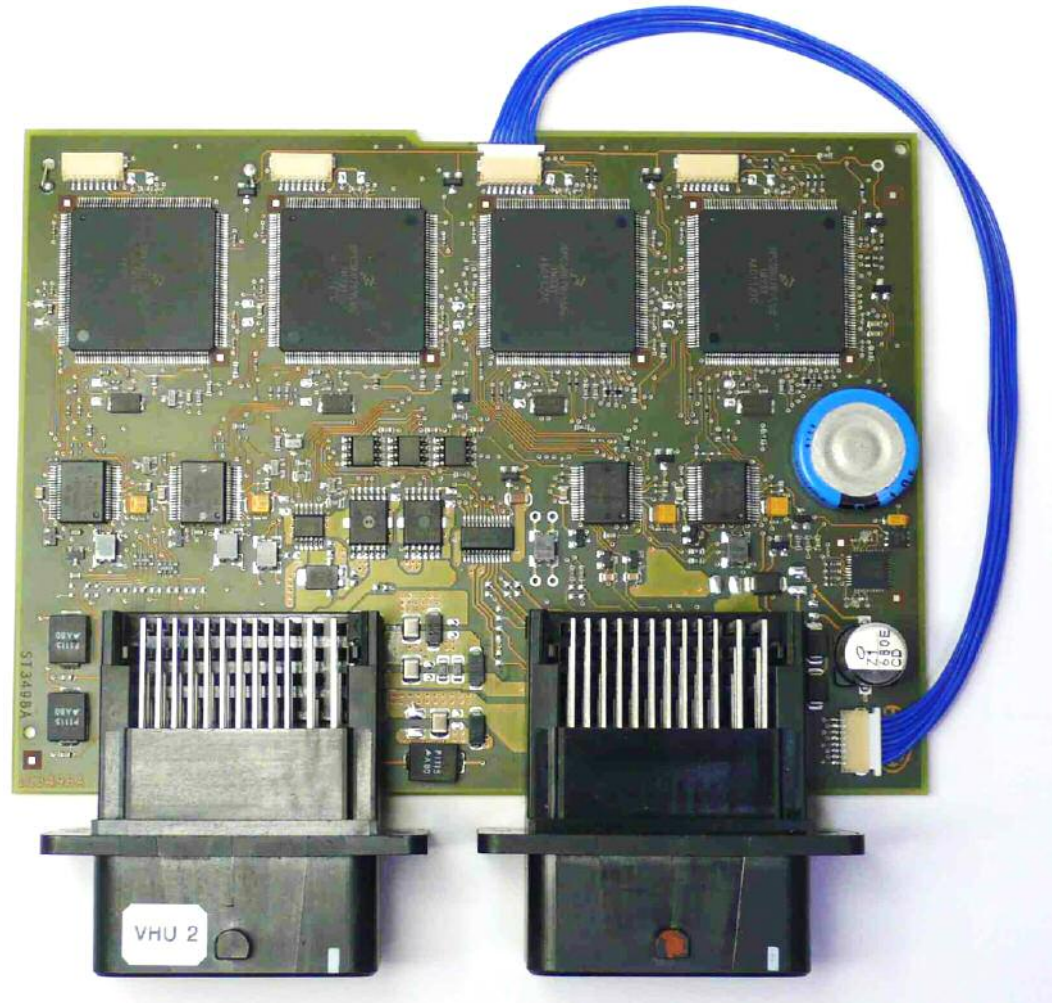
VHU solutions (2): robust design

- Paired micro controllers
 - function supervision
 - redundancy
 - drive train
 - HMI
 - sensors & actuators

- System basis chip
 - doubling power supply to micros
 - watchdog

- Connectors
 - redundant power feed
 - redundant CAN

- AUTOSAR based SW
 - decoupled SW modules

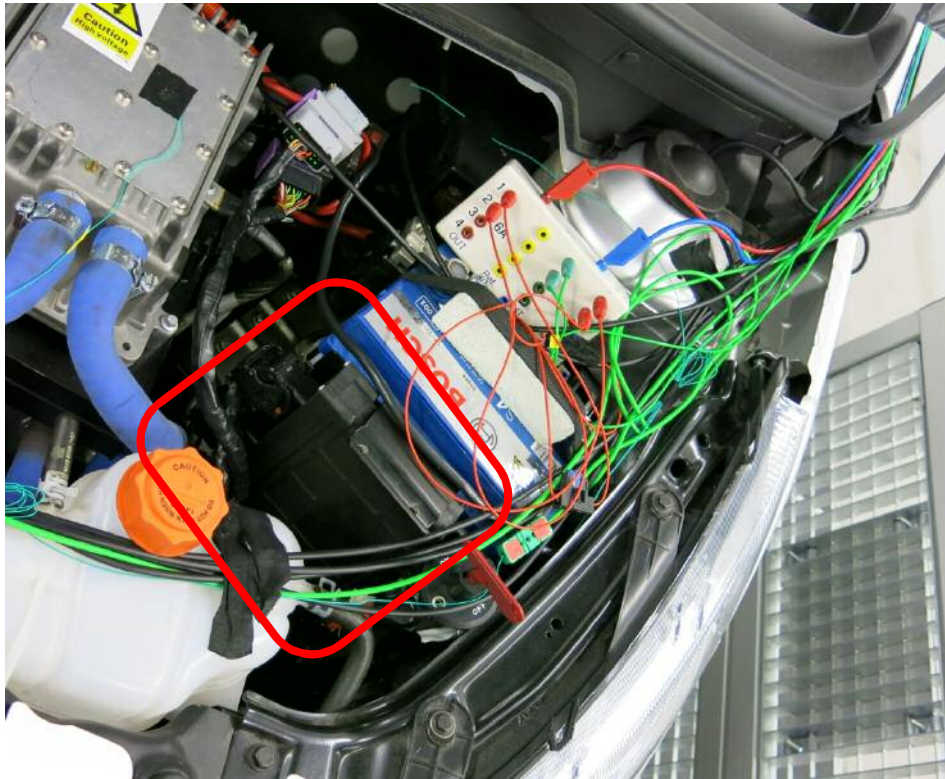


Conclusion & Outlook

- Within an EC funded research project a central ECU for a BEV was developed.
- The VHU is at the heart of a novel function architecture based on the use of decision units.
- The ECU serves as host for
 - drive train control
 - vehicle level energy management
 - exteroceptive sensors
 - HMI
- The demonstrator vehicle is currently being tested!
- We gratefully acknowledge support from the EC under grant no. 258133 within the Green Cars Initiative.

Conclusion & Outlook

Vehicle Head Unit mounted in engine compartment



Conclusion & Outlook

Recent result: roller testing

