GPU Technology Conference, April 18th 2015.

THE FAST LANE FROM SILICON VALLEY TO MUNICH.

UWE HIGGEN, HEAD OF BMW GROUP TECHNOLOGY OFFICE USA.
THE AUTOMOTIVE INDUSTRY WILL UNDERGO MASSIVE CHANGES DURING THE NEXT 10 YEARS.

SUSTAINABILITY

- CARS ARE POWERED BY ELECTRICITY
- CO₂ SUSTAINABILITY HAS GAINED GREATER SIGNIFICANCE

DIGITALIZATION

- CARS ARE DRIVING ALMOST ACCIDENT-FREE
- UTILIZATION CONCEPTS LIKE CAR-SHARING ARE WIDELY AVAILABLE
- HUMAN-MACHINE-INTERFACE BECOMES MORE INTUITIVE
- CARS AS ELEMENTS WITHIN THE DIGITAL ECOSYSTEM
The BMW Group Technology Office aims to accelerate the delivery of automotive innovation to customers through the evaluation, development and design of new technologies.

Located in Mountain View, California, the Technology Office is meant to:
- Explore new technologies and form relevant business partnerships, outside of the automotive world
- Promote external perception of the BMW brand as a leader in innovation
- Attract top talents to BMW within highly competitive Silicon Valley marketplace

The Technology Office produces work that enables BMW to be the future, see the future and reimagine the future of world-class automotive engineering for individual mobility.
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CARS AS ELEMENTS WITHIN THE DIGITAL ECOSYSTEM

EXAMPLE.
BMW i CHARGEFORWARD PROGRAM.
THE NEXT STEP FOR ELECTROMOBILITY.

CUSTOMERS
Enjoy reduced upfront vehicle costs and total cost of ownership.

Extend their contributions to sustainability.

UTILITY
Efficiently use grid resources.

Reduce costs of operating and maintaining power grid.

BMW GROUP
Encourage adoption of electric vehicles.

Expand upon commitment to sustainable mobility.
1. PG&E contacts BMW server and requests load drop (up to 100 kW).

2. BMW selects vehicles for charging delay based upon owner preferences and notifies customers, who can opt out as desired. Stationary battery provides additional power as needed.

3. Smart meters verify that total desired load drop is achieved.
SUSTAINABILITY

CO₂ SUSTAINABILITY HAS GAINED GREATER SIGNIFICANCE

Cars are powered by electricity

DIGITALIZATION

Cars are driving almost accident-free

Utilization concepts like car-sharing are widely available

Human-machine-interface becomes more intuitive

Cars as elements within the digital ecosystem
CONNECTED MOBILITY.
BMW i - THE NEXT GENERATION OF A CONNECTED CAR.

• Charging station availability, off-board range calculation.

• Intermodal routing using off-board sources, Remote Smartphone App.
CONNECTED VEHICLES ARE PART OF THE INTERNET OF THINGS. CONTEXT OF DRIVER AND VEHICLE WILL MELT TOGETHER.
VEHICLES EQUIPPED WITH SENSORS, SENSOR FUSION AND BACKEND CONNECTIVITY PROVIDE A REAL-TIME REPRESENTATION OF THE ENVIRONMENT.

DENSE ROAD NETWORK COVERAGE

CURRENT VEHICLE SENSOR TECHNOLOGY

ONBOARD SENSOR FUSION

- Rain, Light, Sight sensors
- Up to six cameras incl. stereo, color
- Long and short range radar
- Lane detection
- Object detection and classification
- Exterior temperature
- Air quality sensors
- Ultra sonic sensors
- Blind spot object detection
- Night vision w/ pedestrian detection
- Street surface detection

- Passenger occupancy
- Interior temperature
- Navigation Destination
- Driver attention
- Interior camera
- Driver health status

- Odometry, GPS heading, speed
- Inertial sensors, steering angle
torque sensor, Fuel/charging
- status, range, vehicle diagnosis,
status, stability control
CROWD-SOURCING OF SENSOR DATA ENABLES FUTURE USE-CASES AND BENEFITS THROUGH UP-TO-DATE, HIGHLY ACCURATE MAPS.

- PARKING PROBABILITY
- MAPPING OF INDOOR PARKINGS
- ENERGY CONSUMPTION PREDICTION
- CURVE SPEEDS AND CURVATURE
- STOP LINE EXTRACTION
- ROAD GEOMETRY EXTRACTION

DIGITAL MAP

- Up-to-date
- Accurate
- HD Content
- Coverage
HIGHLY AUTOMATED DRIVING WILL INCREASE SAFETY, COMFORT AND EFFICIENCY FOR THE DRIVER AND SOCIETY.

IMPROVED TRAFFIC AND DRIVING SAFETY.

Vehicle can see and react to hazards that a human driver may not be able to.

INCREASED DRIVING COMFORT.

Gaining valuable time by delegation of driving tasks.

IMPROVED DRIVING EFFICIENCY.

Time and fuel savings through optimized driving strategy.
HIGHLY-AUTOMATED DRIVING AND DIGITALIZATION WILL CHANGE THE USER EXPERIENCE IN THE FUTURE.

Uwe Higgen, BMW, April 18th 2015.
BESIDES THE USER-INTERFACE, ADDITIONAL TECHNOLOGIES NEED TO BE MASTERS ON THE WAY TOWARDS HIGHLY AUTOMATED DRIVING.

Uwe Higgen, BMW, April 18th 2015.
360° COLLISION AVOIDANCE. THE NEXT STEP TO ACCIDENT-FREE MOBILITY.

FUNCTION.

- The vehicle automatically avoids collisions with static obstacles.
- When the driver approaches an obstacle suspiciously fast, the vehicle assumes that the driver has overlooked the obstacle and starts to brake.
- At any time the driver can steer away from the obstacle and the brakes will automatically disengage.
- The brakes will also automatically disengage when the driver backs away from the obstacle.
360° COLLISION AVOIDANCE.
THE NEXT STEP TO ACCIDENT-FREE MOBILITY.

TECHNOLOGY.

- Build-in laser-scanners permanently collect data of the vehicle surrounding to build a 360° obstacle map.
- Even if the sensors can not directly see the obstacles close to the doors, the vehicle still estimates their positions relative to the vehicle by predicting the vehicle movement.
- The vehicle calculates an optimal stopping trajectory 100 times per second in order to quickly react to changes in the environment.
HOW DOES IT FEEL TO DRIVE THE ALL-ELECTRIC BMW i3?
THANK YOU FOR YOUR ATTENTION.