AUTOMOTIVE VISION SYSTEMS
OPPORTUNITIES & CHALLENGES FOR THE FUTURE

Enda Ward
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OUR MOTIVATION

Information

SUPPORT
the driver in his/her driving task

Intervention

SAFEGUARD
driver and passenger in critical situations

Automation

RELIEVE
the driver if he/she desires so

Making cars more enjoyable to drive and above all safer
OUR MOTIVATION

Making cars more enjoyable to drive and above all safer

ENJOY

SAFEGUARD
driver and passenger in critical situations

Intervention

RELIEVE
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Automation
OUR MOTIVATION

ENJOY  SAFE

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OUR MOTIVATION

Enjoyment is more than Safety but no Enjoyment without Safety
IN THE BEGINNING...

1956 Buick Centurion

No mirrors!

Just a television camera & screen!
Multiple technologies required to enable future automation
DRIVING ASSISTANCE

Front View

Remote View

Top View

Rear View

Bowl View
AUTOMATED DRIVING & NEAR RANGE SENSING

Pedestrian Classification

Park Slot Marking Detection

NHTSA Rear Camera
(FMVSS 111 / US NCAP Rear AEB)

3D Object Detection
VISION SYSTEM COMPONENTS

Video Capture

Video Processing

Display

New technology advancements to meet market requirements
Technology: where we are going to....

- **Sensor Resolutions** -> VGA -> 1MP -> 2MP -> 4MP -> 8MP+……

- **Data Rates**: 6MHz -> 1Gbit -> 3Gbit -> 6Gbit+ ->…..

- **Semiconductor Technology**: 130nm -> 65nm -> 45nm -> 28nm -> 16nm -> 10nm ->....

- **Packaging Technology**: QFP -> BGA -> CSP -> 3DIC .....
TRADITIONAL VS. NEW PLAYERS

When the automotive world meets Silicon Valley => Market Disruption
SHIFT IN USAGE MODELS

New Vehicle Sharing Models
+ Automated Driving

Traditional example assumes 1 hour total commute per day with 4 minutes of parking
Mobility example assumes 50% vehicle utilisation per day
Where’s the Nanotechnology?

YA CANNA’ CHANGE THE LAWS OF PHYSICS!
Opportunities

➢ Emerging use cases
   ▶ Automated driving
   ▶ Transportation as a Service (TaaS) -> Disruption Potential

➢ New technologies enabling greater service utilisation
   ▶ Bottom up design of systems to meet top down architecture
   ▶ Build on advancements in nanotechnologies and advanced materials

Lens Design  IC Design & Packaging  Connectivity
Challenges

➢ Safety & Security

➢ Reliability in automotive environment - thermal cycling, environmental protection etc…

➢ New reliability models for new use cases

➢ Miniaturisation – increased sensing functions in similar form factors

➢ Cost
TO THE FUTURE...

BMW Vision Next 100 2016

Mercedes-Benz F-015 Concept CES, 2015