Precise positioning & safety IMU

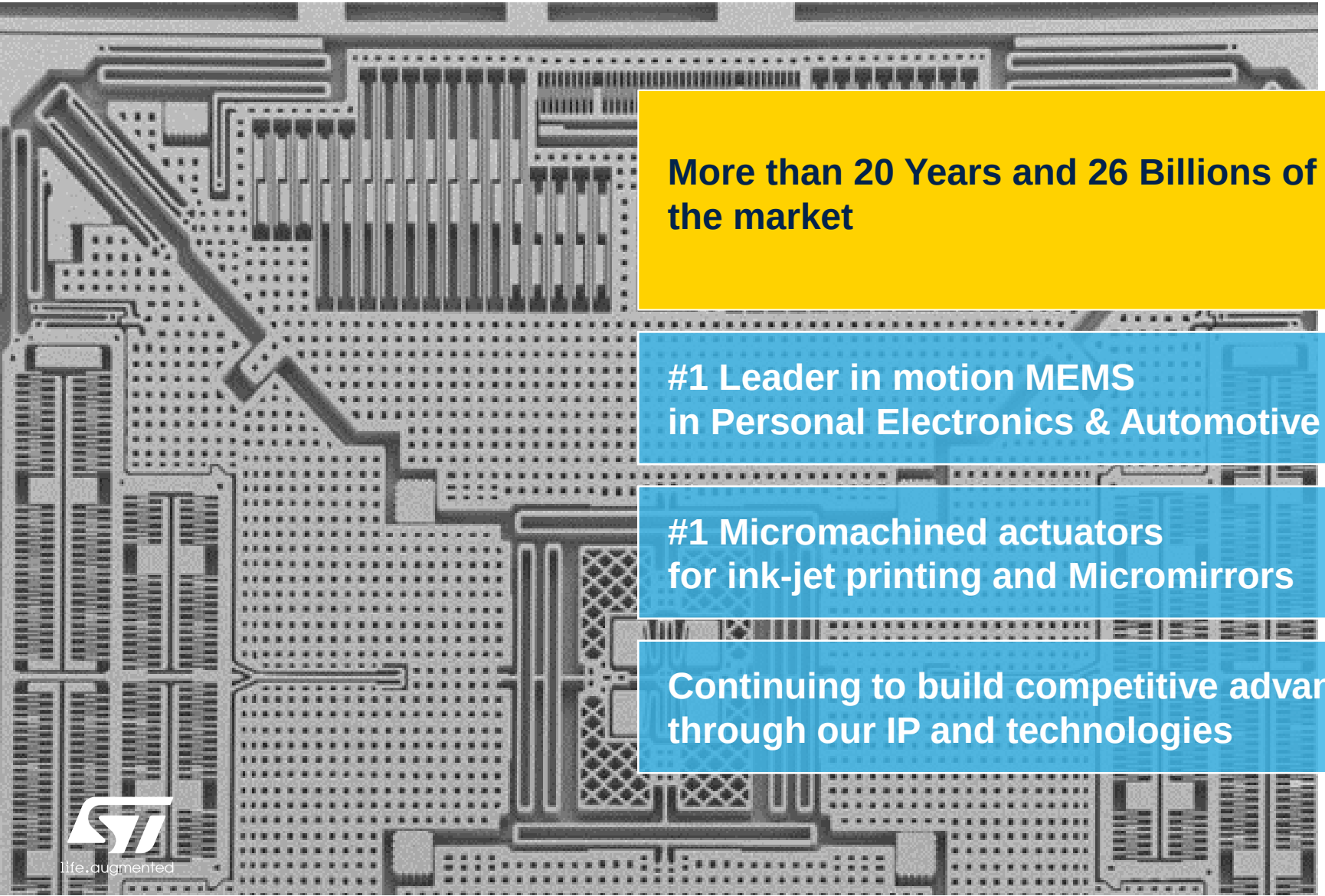
ST MEMS sensors technology

ST IMU family

Precise positioning system

Video

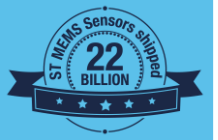
MEMS means **M**icro **E**lectro-**M**echanical **S**ystem



More than 20 Years and 26 Billions of innovative MEMS delivered to the market

#1 Leader in motion MEMS
in Personal Electronics & Automotive Telematics

**Source: OMDIA



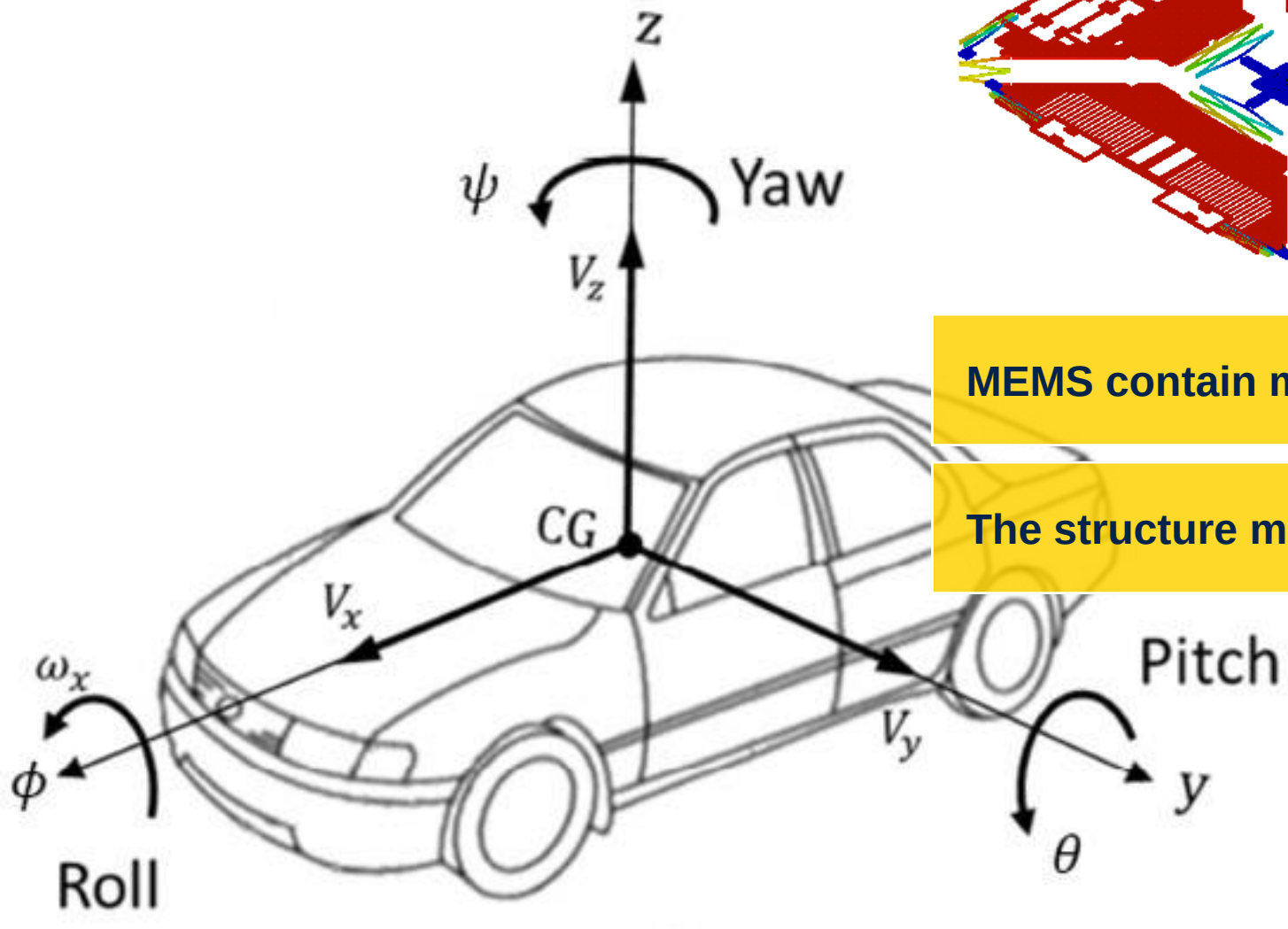
#1 Micromachined actuators
for ink-jet printing and Micromirrors

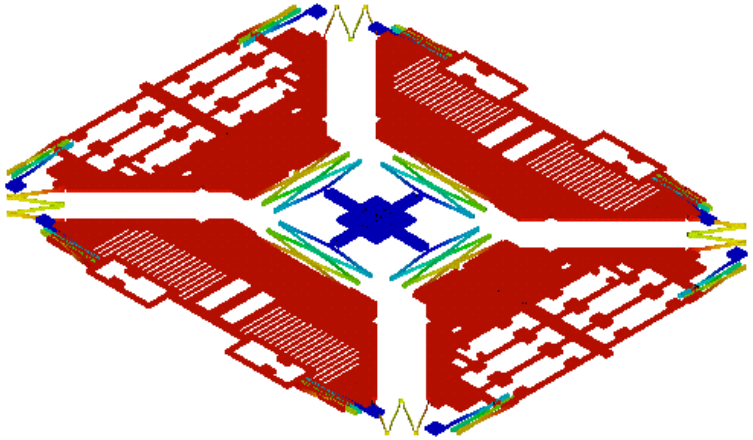
**Source: OMDIA

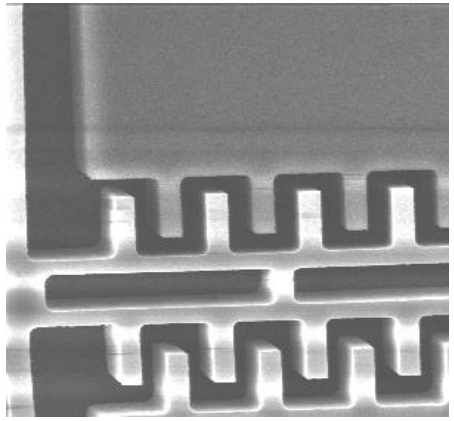
Continuing to build competitive advantage in MEMS
through our IP and technologies

life.augmented

Not only electrons are moving in motion sensors!







MEMS contain movable 3-D structures

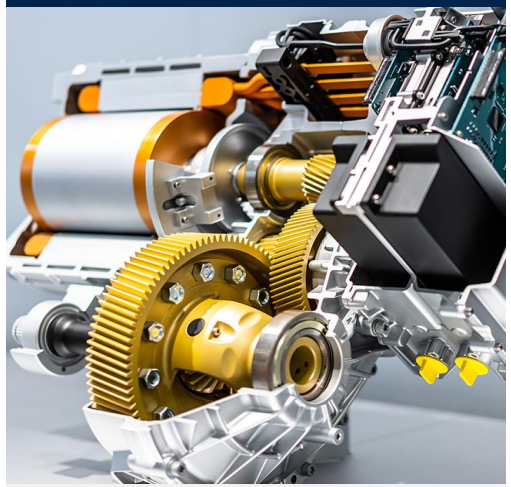
The structure moves accordingly to external displacement

ST MEMS cover all the application domains

Chassis and safety

- Airbag
- Stability control
- Active suspension

Power train



- Predictive maintenance

Body and convenience

- Door / trunk module
- Occupancy detection
- TPMS(1)
- RNC(2)
- Lighting module
- Keyfob

ADAS

- Outside camera
- Fisheye camera
- mmWave radar
- LiDAR
- Precise positioning

Infotainment and telematic

- Infotainment & connectivity
- Navigation system
- Vehicle sound system
- V2X
- Sentry system

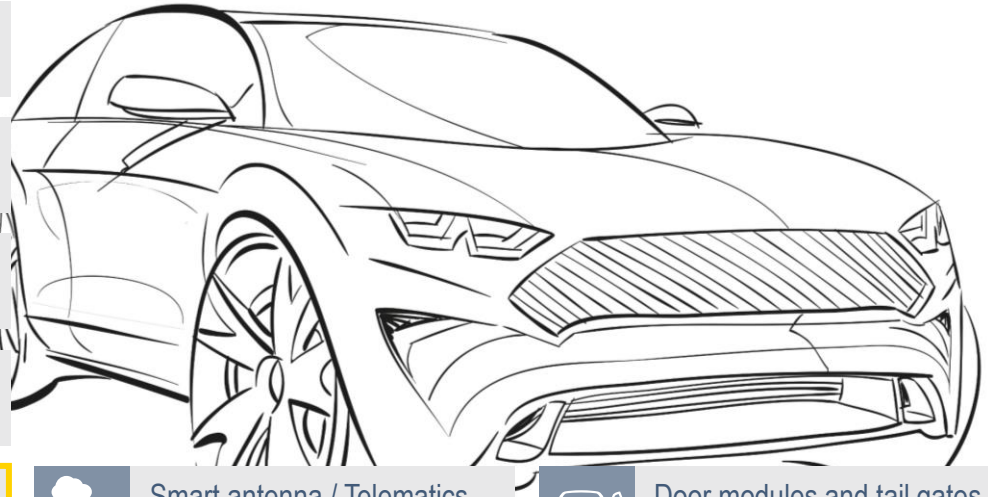
life.augmented

(1)Tire Pressure Monitoring System
(2)Road Noise Cancelling

The 6 degree-of-freedom (DOF) IMU family

A diversified offer for each application, the 6x IMU expands further

- Road noise cancelling **AIS25BA**
- eCall **MP23ABS01**
- Airbag **AIS2120**
- Vehicle dynamics **AM3G, ASM5G**
- Navigation / Positioning **ASM330**
- Car alarm / Anti-theft **AIS2IH**
- Stabilization (radars, lidars & camera) **ASM330**
- Smart antenna / Telematics **AIS2IH**
- Seat & armrest position **AIS2IH**
- Keyfob (car access) **AIS2DW12**
- Door modules and tail gates **AIS2IH**
- Active suspension **ASM330**
- Light level. / Adaptive lighting **ASM330**



More applications on the way to become safety critical ….

ASM330LHH
AEC-Q100 up to 105°C
>50Mu in the market

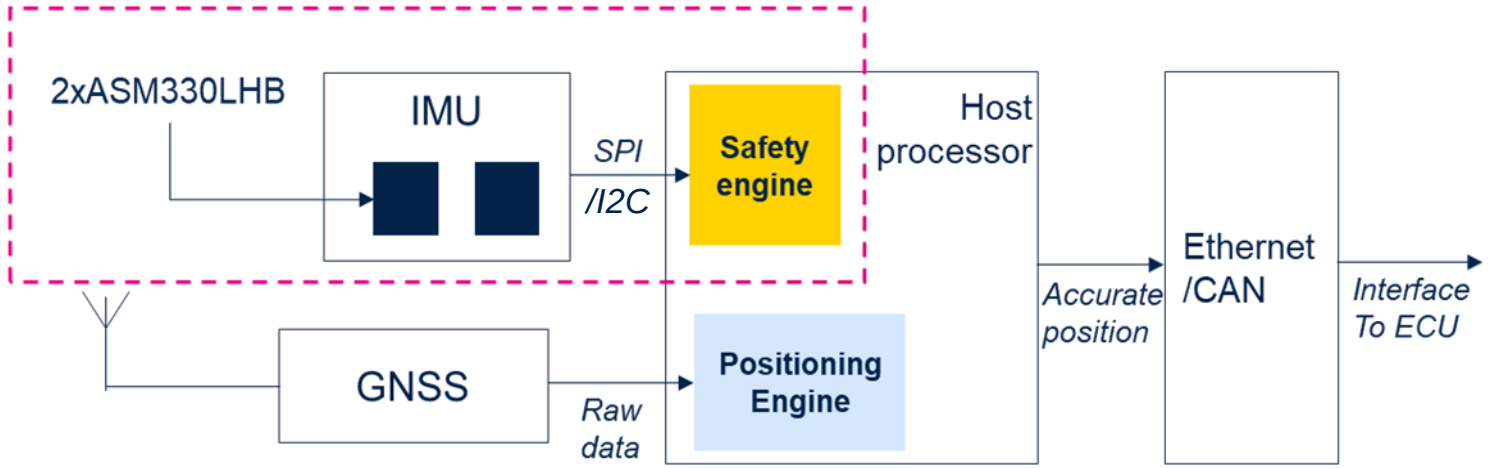
ASM330LHHX / LHHXG1
AEC-Q100 up to 125°C
With low power mode
Embedded MLC(1) and FSM(2)

ASM330LHB / LHBG1
AEC-Q100 up to 125°C
With low power mode
Embedded MLC and FSM
With ASIL-B library

(1)Machine Learning Core
(2)Finite State Machine

The hardware configuration the redundancy concept with ASM330LHB / LHBG1

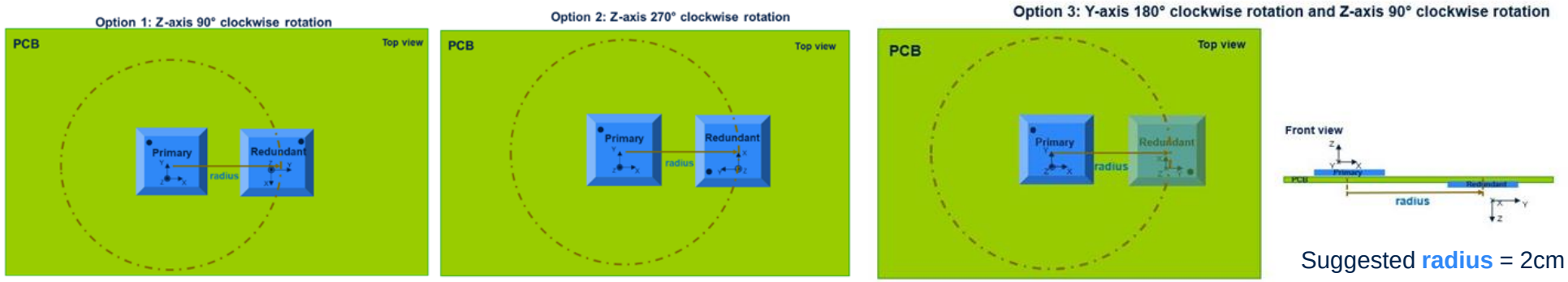
Precise positioning unit in an ADAS system



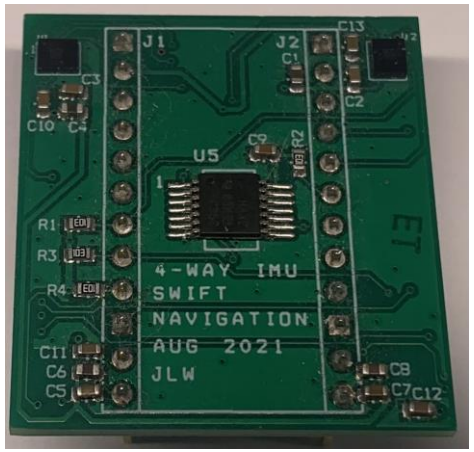
Adopted approach according to ISO26262:
Safety element out-of-context

Software safety mechanisms realized through the **Safety Engine** (that is a software library, certified **ASILB** according to **ISO26262**) and loaded in a host processor

Application hint: recommended mounting position on the PCB



Suggested **radius** = 2cm



life.augmented

Precise positioning system

End-to-end positioning solution for safe ADAS or autonomy from ST and Swift Navigation.

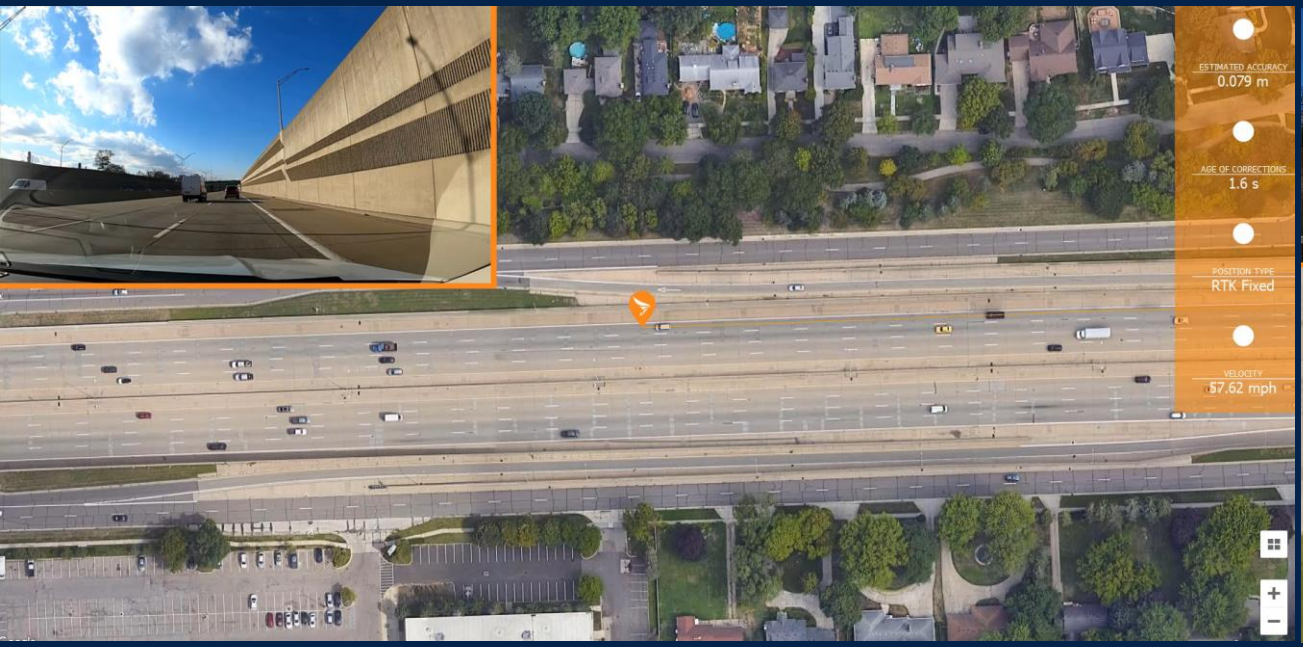
Includes ST ASIL-B 6-axis IMU, TeseoAPP multiband GNSS chipset & Swift Starling positioning and Skylark corrections.

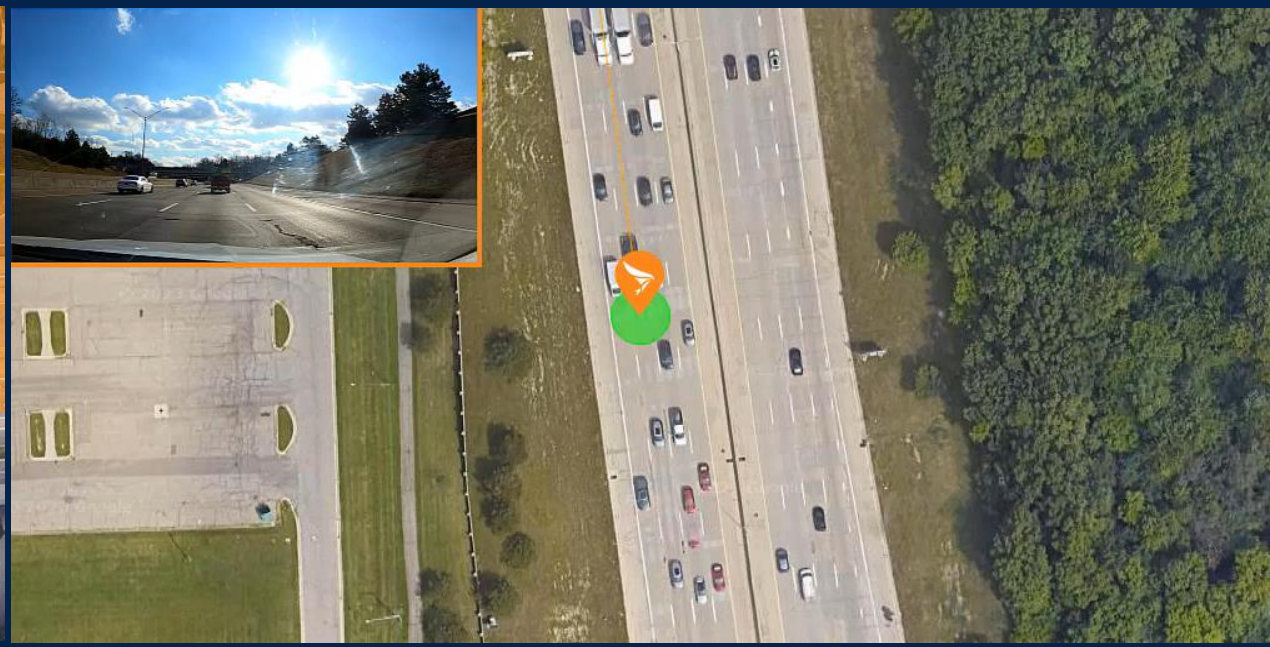
High precision functional safety to enable assisted and autonomous driving

Reliable accuracy even in challenging driving conditions

Portable safety software library allows scalability to triple frequency solution

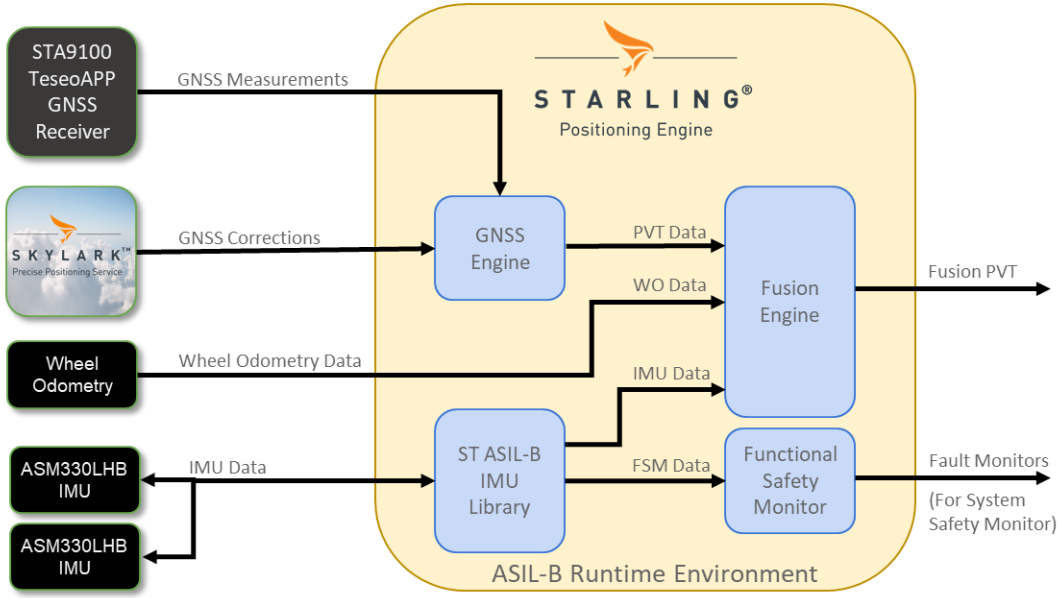
Recorded video





life.augmented

ASIL-B precise positioning architecture



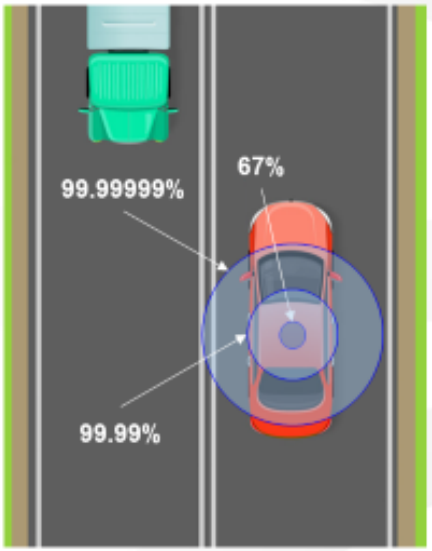
Integrity, protection levels, TIR, and ASIL

Integrity: a measure of trust that can be placed in the correctness of the information supplied by the system.

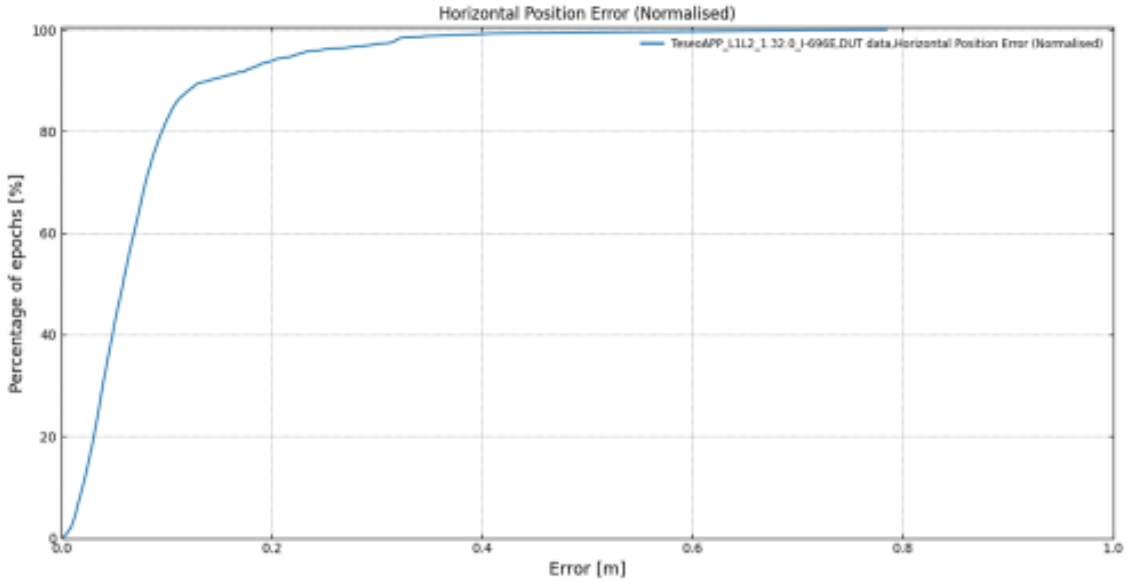
Protection Level (PL): Maximum allowed error bound considering current conditions.

Target Integrity Risk (TIR): Probability that the actual error exceeds the PL (defined by the TIR requirements: i.e.- 10^{-4}, 10^{-5}, 10^{-6}, or 10^{-7} per hour)

Automotive Safety Integrity Level (ASIL): Higher TIRs require an ASIL-level analysis of the system safety case to assure meeting the TIR.



ASM330LHB & TeseoAPP performance with Starling PE



life.augmented