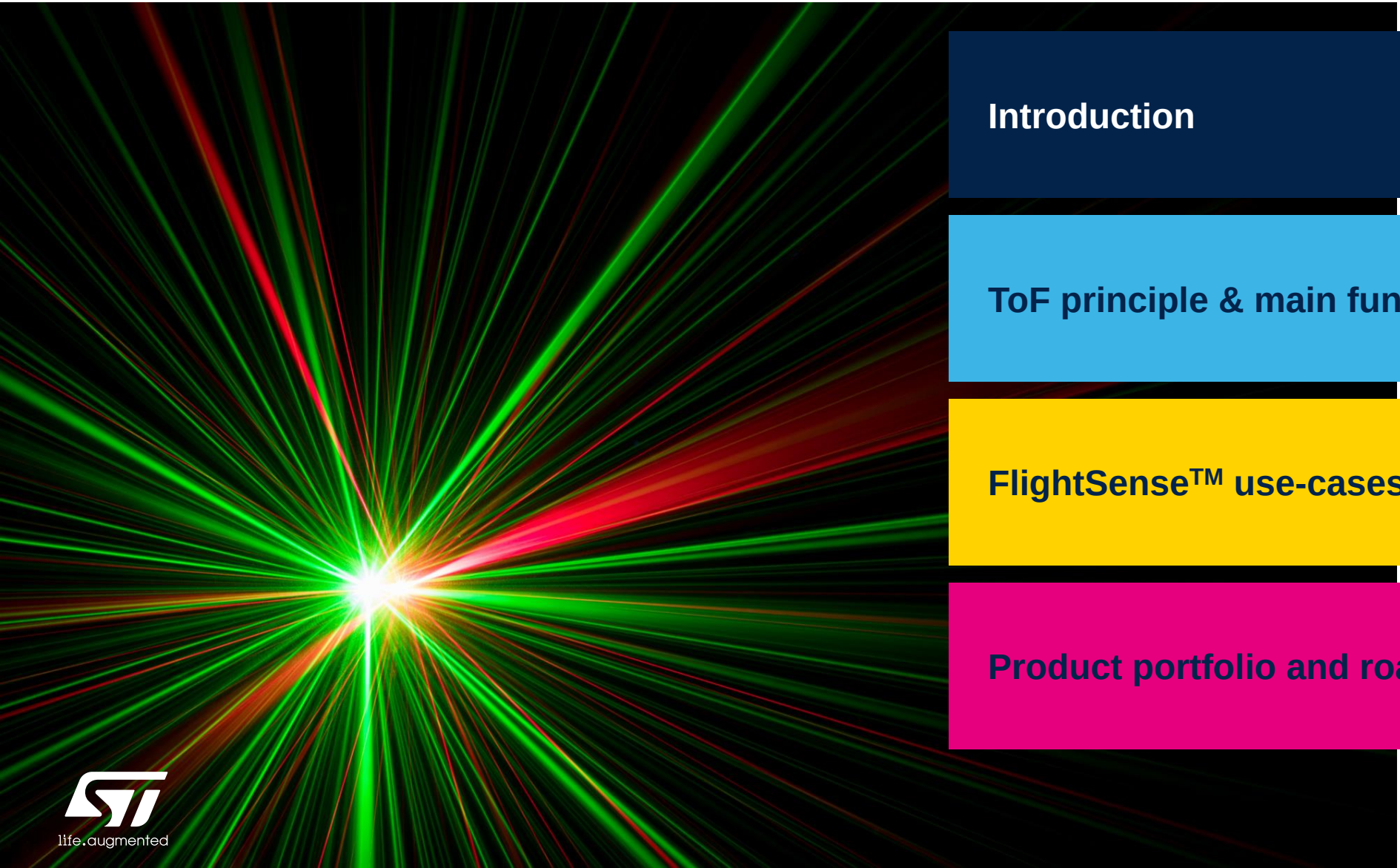
FlightSense™ Time-of-Flight sensors



- Introduction
- ToF principle & main functions
- FlightSense™ use-cases
- Product portfolio and roadmap

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ST pioneer and leader in Time-of-Flight (ToF)

ST is #1 Worldwide ToF sensor supplier

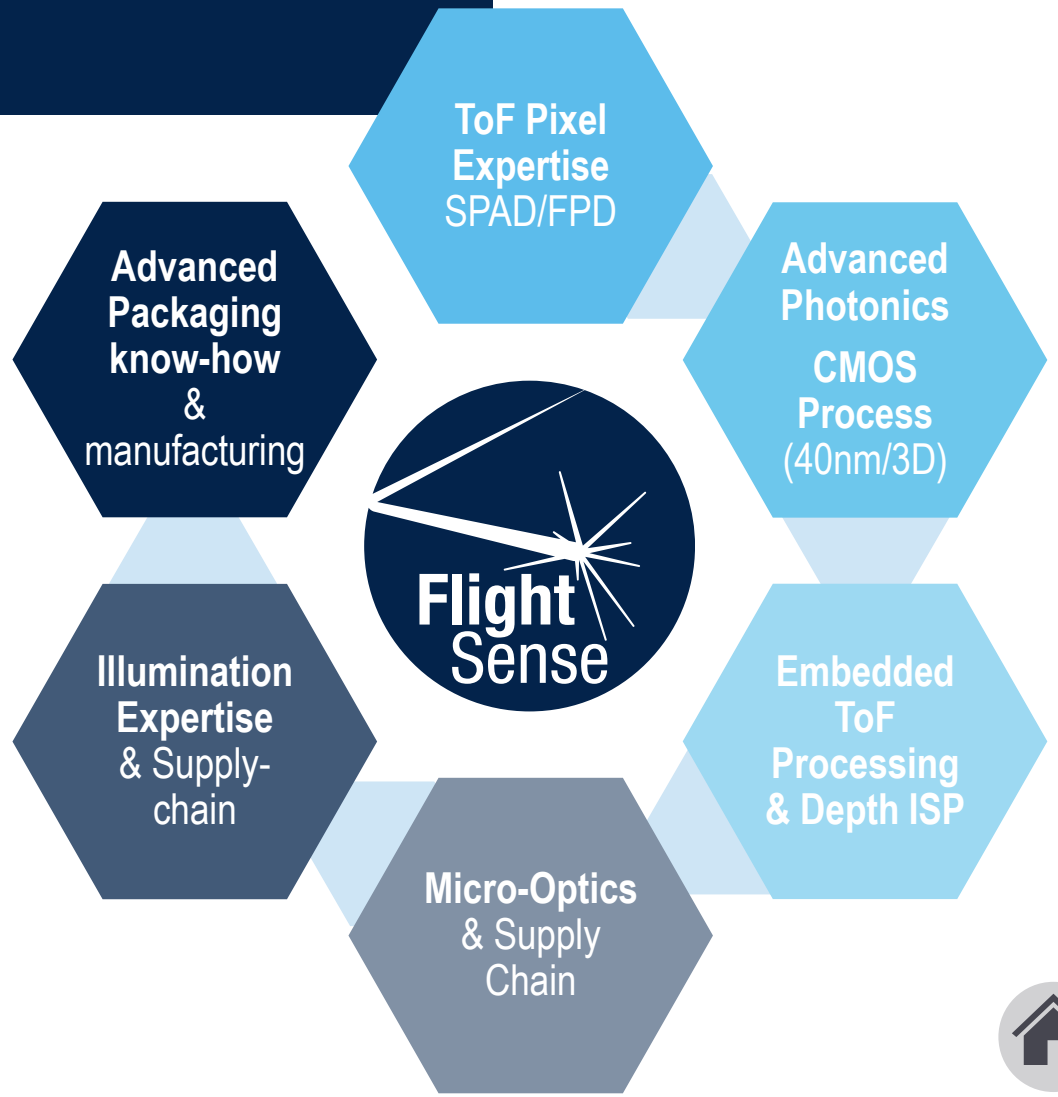
4 Generations
of all-in-one ToF solution deployed since 5 years

>155 phones with FlightSense™
Above 15 smartphone OEMs

Hundreds other customers
Hundreds non wireless end-products in the market

>40,000
Evaluation kits deployed

>1Bu
ToF units shipped. Mastering end-to-end supply chain



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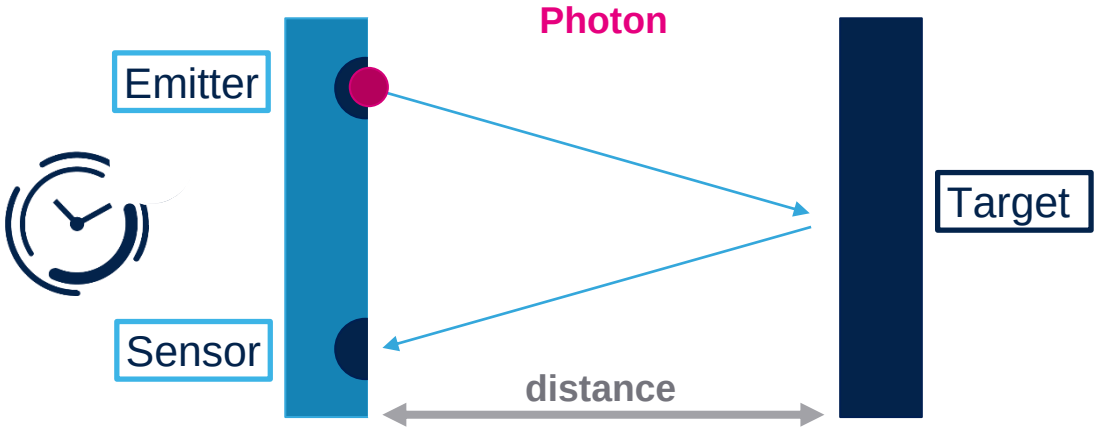
FlightSense™ … making light work

Time-of-Flight Principle



Measured distance = Photon travel time / 2 x Speed of light

1cm round-trip takes 67ps

- ST proprietary **Flight**Sense™ technology
- True distance measurement
  Independent of target size, color & reflectance
- Fast and low power
- Truly invisible 940 nm illumination

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FlightSense™ Typical module overview

All-in-One (illumination & sensor) Time of Flight system
→ Optimized size / performance / cost mix

Advanced optics with integrated IR filter

State-of-art assembly & testing manufacturing ST line in SHZ

Monolithic ToF SoC, SPAD Array, RAM/ROM & powerful Class1 VCSEL driver

High power VCSEL Full Class 1 safety

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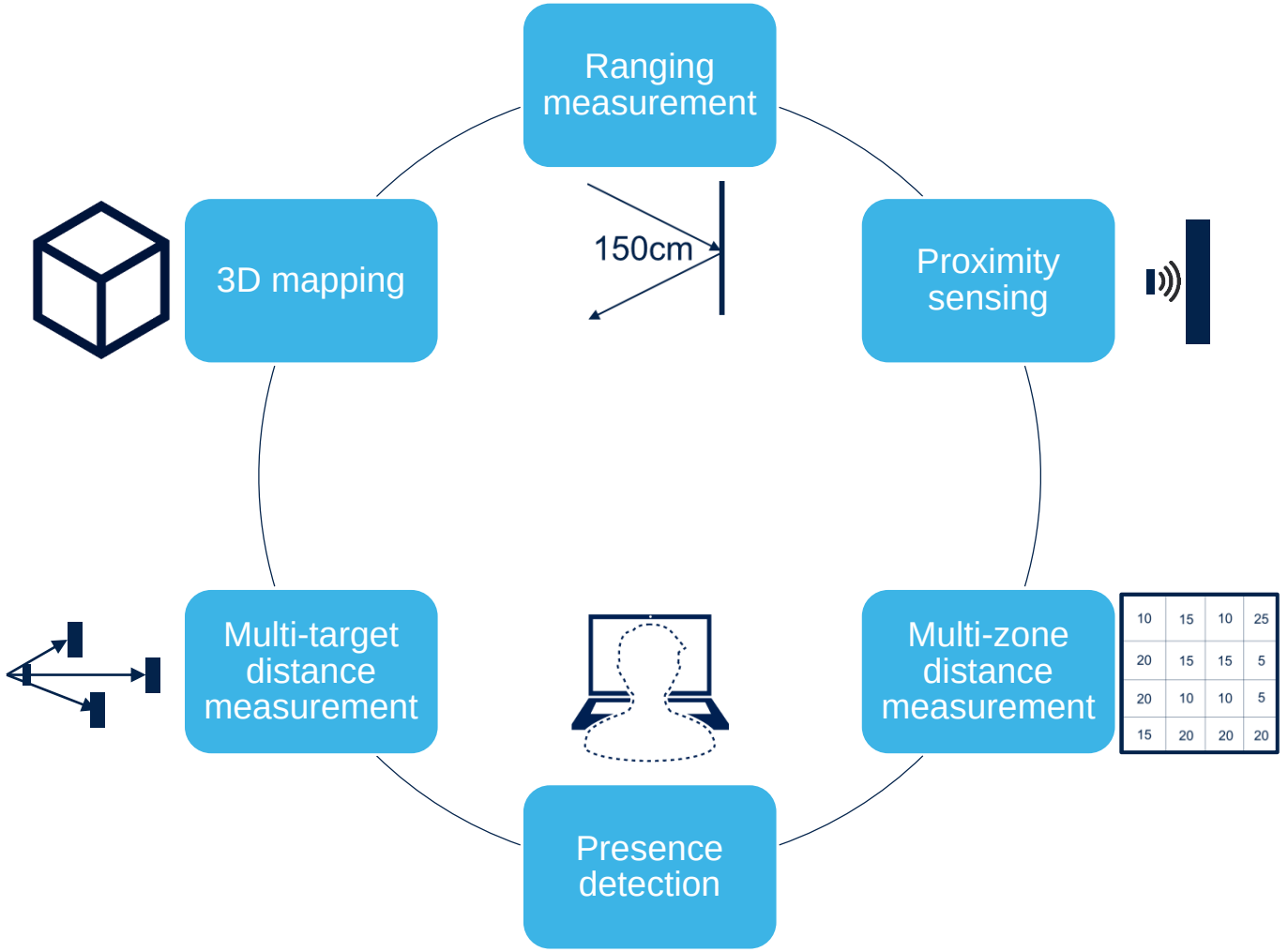
FlightSense™ sensors main functions

Enabling endless Use-Cases

- Ceiling detection
- Content analysis
- Cliff detection
- Gesture control
- Hands-free operation
- Light control
- Load management
- Object detection
- Obstacle avoidance
- Occupancy detection
- Parking occupancy
- People counting
- Power saving
- SLAM
- Touch-less operation
- User detection
- Volume control
- Wall tracking



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Market & applications


Lighting


Faucets


Laptops


Dispensers


Farming


Trucks


Public Parking


Printers


Drones


Service Robots

ATM

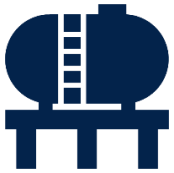
Smart home


Tablets


Projectors


Vacuum cleaners


AR/VR


Tanks


Industrial


Wearable
& IoT


Medical


Lockers


Logistic


Toys


Warehouse


Vending
machines


White Goods

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FlightSense™ robotics applications

Typical use-cases

Cliff detection
Avoid robot falling

Wall tracking

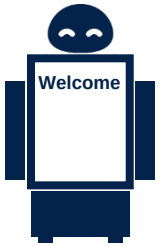
Obstacle detection
Avoid collision with user or breakable object

Cleaning robots

Home assistant

Air purifier

Service robots



Pet robots

Benefits

Depth map (multi sensor design)

Avoid collision with human or object

Low power

Toy robots

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FlightSense™ smart building applications

Typical use-cases

Gesture control
Robust gesture recognition for IoT

Light control
Energy management

User detection
Energy saving

Parking occupancy
Security, parking management

Smart Home

White Goods

Benefits

Small footprint for easy integration

Works with many cover Glass materials

Immune to color, texture, and material

Battery-operated, high-performance applications

- Down to 175 µW at 1 Hz

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FlightSense™ laptops / tablets / conference calls applications

Typical use-cases

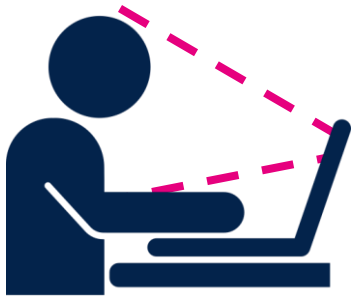
Security
Immediate log-off or lock, log-in assist

Power saving
Immediate screen on/off, low power mode

Eye protection
Warning when user is too close from screen

Audio/User interface enhanced control
Adjust mic/speaker mode based on distance

Simple and robust gesture
Tap & Swipe



PC presence detection

Conference call system presence detection

Tablet proximity measurement

Benefits

Immediate Presence Detection

Accurate distance measurement

Small footprint for easy integration

Autonomous low power mode

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FlightSense™ industrial applications

Typical use-cases

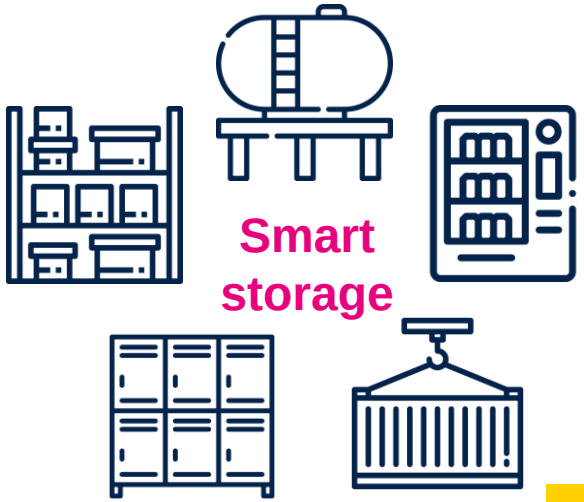
Liquid level control
Water / Oil tank level management

User detection
People counting

Load management
Filling monitoring

Object detection
Smart lockers, smart shelves

Security
Security barriers to protect



Smart storage

Industrial robots

Factory management

Logistic

Benefits

High accuracy

Configurable FoV

Fast ranging mode (100 Hz)

Long distance ranging

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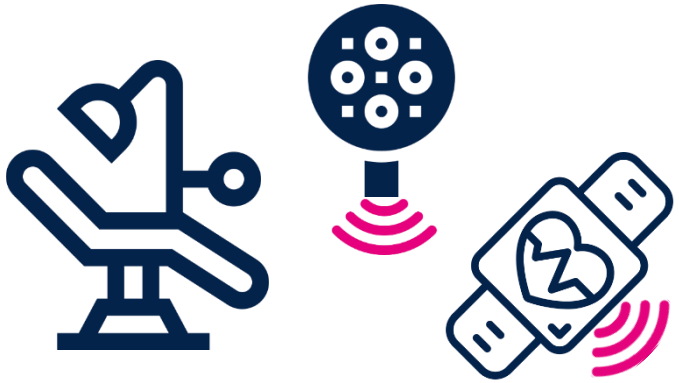
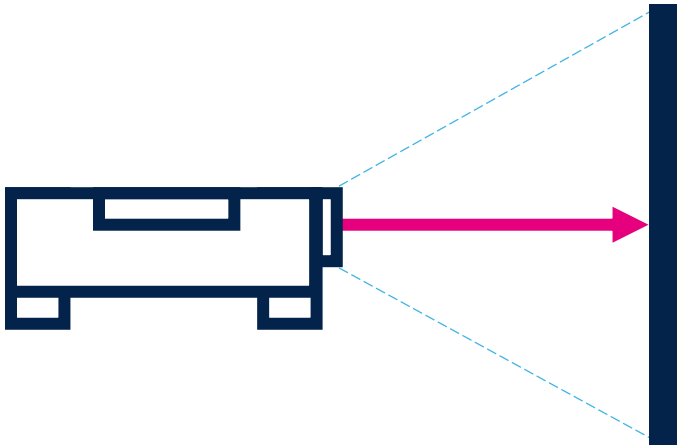
FlightSense™ applications

Medical



Basic gesture recognition
"zero-touch" control of devices

Projectors

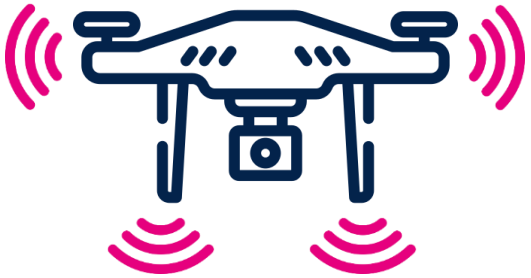


Auto-Focus adjust

Distance measurement
Adaptive configuration & set-up

Presence detection
User eye safety protection

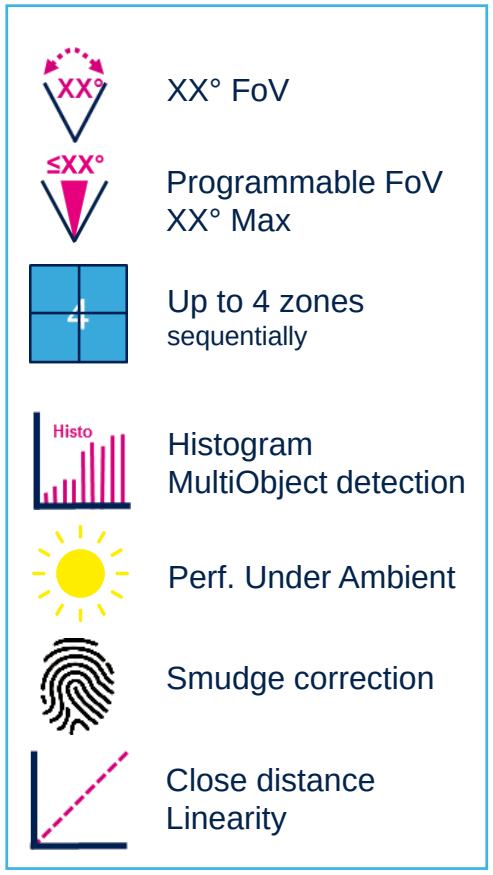
Drones

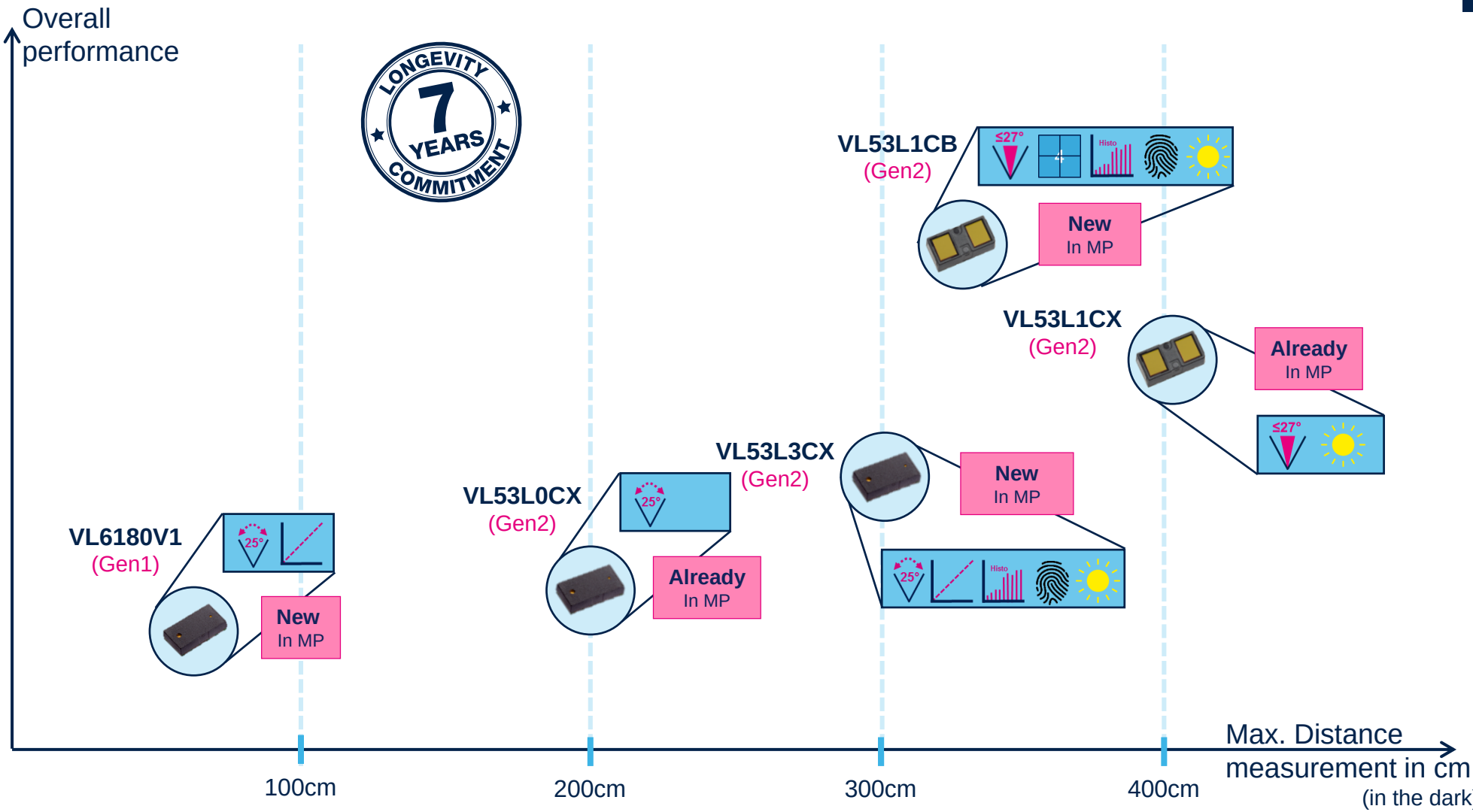


Flying assist

Collision avoidance
Obstacle, ceiling and floor detection

FlightSense™ mass-market roadmap





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