



## LSM6DSV80X

IMU for impact intensity tracking in sports activities

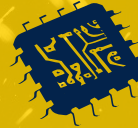


# Challenges for sensors in sports tracking



## Loss of inertial information

Miss high acceleration events due to sensor saturation



## PCB space

Detecting both high-g and low-g accelerations normally requires two devices



## Accuracy tradeoff

Low-g sensor provides high accuracy with limited range  
High-g sensor offers an extended range with less accuracy



## Battery life

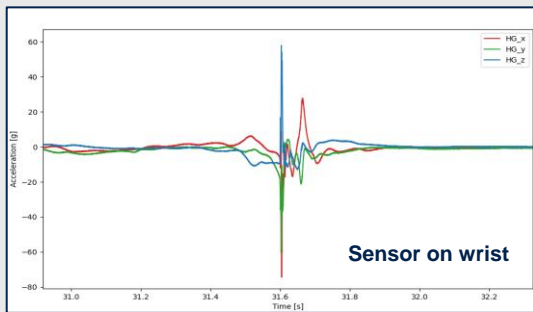
High and low accelerations detection drain more power due to double devices management

# Intense impacts tracking in sports

## Volleyball



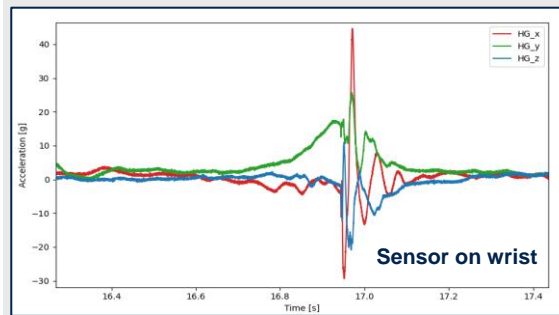
**Training:** Measure spike force progress  
**Performance:** Collect ball-hand contact time and acceleration profile for guide athletic improvement



## Padel / tennis



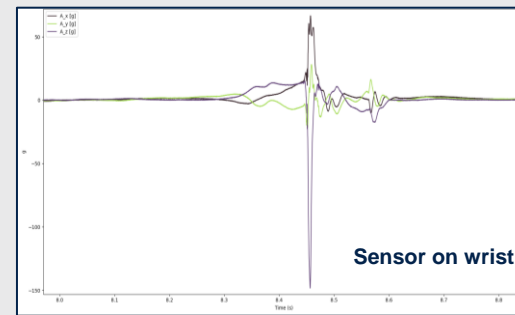
**Training:** Wrist rotation speed and acceleration tracking  
**Performance:** ball hitting metrics



## Boxing



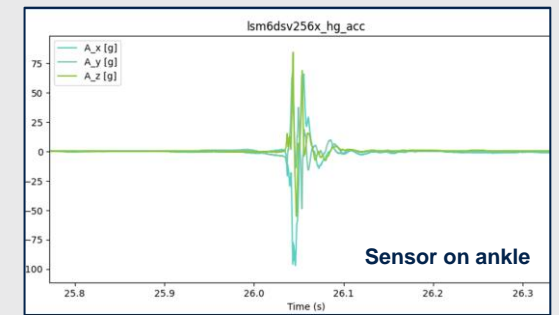
**Training:** performance and motion monitoring  
**Performance:** punch metrics, concussion detection on helmet



## Plyometrics / Explosive jumps



**Training:** stress of joints  
**Performance:** metrics (impulse intensity, impulse width, fall time)



# LSM6DSV80X, designed with sports tracking in mind

Extended full scale to detect any sport dynamic

## High performance for everyday life and intense sport training

- Multiple full scales from 2g up to 80g
- ODR up to 7.68 kHz with HAODR<sup>(1)</sup>
- Low noise and low power

## At-the-edge processing

- Adaptive self-configuration (ASC)
- MLC<sup>(2)</sup>, FSM<sup>(3)</sup>
- Embedded SFLP<sup>(4)</sup>
- Automatic FS switch based on the context
- 1.5 KB FIFO (up to 4.5 KB with compression)

## No overhead in the package size

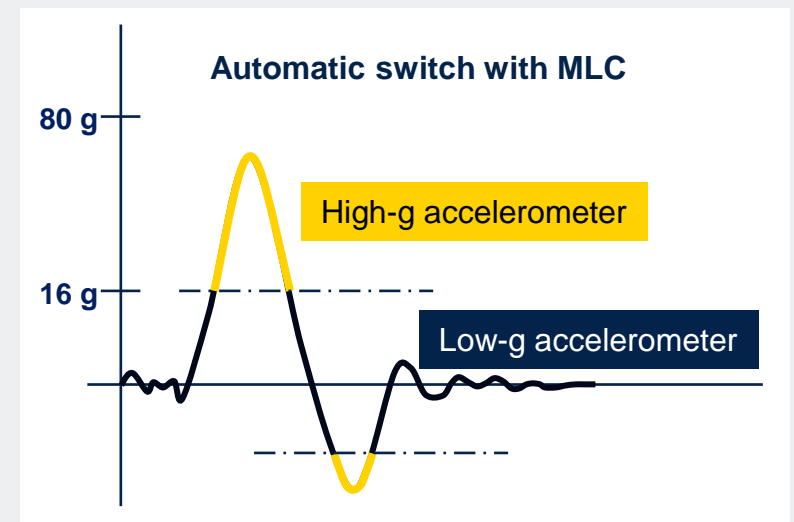
- Standard IMU footprint: 2.5 x 3.0 x 0.83 mm

(1) HAODR: High Accuracy ODR

(3) FSM: Finite state machine

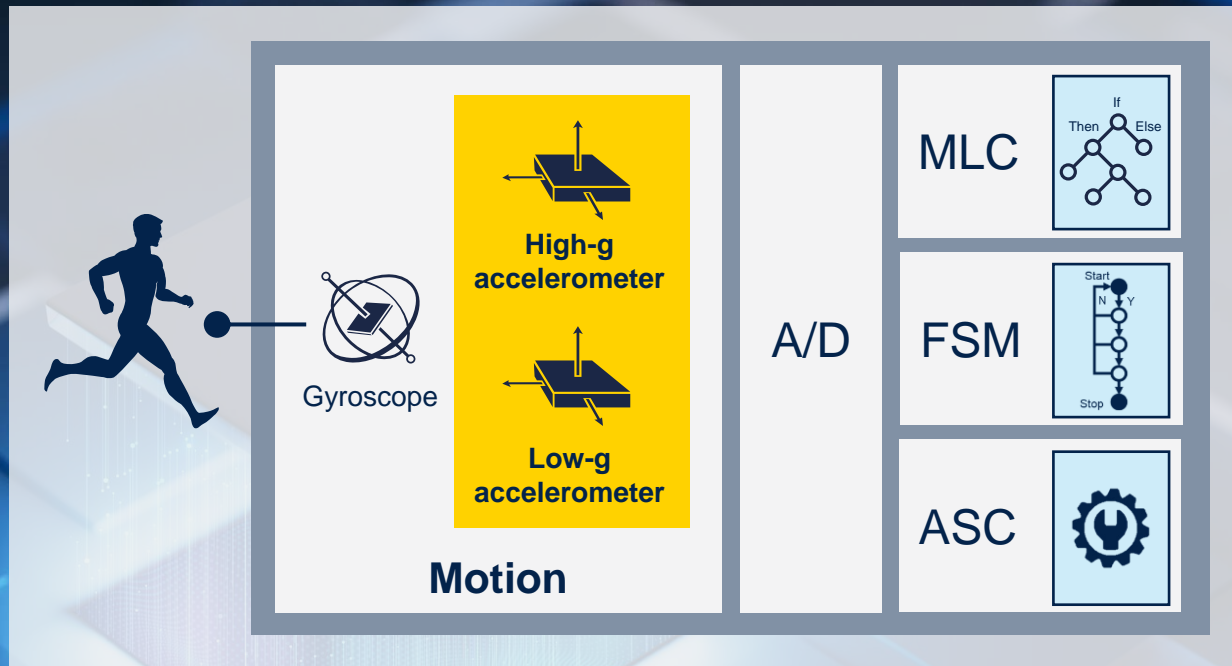
(2) MLC: Machine learning core

(4) SFLP: Sensor fusion low power



# What's inside the LSM6DSV80X?

A new sensor technology to accurately and efficiently measure both high and low acceleration levels



**Consistent performance and valuable insights** for intense impact in sports and in everyday tracking movements

**Self-configure** the sensor in real time without the need of the **host processor**  
Data available to **FSM\***, **MLC\*** and **ASC\*** embedded resources



\*FSM = finite state machine  
\*MLC = machine learning core  
\*ASC = adaptive self-configuration

# Which attributes for LSM6DSV80X?

## Track and impact

**Low-g accelerometer** for wake-up, orientation, accuracy, step counting

**High-g accelerometer** to track shock, falls detection, highly intense sport activities

## Integration

In a **2.5 x 3 mm package**, it integrates 3 sensing capabilities:

- Gyroscope
- Low-g (16g) accelerometer
- High-g (80g) accelerometer

All sensing capabilities are fully **synchronized**

## Decision making

**AI & context awareness** for processing of sensor data at the edge (MLC & FSM) and fusion of data (Sensor Fusion Low Power) for 3D orientation

**Adaptive sensing configuration** in real time without the host processor for optimized performance and power saving

Improve sports activities by **accurately and efficiently measuring** both **high and low acceleration** levels delivering consistent performance and valuable insights

# LSM6DSV80X vs general purpose IMU

## LSM6DSV80X

### Superior choice for wearables and tracking

- Three sensing capabilities in a single package
  - Gyroscope
  - Low-g accelerometer (16g)
  - High-g accelerometer (80g)
- Embedded processing in MEMS sensor, offloading the microcontroller
- Leverage MEMS sensor embedded ecosystem, including MLC

**Suitable for wearable and sport tracker devices**

VS

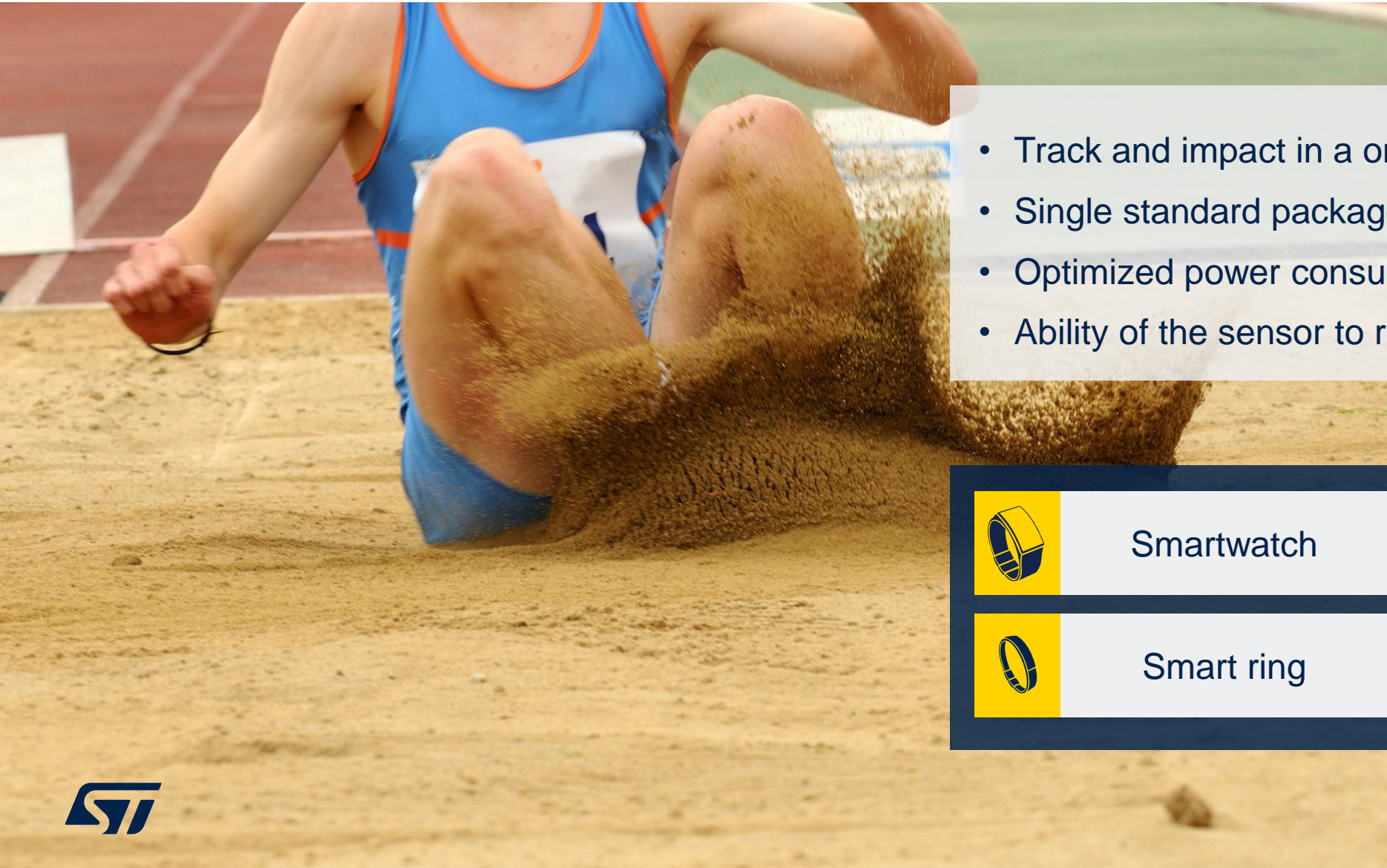
## General purpose IMU

### Current devices

- Two sensing capabilities in a single package
  - Gyroscope
  - Low-g accelerometer (32g)
- Require an external host processor to decodify the inertial measurements data
- Lower communication capability due to older standard interfaces

**Suitable for standard wearable**

# Intense movement tracking in wearable devices



- Track and impact in a one IMU
- Single standard package
- Optimized power consumption
- Ability of the sensor to reconfigure itself



Smartwatch



Sport tracker



Smart ring

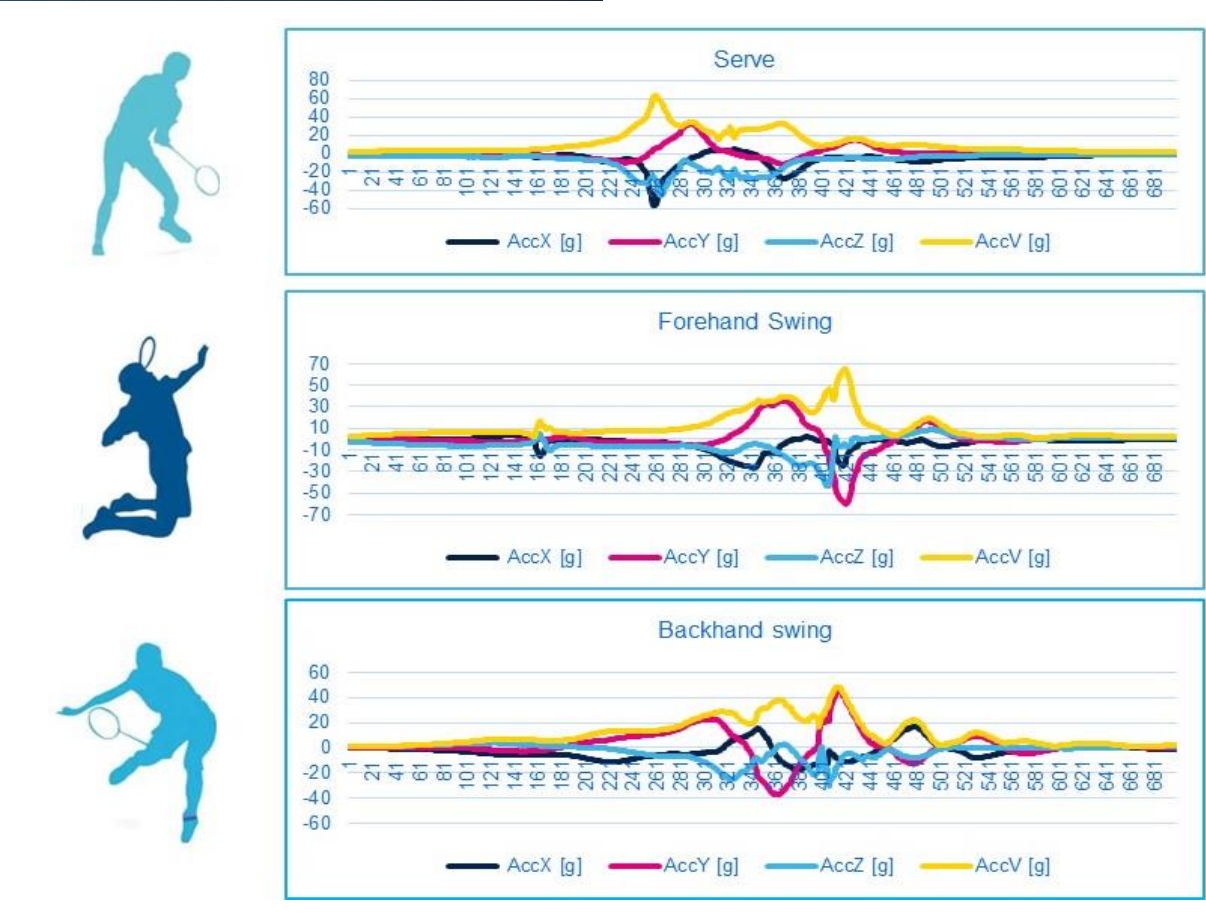


Wearable



# Example in tennis with LSM6DSV80X

In tennis actions like swinging a racket, the acceleration is up to 60g



# Train like a pro!

## LSM6DSV80X: the final device for your sport tracking

**Capture and process all relevant data** even in extreme situations unlocking new possibilities

**Best system optimization** with processing at the edge and self-configuration

**PCB spacing and BOM cost reduction:** a single IMU that embeds two accelerometer structures (16g + 80g) and a gyroscope

# Our technology starts with You



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