



## Get the movement data you need for meaningful results

Opals are a wireless movement monitors about the size of a watch. They use the latest Micro Electro Mechanical Systems (MEMS) technology to precisely record movement with a complete kinematic sensors suite that include triaxial accelerometers, gyroscopes, and magnetometers. If more than one Opal is used simultaneously, the devices wirelessly synchronize so data is acquired simultaneously a timing resolution better than 0.01 ms.



### Technical Specifications

#### Device Characteristics

**Dimensions:** 48.5x36.5x13.5 mm

**Weight:** 22 grams (with battery)

**Material:** 6061 clear anodized Aluminum, ABS plastic, and Velcro straps.

**Internal Storage:** 8 GB (~720 hours of recording)

**Battery Life:** Wireless Streaming: 8 hours

Synchronous Logging: 12 hours

Asynchronous Logging: 16-36 hours (depending on output rate)

#### Sensor Characteristics

Property	Accelerometer	Gyroscope	Magnetometer
Axes	3	3	3
Range	+/-2g or +/-6g	+/- 2000 °/s	+/- 6 Gauss
Noise Density	128 $\mu\text{g}/\sqrt{\text{Hz}}$	0.07 $^{\circ}/\text{s}/\sqrt{\text{Hz}}$	4 mGauss/ $\sqrt{\text{Hz}}$
Sample Rate	1280 Hz	1280 Hz	1280 Hz
Output Rate	20 - 128 Hz	20 - 128 Hz	20 - 128 Hz
Bandwidth	50 Hz	50 Hz	50 Hz
Resolution	14 bits	14 bits	14 bits

#### Wireless Characteristics

**Synchronous units:** 2 to 24 Opals exchange data packets to maintain precise time synchronization

**Synchronization resolution:** 10  $\mu\text{s}$  resolution between Opals in a network

**Transmission range:** 30m line of sight, 10m office

**Transmission latency:** 300 ms with data buffer feature turned ON

30 ms with data buffer feature turned OFF

**Data buffer:** 8 GB storage completely eliminates data loss while streaming.

#### Data and System Information

**Data output:** 3D acceleration, angular velocity, magnetic field, and orientation estimate

**Data format:** Documented binary format (HDF5) and/or plain text (CSV)

**Application development:** Complete cross-platform software development kit included for Windows, Mac, and Linux. Compatible with **MATLAB™**, **Java**, and **C**.

**Synchronize with 3rd party systems:** ECG, force plate, gait mats, optical systems, and more

#### Accessories

**Straps:** For the wrist, ankle, bicep, thigh, head, trunk, sternum, belt, or shoe

**Docking station:** Recharge the battery and download stored data, includes AC adapter

**Access point:** Enable wireless data streaming from the Opals to the user's computer over USB

**External button:** When an event occurs, such as a fall, the subject can indicate the occurrence by simply pressing the external button located on the Opal