OSMIUM MIMU22BL/22BLP/22BLPX

Shoe-mounted PDR Sensor (IMU)

INERTIAL ELEMENTS

Highlighting Features

- 4 nine-axis ICM -IMU array (Accelero+Gyro+Magnetometers)
- Accelerometer Range:- ±2g, ±4g, ±8g, ±16g

Axis	Bias Stability (mg)	Velocity Random Walk (m/s/√hr)
X	0.051	0.079
Y	0.063	0.080
Z	0.056	0.073

- Gyroscope Range:- ±250, ±500, ±1000, ±2000 deg/s

Axis	Bias Stability (°/hr)	Angle Random Walk (°/√hr)
X	4.760	0.381
Y	4.490	0.366
Z	4.620	0.378

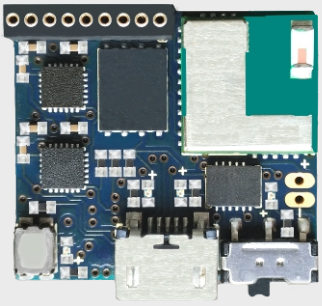
- IMUs' placement and orientation to minimize systematic errors
- Bluetooth BLE v4.1 and USB 2.0 data interfaces
- 32b Floating point controller with 512 Kb internal flash
- Pressure sensor, 8 Mb Data Flash memory*
- Barometer & IMU fused altimeter
- Tilt compensated true magnetic compass incorporated
- ZUPT-aided inertial navigation
- Performs sensor fusion inside
- Powering with Li-ion battery, USB; Battery charging with USB
- ON-OFF switch, LED indicators; Peak cont. current: 65mA
- USB (Bootloader) programmable; JTAG programmable
- Single board; Low profile
- Rechargeable battery; Battery backup: 8 – 9 hours
- Dimensions:
  - MIMU22BL : 20.9 x 22.7 x 5.5 mm; Weight - 3.5 g
  - MIMU22BLP : 31.0 x 23.5 x 13.5 mm; Weight - 12 g
  - MIMU22BLPX : 42.2 x 27.9 x17.0 mm; Weight - 20g

** Support to access Data Flash memory is not available at the moment.*

Application Interface

- A simple command based interface
- Opensource Python APIs
- Access to sensors' data
- Access to fused and intermediate data
- Smart Android Apps for data logging & visualization
- Allows Google Map based tracking
- Access to tilt compensated true magnetic compass
- Allows compass calibration
- Provides 3D positioning information
- Allows remote monitoring of battery status

Osmium MIMU22BL is a miniaturized motion sensing multi-IMU (MIMU) platform, configured as shoe-based Pedestrian Dead Reckoning (PDR) sensor for real-time indoor localization in GPS denied environment. It finds applications in indoor real-time location systems (RTLS) for industrial workers and first responders. Besides, it also has applications in robotics, urban geo-survey, AR, gaming, gait biomechanics, wearable IoT etc.



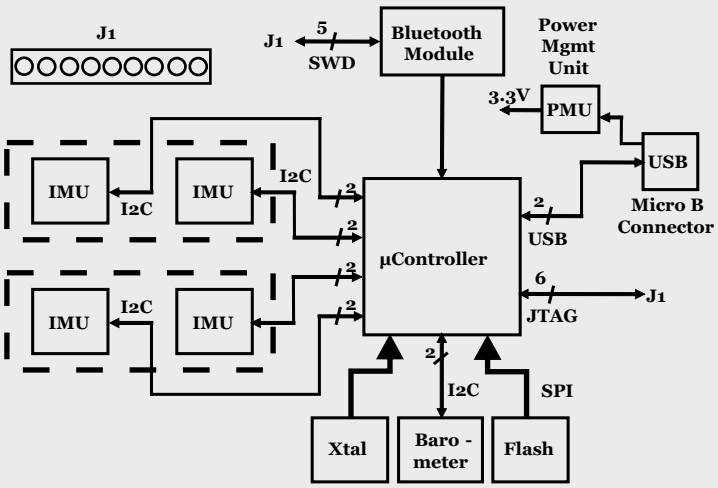
A smart IoT sensor node, capable of providing simplified yet information rich data, thereby relieving application platform and developers from the compute intensive development and tasks. This greatly simplifies data interface and makes integration of this device with rest of the localization system, effortless. This results in improved tracking accuracy, relaxes constraints on the integration platform and significantly reduces time-to-market.

Presence of on-board floating point processing capability, along with four IMUs array, makes sensor fusion and motion processing possible within the module itself, which in turn results in very accurate motion sensing. It is also configurable as a wireless IMU, thanks to the on-board bluetooth module.

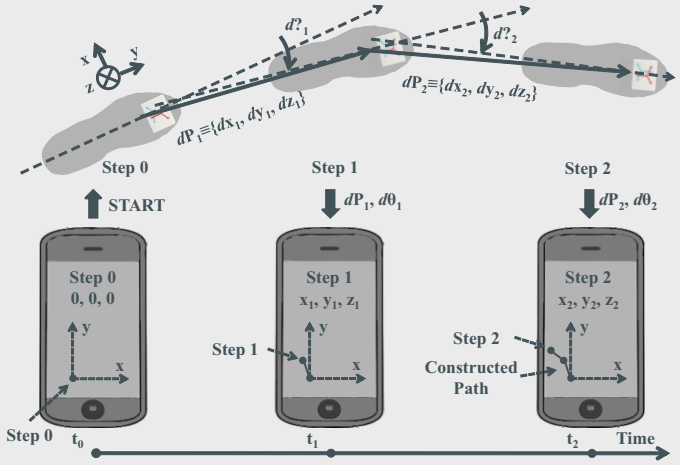
Value Proposition

PDR Data | Accurate | Affordable | Short Time-to-Market | Low Power | Customizable

Block Diagram of Osmium MIMU22BL shows the interfacing of the microcontroller with IMUs, Barometer, USB, Bluetooth and Power Management Unit.



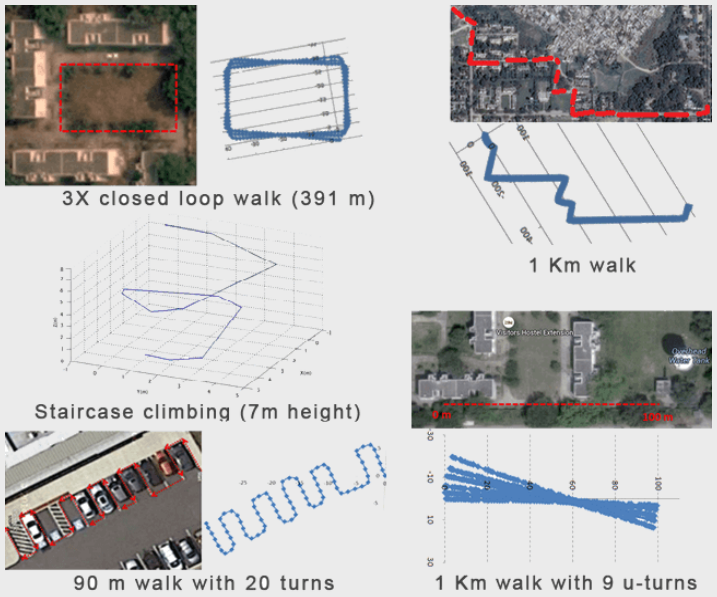
Pedestrian Dead Reckoning (PDR) is simplified with the foot-mounted MIMU22BLP/ MIMU22BLPX. The device starts transmitting location data at every step, on receiving start command from the application platform. Based on this data, complete path is built in the application platform DaReX.



Calibration: A simple calibration procedure which compensates for the inter IMU misalignment. A novel mechanical rotation-rig-free calibration procedure for all MIMU devices. Presenting a simple 3D printable 20-faced polyhedron (Icosahedron) for this purpose.

Osmium MIMU22BLP/ MIMU22BLPX is used as a shoe mounted indoor tracking device. The tracking performance of MIMU22BLP/ MIMU22BLPX depends on mounting procedure. Elastic shoe mount gives superior performance compared to other

Sample Results of PDR Using MIMU22BLP/ MIMU22BLPX



Target Applications:

Workforce Safety & Management

Autonomous Robotics

Urban Survey

Gaming & VR

Biomechnics

First Responders' Safety

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