

## Q-Stat

### Modular Wearable Hub Platform

The Q-Stat is a cutting-edge modular wearable hub and platform designed to deliver individualized network-resilient health and safety monitoring of personnel.

#### Challenges with Today's Wearables

Existing consumer-grade wearables present several limitations:

- **Lack of Raw Data:** These wearables typically do not provide access to raw data, limiting the depth of analysis and customization possibilities.
- **Limited Medical Utility:** Due to susceptibility to motion and other noise artifacts, consumer-grade wearables are unsuitable for medical applications, hindering their reliability and accuracy. Also, consumer wearables prioritize situational awareness and are optimized for energy efficiency on downstream mobile devices, sacrificing in-depth data collection capabilities.
- **Vendor Lock-In:** Data generated by these wearables often become locked into proprietary cloud backend systems, posing challenges for integration with other sensors, such as gas and environmental sensors, and hindering interoperability.
- **Lack of Customization:** These wearables typically do not allow for hardware customization options, limiting their adaptability and versatility to different use cases.
- **Connectivity Issues:** Consumer wearables are not robust to intermittent connectivity, potentially affecting data transmission and collection reliability and sustainability in harsh RF environments, which is especially prevalent in hospitals, airports, construction sites, mines, etc.

#### How is Q-Stat different? ... Solutions to the Current Challenges

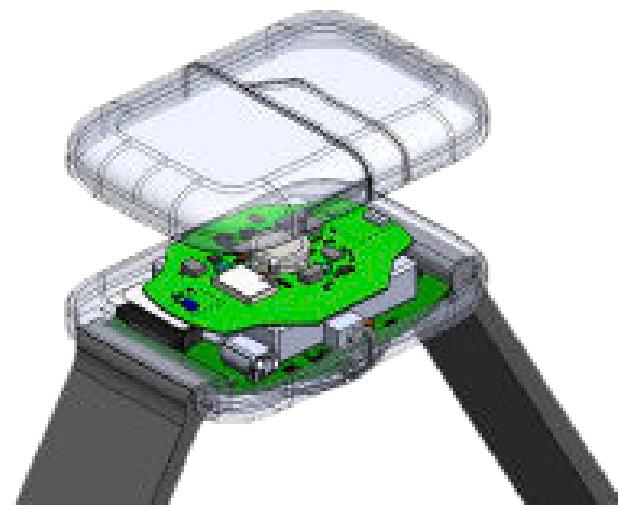
The Q-Stat wearable hub platform systematically addresses the limitations of consumer-grade wearables through its advanced features: the limitations of consumer-grade wearables through its advanced features:

- **Continuous Raw Data Streaming:** Q-Stat enables continuous raw data streaming, facilitating early health



diagnostics through downstream AI applications. This feature overcomes the limitation of consumer wearables that typically do not provide access to raw data.

- **Sensor Fusion and Signal Processing:** Sophisticated sensor fusion and digital signal processing algorithms are employed to correct motion-induced errors and noise, enhancing the collected data's accuracy and reliability making them medically relevant and useable.
- **Seamless Integration with Commercial-Off-the-Shelf (COTS) Sensors:** The wearable hub platform seamlessly integrates with up to 30 COTS BLE sensors, allowing for a wide range of sensor compatibility and enhancing flexibility in data collection. This provides a holistic view of one's health and environment.



Modular Board Design

- Open Data APIs:** Q-Stat provides open data APIs, empowering customers to own and control their data. This addresses the vendor lock-in issue commonly associated with consumer wearables.
- Modular Hardware Design:** With a modular hardware design, Q-Stat offers high customizability and facilitates quick productization of new hardware features.
- Onboard Storage and Customizable Data Pipelines:** The platform includes onboard storage and data ingestion pipelines to ensure lossless data transfer and preserve data integrity ensuring reliable data transmission.

- Communication Options:** Standard Wi-Fi and Bluetooth LE communication in the Q-Stat offers high data throughput and direct integration into mobile and web apps as well as the Rajant Kinetic Mesh network. Additionally, the Q-Stat offers LTE as a communications backup for high availability. Optionally, the Q-Stat can provide long-range communication with LoRa, enhancing connectivity options and flexibility in data transmission.
- Multi-objective Power Optimization:** Intelligent communication modality switching and smart operation modes for optimized utilization while also extending battery life.

Model	Description
(TBD)	The Q-Stat is a cutting-edge <b>modular wearable hub</b> and <b>platform</b> designed to deliver individualized network-resilient health and safety monitoring of personnel.

### Key Technical Specifications

<b>Communication</b>	<ul style="list-style-type: none"> <li>BLE, Wi-Fi (2.4 GHz), LTE</li> </ul>
<b>GNSS</b>	<ul style="list-style-type: none"> <li>GPS, GLONASS, Galileo, BeiDou</li> </ul>
<b>Storage</b>	<ul style="list-style-type: none"> <li>512MB Flash Storage (Up to 4 weeks data backup)</li> </ul>
<b>Vitals</b>	<ul style="list-style-type: none"> <li><b>Photoplethysmography (PPG):</b> raw data (waveforms) up to 2kHz sampling rate</li> <li><b>HR and SpO2 Monitoring:</b> derived data from PPG, with motion-artifact removal</li> <li><b>EKG/ECG:</b> 1-lead (spot measurement)</li> <li>Galvanic skin response</li> <li>Skin temperature</li> </ul>
<b>Audio</b>	<ul style="list-style-type: none"> <li>Microphone, Speaker</li> </ul>
<b>Display</b>	<ul style="list-style-type: none"> <li>High-resolution screen with touch</li> </ul>
<b>Haptic</b>	<ul style="list-style-type: none"> <li>For alerts and notifications</li> </ul>
<b>Motion</b>	<ul style="list-style-type: none"> <li>9-Axis Inertial Measurement Unit with Accelerometer, Gyroscope, and Magnetometer</li> </ul>
<b>Battery</b>	<ul style="list-style-type: none"> <li>Up to 48 hours of continuous use, and Fast Charging</li> </ul>
<b>Physical</b>	<ul style="list-style-type: none"> <li>Compact dimensions (50mm x 35mm x 13mm)</li> <li>Water-resistant IP67</li> </ul>
<b>Updates</b>	<ul style="list-style-type: none"> <li>Firmware-Over-The-Air (FOTA) updates using Wi-Fi and Bluetooth</li> </ul>
<b>Warrenty</b>	<ul style="list-style-type: none"> <li>Standard one-year warranty</li> </ul>

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