| **Expectation Group** | **Specific Expectations** | **Team members** |
| --- | --- | --- |
| **Hardware Expectations** | • Compact IoT Devices: Use of compact, power-efficient devices for physiological monitoring, including PPG, ECG sensors, and ESP32-based microcontrollers.  • Interoperability: Support for heterogeneous devices and protocols (HTTP, MQTT, CoAP, BLE).   * Redesign the power management system to ensure at least two days of continuous use of the system without recharging the battery   • Edge Processing: Real-time signal processing at the edge for ECG and PPG signals.  • Low-cost Solutions: Affordable design focusing on continuous, real-time health monitoring. |  |
| **Software Expectations** | • Real-time Data Analytics: Use of Apache Kafka and Spark for real-time processing, identifying trends, and anomalies in physiological data.  • Cloud-based Monitoring: Support for cloud-based architectures for large-scale data collection and processing (e.g., ThingsBoard).  • Data Visualization: Creation of user-friendly dashboards displaying real-time data for healthcare professionals. |  |
| **Data Management System** | • Distributed Data Storage: Use of scalable, distributed databases (e.g., Cassandra, MySQL, PostgreSQL) for long-term, secure storage of physiological data.  • Real-time Data Handling: Use of Kafka for streaming data to ensure minimal latency and high reliability during transmission.  • Interoperability Handling: Use of gateways and data converters to support various devices and communication protocols. |  |
| **Prototype Development** | • End-to-End Prototype: The developed system includes custom-designed PCBs and IoT devices for collecting and transmitting patient data to the cloud.  • Testing with Simulators and Patients: The system has been validated using bio-signal simulators and real patient trials for real-time physiological monitoring feasibility. |  |
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| **Validation of the System** | • Accuracy and Latency Tests: Testing for data loss and latency during transmission, showing low data loss and acceptable latency for real-time monitoring.  • Comparison with Gold Standards: Benchmarking data quality against traditional methods like polysomnography (PSG) shows strong similarity.  • Clinical Trials: Trials with cancer patients validated the system’s effectiveness for continuous health monitoring during treatment. |  |
| **Documentation of Design and Development** | • Comprehensive Documentation: Detailed documentation of system design, including hardware schematics, PCB layouts, BOM, and software architecture, with version control for tracking changes.  • Assembly and Testing Procedures: Development of thorough assembly and testing manuals with step-by-step instructions, calibration methods, and quality control checkpoints.  • Source Code and Configuration Files: Well-commented and organized source code repositories for firmware, software applications, and cloud integrations, including IoT device settings and data pipelines.  • Testing and Validation Reports: Detailed records of testing phases, including lab simulations, patient trials, and benchmarking against industry standards. |  |