CEO
M. Bilal Javaid

Valid from: 19th September 2025

Valid To: 26th September 2025

Feasibility Report

Lapel-Pin Voice AI Device

Client Name: Kiran

About M. Bilal Javaid

Link to Intro

- 8+ years of experience in industrial design and electronics engineering.
- Expertise in PCB design, 3D modeling, and Prototyping.
- Specialized in embedded systems (STM32, ESP32, Raspberry Pi)
- Proficient in CAD, Rendering and DFM
- Builds practical, manufacturable tech solutions by uniting design and engineering.

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Project Scope

This project will build a lapel-pin sized prototype device that lets users press a button, speak a command, and receive an AI response. Its goal is to demonstrate the full interaction loop, where input is captured, processed by AI, and the response is delivered through audio or visual output. The hardware will use an ESP32-S3 microcontroller with MEMS microphone, push button, LED indicator, and rechargeable battery, while a React Native mobile app will connect via BLE to stream audio, process it through AI APIs, and provide responses.

Key Requirement:

- Lapel-pin sized prototype form factor with ESP32-S3 as core
- MEMS microphone for voice capture
- Push button for activation and LED for status indication
- Rechargeable battery for portable use
- BLE connection to companion mobile app (React Native)
- AI pipeline: Speech-to-Text → LLM Response → Text-to-Speech
- Initial processing on phone/laptop with roadmap for offline AI and phone action integration
- Documentation of system architecture and usage

In this project, a working lapel-pin voice AI prototype will be delivered with firmware, mobile app, and documentation, demonstrating the interaction loop and enabling future development.

Chapter : 01

Research and Development

1.1 Approach

All hardware validation and firmware development for the voice AI assistant will be executed in-house. The process begins with a comprehensive characterization of the low-power system architecture and the Bluetooth LE communication subsystem, utilizing the selected microcontroller to establish a robust foundation for power-constrained operation. Firmware is architected for deterministic, event-driven performance, employing custom power state management and efficient audio processing to ensure minimal sleep current and reliable voice data transmission. Validation includes rigorous testing for BLE interoperability across mobile platforms, detailed battery life profiling, and audio clarity analysis under real-world acoustic conditions. The final deliverable comprises a fully functional prototype, a production-ready firmware binary, and complete hardware documentation, all optimized for performance, user experience, and manufacturability.

Finalize Hardware Specifications

- Review all respective specified components against project requirements, confirming technical specifications, operating parameters, and compatibility through detailed datasheet analysis.
- Finalize power management system architecture, including battery specifications, charging circuit requirements, and power distribution design to meet operational and standby runtime targets.
- Validate communication protocols (I2S, BLE, GPIO) and electrical characteristics to ensure seamless interoperability between all subsystems

Hardware Prototyping

- Assemble a functional prototype using ESP32-S3, INMP441 MEMS microphone, tactile button, status LED, and Li-Po battery on veroboard.
- Implement power management with charging circuit

Firmware Development

- Develop interrupt-driven button handling for voice capture initiation

- Implement efficient I2S audio sampling from MEMS microphone
- Create low-power BLE audio streaming protocol
- Design state management system (idle, listening, streaming, processing)

Mobile Application

- Develop BLE connectivity management
- Implement audio stream reception and buffering
- Integrate cloud APIs for STT, AI processing, and TTS
- Create response playback interface

Testing and Validation

- Conduct audio quality testing across environments
- Validate BLE connection stability and range
- Measure power consumption and battery life
- Perform end-to-end latency testing

Documentation

- Create comprehensive setup and installation guides
- Document API integrations and architecture
- Provide future development roadmap

Development Setup and Technical Implementation

Development Setup:

- Choose a framework like React Native (recommended for iOS/Android from one codebase) or Flutter.
- Create the basic app structure (navigation, screens, etc.).

Recreating the UI from Figma:

- We will write code to rebuild every screen from the Figma design exactly.
- This involves creating components like Button, ChatBubble, SettingsSwitch, and MarketplaceItem.
- Tools: Use Figma's "Developer Handoff" mode to inspect the exact colors, fonts, sizes, and spacing and copy CSS-like code snippets.

Making the UI Interactive:

- Add logic for button presses, text input, scrolling, and switching between tabs.
- At this point, the app will look right but won't do anything functional. Buttons won't send real messages, etc.
- We can also use Figma make or Anima to convert it into Html/CSS

Implementing the Chat Flow with Backend

- Frontend: The "Hold to Talk" button in our Figma design triggers the phone's microphone.
- Implementation: Use a library like react-native-voice to record speech and convert it to text directly on the device (Speech-to-Text).

Sending to Cloud & Getting Response:

- Frontend: The converted text is now sent to our cloud backend via an HTTP POST request

- Backend: our cloud service receives the text, adds any "guardrails" (safety prompts), sends it to OpenAI's API, gets the text response, and then sends that text to Resemble AI for TTS conversion.

Playing the Audio:

- Backend: Resemble AI sends back an audio file or stream.
- Frontend: our app receives this audio stream/file and plays it through the phone's speaker using a library like react-native-sound or react-native-track-player.

Implementing Bluetooth Pairing & Communication

Frontend: The "Pair Toy" screen from our Figma design will use a Bluetooth library like react-native-ble-plx.

Implementation:

- The app scans for Bluetooth devices with a specific Service UUID that identifies our toy.
- When the user selects their toy, the app connects to it.
- "Locked Pairing" is achieved because the toy is programmed only to advertise and accept connections from an app with our specific App ID/Service UUID.
- The app can then send signals to the toy (e.g., "wake up," "change LED color") and receive signals from it (e.g., "button pressed").

Implementing the Marketplace & Admin Panel Connection

- Backend: We create a set of APIs for our admin panel and app.
- GET /api/voices - Returns a list of available voices.
- GET /api/products - Returns a list of purchasable products.
- POST /api/voices - (Admin) Allows uploading a new voice.

- Admin Panel (Web): A simple React.js website that uses these POST APIs to upload new content.
- Mobile App (Frontend): The "Marketplace" screen in our Figma design makes a GET request to these APIs to fetch and display the list of voices/products. When a user selects one, the app sends another API call to "purchase" or "activate" it.

Implementing "Fast Feel" & Cached Phrases

- Pre-saved Phrases: The app will have a small library of pre-downloaded audio files (e.g., "Yo," "Let me think..."). As soon as the wake word/button is detected, one of these is played immediately from the device's local storage, hiding the backend latency.
- Cached Phrases for Offline Use: Common responses or error messages can be stored locally on the phone. If the internet connection fails, the app checks its local cache for a suitable response to play instead of staying silent.

Technical Stack Recommendation

- Frontend (Mobile App): React Native with TypeScript.
- State Management: Redux Toolkit or Zustand (to manage global state like user preferences, chat history, Bluetooth connection status).

Bluetooth: react-native-ble-plx

- Audio: react-native-track-player (for advanced audio streaming) or react-native-sound.
- Speech-to-Text: @react-native-voice/voice
- Backend (Cloud): Node.js (Express) or Python (FastAPI) on a cloud provider like AWS or Google Cloud.
- APIs: RESTful APIs or GraphQL for communication between the app and our backend.

Milestones and Deliverables

Milestones

- Finalize Hardware Specifications
- Hardware Prototyping
- Firmware Development
- Mobile Application Development
- Testing & Validation
- Documentation

Deliverables

- Working Prototype Device
- Complete Source Code
- Technical Documentation

Timeline

- Finalize Hardware Specifications – 40 Hours
- Hardware Prototyping – 40 Hours
- Firmware Development – 50 Hours
    - Testing & Validation – 40 Hours
- Documentation – 10 Hours

It working will continue in parallel

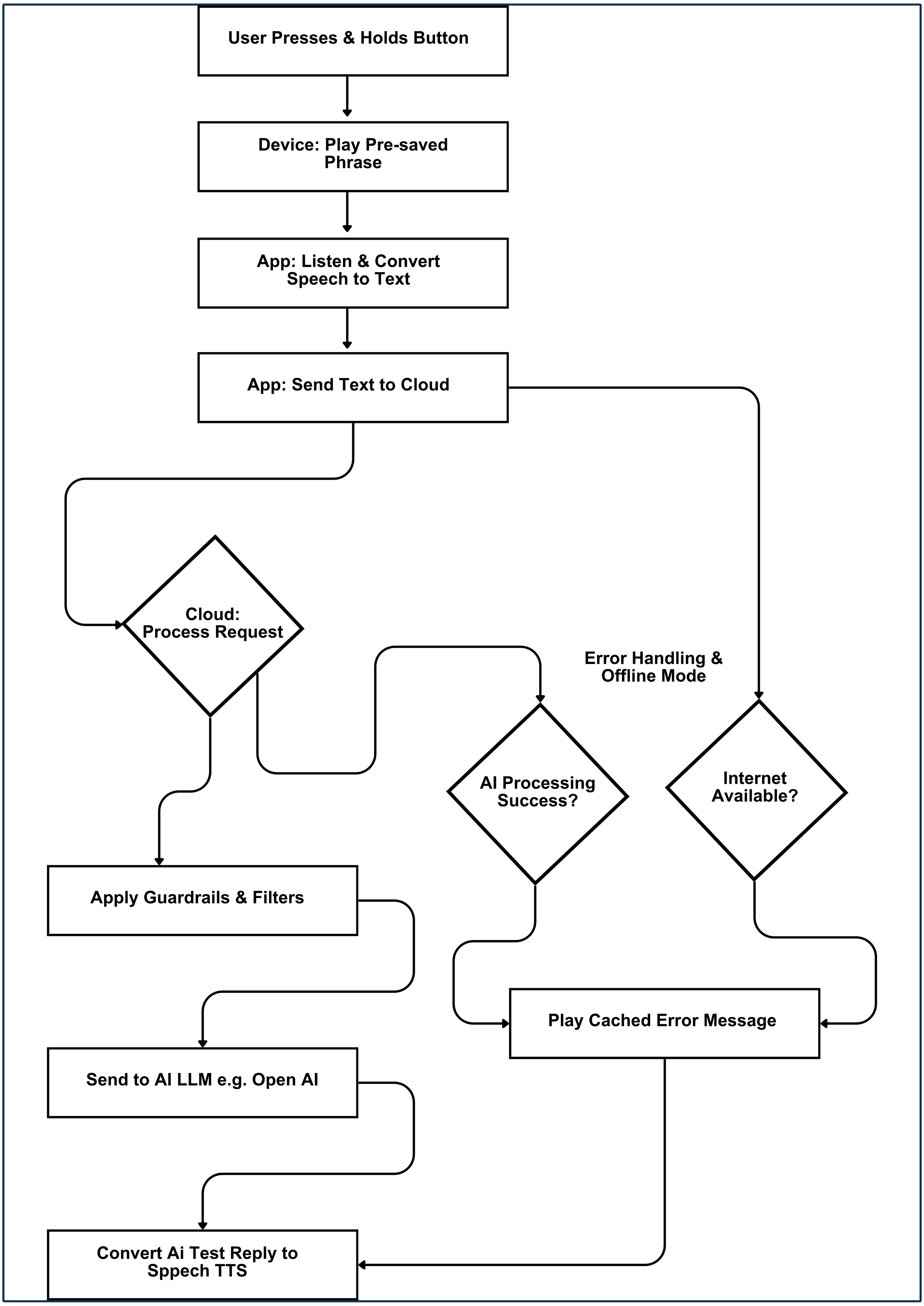
- Mobile Application Development – 160 Hours
    - BLE connectivity management
    - Audio stream reception and buffering
    - Cloud API integration for STT, AI processing, and TTS

- Response playback interface

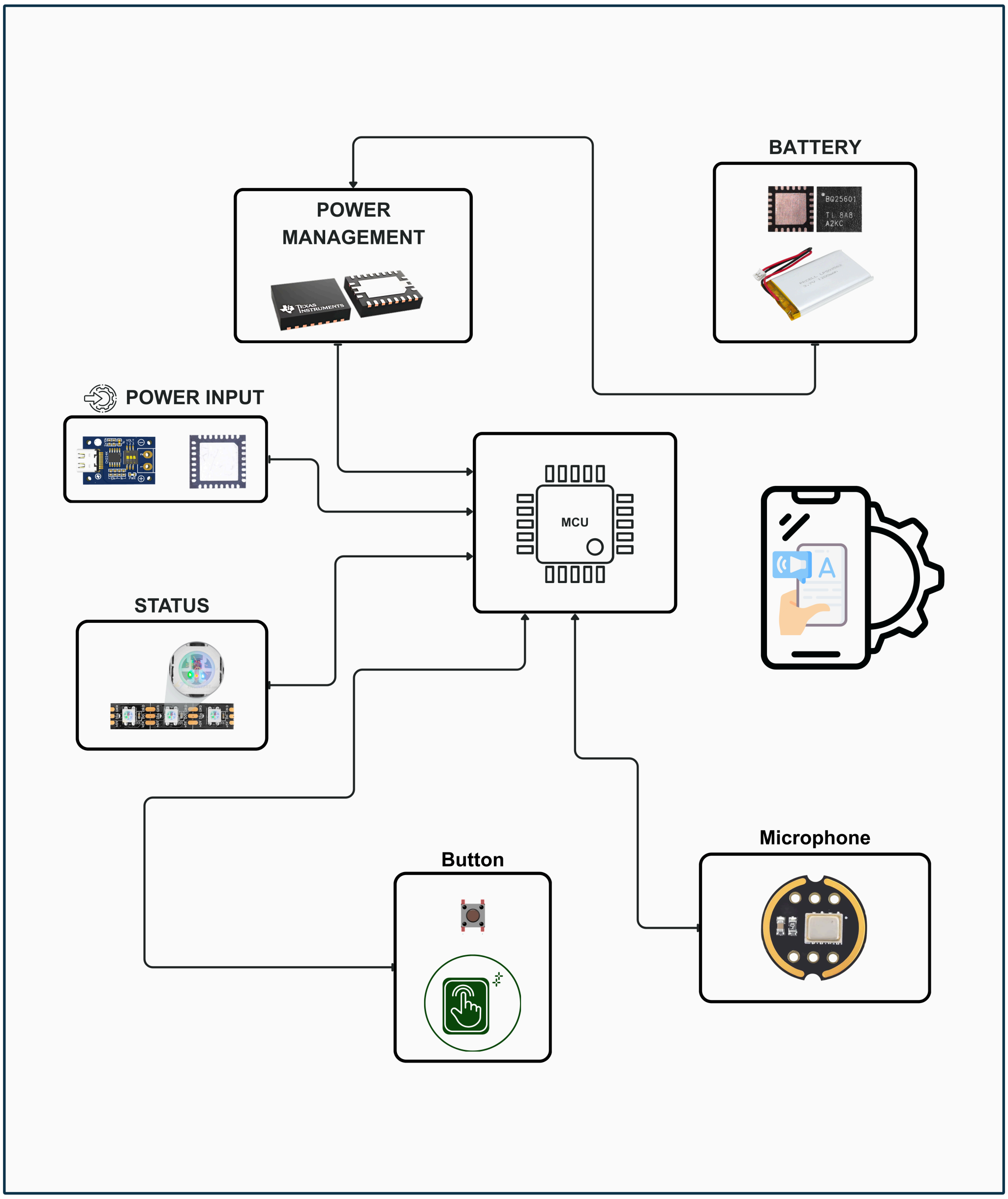
Note

- Total R&D Time: 180 Hours

Flow Chart


User Presses & Holds Button
Device: Play Pre-saved Phrase
App: Listen & Convert Speech to Text
App: Send Text to Cloud
Cloud: Process Request
Error Handling & Offline Mode
AI Processing Success?
Internet Available?
Apply Guardrails & Filters
Play Cached Error Message
Send to AI LLM e.g. Open AI
Convert Ai Test Reply to Sppech TTS

Block Diagram



Total timeline for R&D: 180 Hours

Signature of R&D HOD:

Chapter : 02

PCB Design

2.1 Approach

Once the key components are finalized, we will design the schematics for the power tree, charging circuits, Bluetooth SoC, audio path, and protections. The PCB layout will be optimized for compactness, low power, RF integrity, and thermal management, using a 2-layer or 4-layer stack-up as needed. All schematic design, layout, and BOM preparation will be done in-house, with fabrication through JLCPCB. Final deliverables will include schematics, Gerber files, assembly drawings, BOM, and a 3D STEP model for housing integration.

Schematics

Power Supply & Battery

- Battery: Small Li-ion battery to ensure compact size and extended operation.

Power Regulation:

- Buck converter for efficient power management from the battery.
- LDO (Low Dropout Regulator) for noise-sensitive components such as the MEMS microphone and ESP32-S3.

Battery Charging:

- USB-C port with integrated charging IC (TP4056 or similar) for recharging.
- Thermistor for temperature monitoring during charging to avoid over-heating

Audio Circuitry

- MEMS Microphone:
- Audio Output Amplifier

User Interface

Push Button:

- Simple on/off button to activate the system (BLE pairing, voice input).

LED:

- Indicates system status
- Current limiting resistors will be placed to protect the LED.

Schematic Overview

Power Source (Battery) → PMIC → ESP32-S3

Button → ESP32-S3 (GPIO for input)

MEMS Mic → Pre-amp → ADC on ESP32-S3

LED → GPIO (Status indication)

Audio Amp → Speaker (audio response)

PCB Layout Considerations

Compact Design

- The PCB will be compact to fit within the lapel-pin-sized housing.
- Careful component selection for small form factor (e.g., MEMS mic, small battery, small capacitors and resistors).
- Use of rigid-flex PCB design (where necessary) to ensure a compact and flexible form factor.

Low-Power Operation

- All components will be selected for low quiescent current to ensure minimal power consumption.
- Power rails for audio circuits and BLE will be optimized for efficiency (e.g., using low-power LDOs and DC-DC converters).

Audio Circuitry Layout

- Signal Integrity: The audio path (mic to amplifier to speaker) will be carefully routed to avoid noise coupling.
- Shielding: Consider adding ground pours around the analog signals (MEMS microphone), ensuring a clean path for audio signals.
- Noise Filtering: Proper decoupling capacitors (100nF, 10uF) will be placed at power input pins of ESP32-S3 and the microphone.:

BLE Connectivity and Antenna

- Antenna Placement: The PCB design will consider antenna placement for BLE 5.0 to maintain optimal RF performance.
- Keepout Area: Metal parts or traces near the antenna will be minimized, ensuring a clear RF path.
- Impedance Matching: Ensure proper trace width for 50Ω impedance to match with the antenna.

Battery Management

- Charging Circuit: The PCB will integrate a battery management IC (BMS), which will manage charging, discharging, and battery protection.
- Thermal Considerations: The charging circuit will be designed to ensure the system remains thermally stable and avoids overheating during charging.

Wearability & Enclosure Integration

- Mounting & Size: The PCB will be designed to fit into a lapel-pin-sized housing, with provisions for mounting components securely within the space available.
- Enclosure Considerations: The layout will allow for easy integration with the enclosure design, including the USB-C port, button, mic, and LED.
- Sealing & Durability: To protect the PCB from dust and moisture, conformal coating will be applied to the PCB surface (ensuring IP-rated sealing).

Compliance & Certifications

- The design will adhere to relevant safety standards (e.g., UL, CE), ensuring the circuit is safe for battery-powered wearable devices.
- The Bluetooth module will comply with Bluetooth SIG certifications and RF standards.
- ESD Protection: Necessary TVS diodes will be placed on sensitive pins (e.g., USB-C, I/O) to protect against static discharge

Milestones and Deliverables

Milestones

- Schematic design (power, charging, BLE SoC, I/O, protections)
- PCB layout (2/4 layer, RF & compact routing)
- Design review & refinement (power, thermal, EMC/ESD)
- Prototype-ready package (Gerbers, 3D STEP, BOM, Compliance & Risk Analysis)

Deliverables

- Complete PCB schematics (PDF and source files).
- PCB layout files (Gerbers, drill files, assembly drawings).
- Bill of Materials (BOM) with cost estimates for each component.
- 3D model of the PCB (STEP file) for housing integration.
- Compliance & risk analysis (pre-compliance for certifications like CE, FCC).

Timeline

- Schematic Design – 20 Hours
- PCB Layout (2/4 layer depending on demand) – 30 Hours
- Design Reviews & Refinements – 20 Hours
- Final Deliverables Package (Gerbers, BOM, 3D STEP, Compliance & Risk Analysis) – 10 Hours

Note

- Total PCB Design Time: 80 Hours

PCB fabrication will be carried out through JLCPCB, ensuring high-quality manufacturing and adherence to design specifications. The estimated lead time for fabrication and delivery is approximately 2-3 weeks.

Total timeline for PCB Team: 80 Hours

Chapter : 03

Mechanical Design

Approach

The design process will begin with creating concept designs for the interactive toy hardware, focusing on placement for multiple microphones, speaker, USB-C charging port, and control buttons. After finalizing the conceptual layout, detailed CAD modeling will follow, incorporating bosses, ribs, and cutouts designed per DFMA standards.

The design will emphasize ergonomics, safety, and durability, ensuring smooth edges, child-safe features, and moisture resistance through sealed joints. Once the 3D CAD model is completed, prototypes will be produced using our in-house 3D printing setup for rapid validation. After testing and iteration, the final mechanical design package will be prepared for production readiness. The enclosure will be dimensioned to house all essential internal components:

- PCB: Dedicated compartment for the main control board and communication module.
- Battery: Rechargeable Li-ion battery supporting over 12 hours of operation.
- Charging Port: Reinforced slot for a USB-C charging module.

Mechanical cutouts and design provisions will include:

- Microphones: Multiple microphones strategically positioned for clear sound capture from various directions.
- Speaker: Outward-facing grill optimized for clear and rich sound output.
- User Inputs: Power and volume buttons with tactile feedback for intuitive control.
- Status Indicator: LED window integrated through a lightpipe channel for status and connectivity indication.

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Important Design Aspects

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The toy design will feature moisture and splash resistance, achieved through rubber gaskets and sealed parting lines. The overall enclosure will balance strength and lightweight feel while ensuring comfort and durability for daily handling.

Material Selection

Prototyping: PLA will be used for initial 3D-printed prototypes to verify geometry, ergonomics, and assembly alignment.

Mass Production:

- ABS for the main housing chosen for impact resistance and strength.
- Polycarbonate (PC) for transparent lightpipe sections to enhance LED visibility.
- Silicone/Rubber Inserts for buttons and seals to improve tactile response and provide splash protection.

Mechanical & Component Mounts

- PCB Mounting: Secured using snap-fit standoffs and brass inserts to allow rework and serviceability.
- Battery: Placed in a molded pocket with foam support for vibration damping and expansion tolerance.
- Speaker/Microphones: Aligned precisely with grill openings, covered by acoustic meshes for clarity and protection.
- Charging Port: Integrated in a recessed and reinforced slot to prevent stress during cable insertion and removal.

Positioning & Integration

- Microphones & Speaker: Microphones will be placed on multiple sides for wide sound capture; the speaker will be oriented toward the front or top for clear audio playback.
- Charging Port: Positioned on the back or underside for easy charging access.
- Status LED: Routed through a clear lightpipe window visible during operation and charging.
- User Controls: Power and volume buttons ergonomically placed for comfortable operation, with raised icons for tactile identification.

Prototyping & Testing

- Prototypes will be fabricated via 3D printing for evaluation of fit, assembly, sound performance, and user ergonomics.

Testing will include:

- Audio Clarity: Evaluating microphone sensitivity and speaker output.
- Durability Tests: Drop and vibration testing to ensure child-safe robustness.
- Battery Endurance: Verifying >12-hour operation under normal conditions.
- Environmental Resistance: Checking splash and dust protection in realistic scenarios.

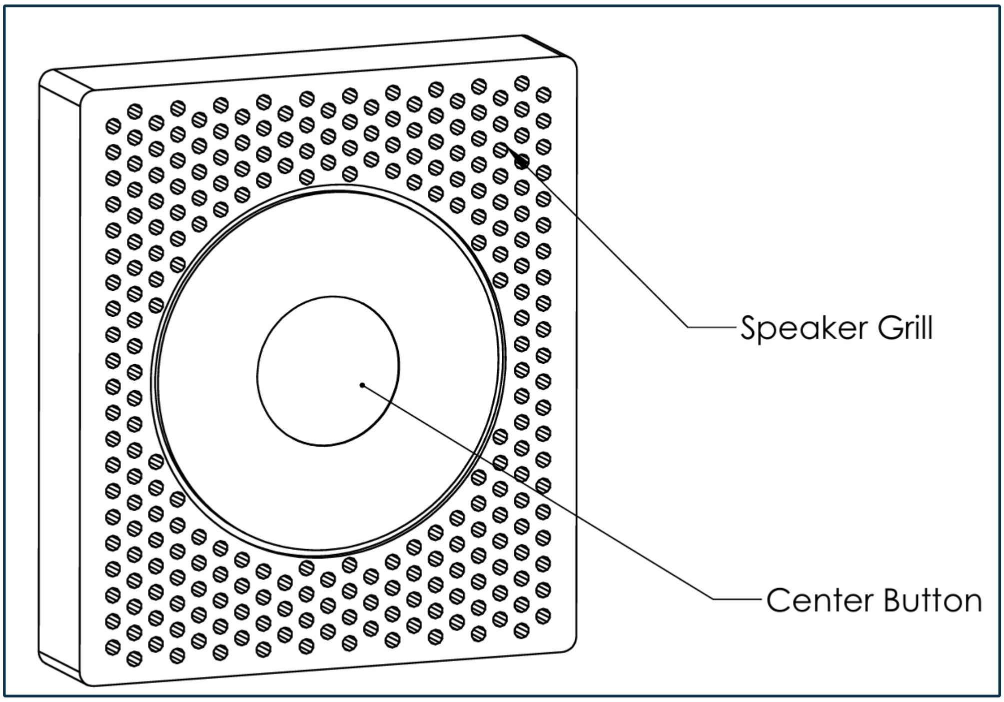
Notes and Limitations

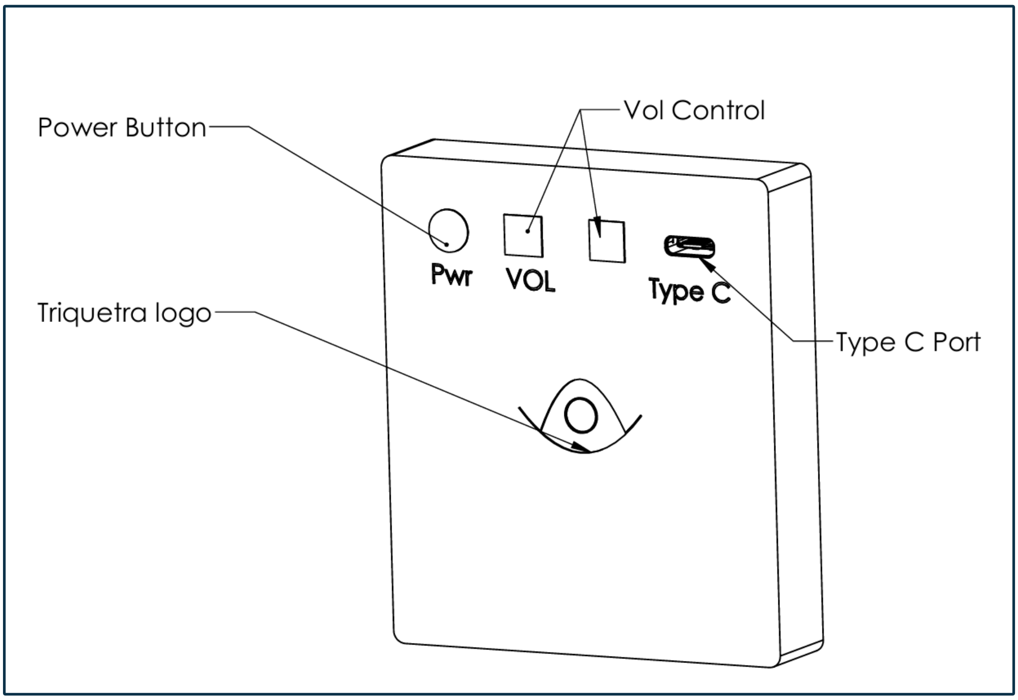
- Wall Thickness: Target 1.5–2.0 mm to ensure adequate rigidity while maintaining lightweight construction.
- Weight Budget: Total device weight under 150 g for comfort and safety.
- Serviceability: Snap-fit designs with micro screws in brass inserts for easy assembly/disassembly.
- Water Resistance: Target IPX4 level protection using sealed joints and mesh-covered ports.
- Thermal Safety: Adequate ventilation for battery and speaker modules without compromising sealing.

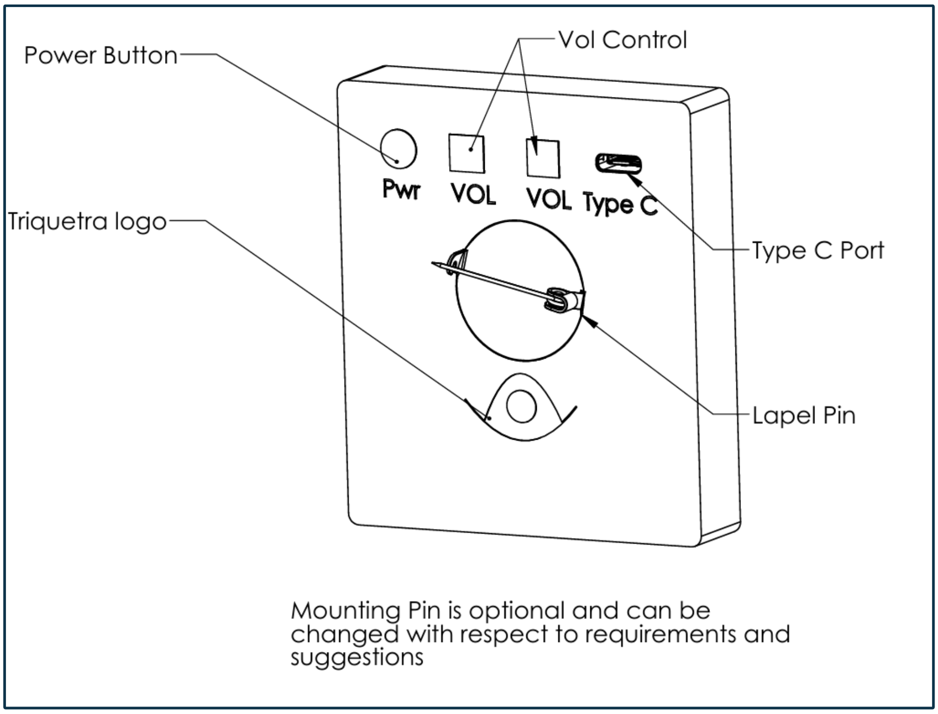
Conceptual Model

The Conceptual design of the Lapel-pin device is shown below:.

Isometric View







Milestones and Deliverable

Milestones

- Conceptual Sketches & Layout
- Initial CAD (Enclosure + Cutouts)
- DFMA Refinement (Manufacturable Model)
- Prototype Builds (3D Prints, Assembly, Electronics Integration)
- Mechanical & Functional Testing (Audio, Battery, Ergonomics)

Deliverables

- Complete conceptual sketches and layout drawings
- Detailed CAD models for enclosure and internal packaging
- DFMA-optimized design package ready for production
- 3D-printed prototype assemblies for testing and validation
- Test reports covering sound, battery, and environmental performance

Timeline

- Conceptual Sketches & Layout – 12 Hours
- Initial CAD (Enclosure + Cutouts) – 40 Hours
- DFMA Refinement (Manufacturable Model) – 32 Hours
- Prototype Builds (3D Prints, Assembly, Electronics Fittings) – 32 Hours
- Mechanical Testing (Sound, Battery, Ergonomics) – 16 Hours

Note

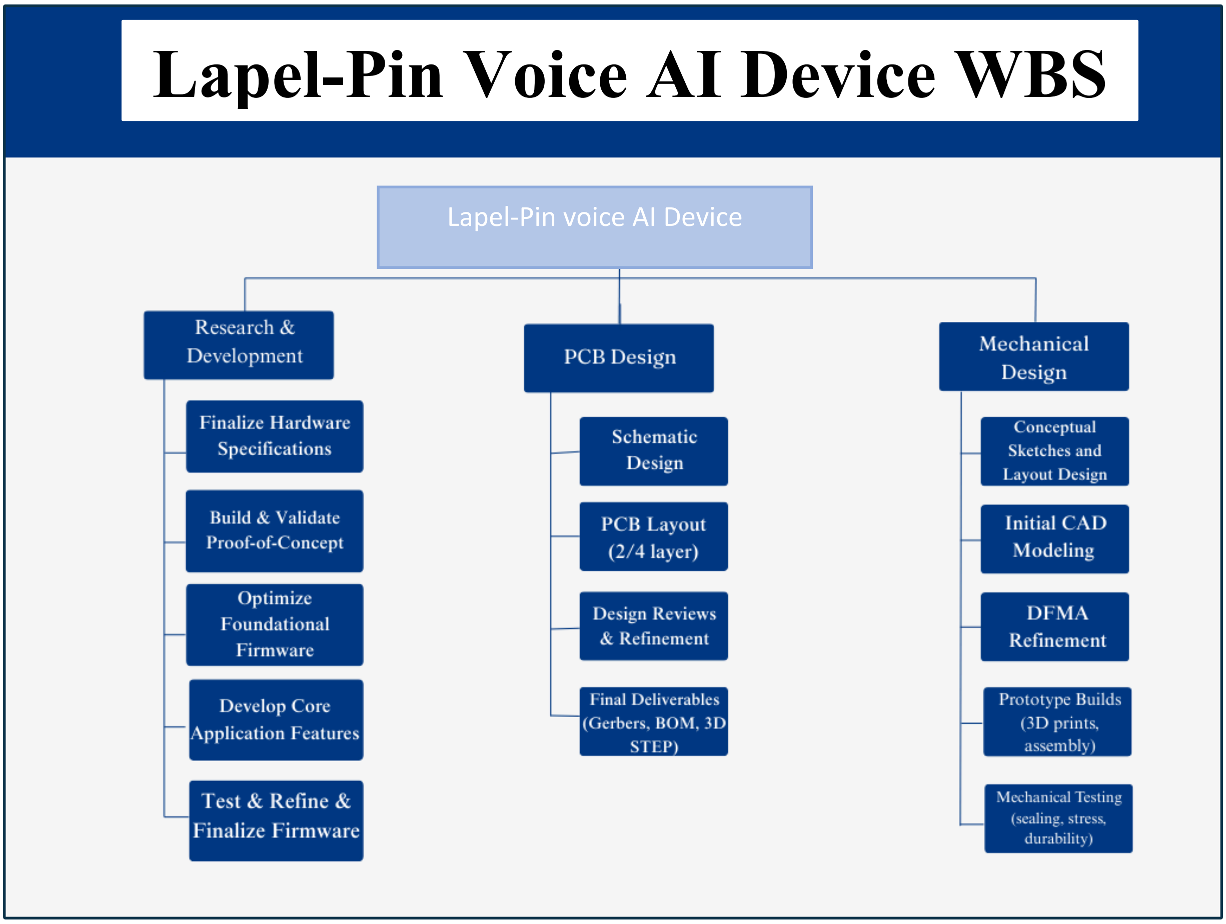
- Total Mechanical design Time: 132 Hours

3D printing and assembly of prototypes will take around four days, including printing, post-processing, and fitting of all key components. This period will allow us to validate assembly alignment, sealing performance, and structural strength. Testing will begin immediately after assembly to ensure the design meets all functional and durability requirements.

Total timeline for Mechanical: 132 Hours

Signature of Mechanical HOD:________

Work Breakdown Structure



KPI (Key Performance Indicator)

A measurable value that indicates how effectively the project is meeting its objectives.

Rate: 95%

Disclaimer: The KPI rate reflects the targeted performance level under planned project scope and resources. Actual outcomes may vary depending on unforeseen technical or operational challenges.

Creep (Scope Creep)

Uncontrolled or gradual expansion of project scope beyond its original objectives.

Rate: 5%

Disclaimer: The creep rate represents an estimated buffer for minor deviations. Any expansion beyond this rate will require formal change requests and client approval.

Timeline Justification

R and D

The timeline for this project is structured to ensure that all aspects, including hardware, firmware, PCB design, and mechanical design, are thoroughly validated while meeting the project's key requirements. The R&D phase (180 hours) includes hardware specification finalization (40 hours) to ensure the selection of the optimal components and integration of all subsystems (e.g., power management, BLE, and audio). Prototyping (40 hours) and firmware development (50 hours) are allotted to create and test the prototype device, focusing on power management, audio capture, and low-latency BLE communication. Mobile app development runs in parallel with the hardware development (160 hours) to ensure connectivity and integrate AI APIs for voice processing. Testing and validation (40 hours) covers audio clarity, BLE stability, and power profiling to ensure real-world performance, while documentation (10 hours) is dedicated to providing clear and concise setup instructions, source code, and system architecture.

PCB Design

For PCB Design (80 hours), significant time is allocated to layout and schematic design (50 hours) to guarantee signal integrity, RF optimization, and power efficiency. Design reviews (20 hours) ensure that the design is robust, with the final deliverables (Gerbers, BOM, 3D STEP files) prepared for prototype manufacturing in a further 10 hours. The Mechanical Design (132 hours) includes conceptual sketches (12 hours), CAD modeling (40 hours), DFMA refinement (32 hours), and prototyping (32 hours), ensuring the lapel-pin device is compact, ergonomic, and functional for everyday wear. Testing and validation (16 hours) ensure the design's durability and comfort. This approach provides a systematic, flexible, and comprehensive framework to meet project goals while mitigating risk.

Mechanical Design

The mechanical design timeline (132 hours) is structured to balance conceptual development, manufacturability, and real-world validation. Conceptual sketches & layout (12 hours) are allocated to establish the overall design direction, including placement for the microphone, speaker, charging port, and user interface elements. Initial CAD modeling (40 hours) is the most time-intensive, as it defines the geometry for the enclosure, cutouts, and internal packaging, ensuring that all components fit within the lapel-pin-sized housing. DFMA refinement (32 hours) ensures that the design is manufacturable and optimized for production, including adjustments for sealing, magnet alignment, and charging interface integration. The prototype builds (32 hours) phase allows for 3D printing and assembly of key components to verify fit, ergonomics, and functionality. Mechanical testing (16 hours) includes sealing, stress, and ergonomic testing to ensure that the device is durable, functional, and comfortable for users. The timeline allows for iterative testing, design refinement, and validation to ensure that the final product is manufacturable, reliable, and user-friendly.

Signature of Deputy Director:__________

Portfolio

Private & Confidential

nRF-Based My Status Band
Smart Social Wristband

Muhammad Bilal Javaid

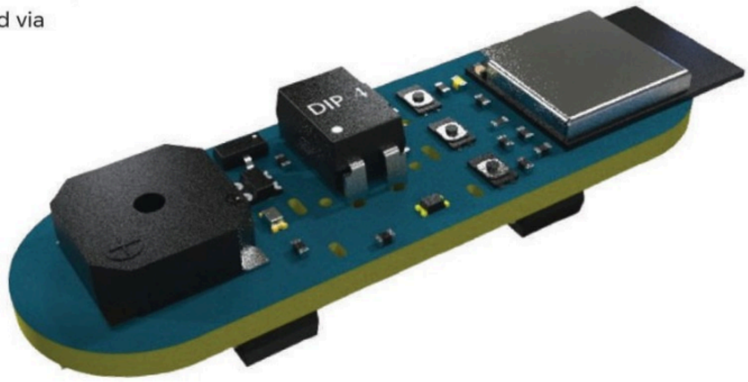
Overview & Key Features

Overview:

- My Status Band is a Bluetooth Low Energy (BLE) wearable powered by the nRF52840 SoC, designed to make social interactions more engaging and approachable. It uses color-coded LEDs to display a user's social or relationship status (e.g., Green = Single, Red = Taken), with status changes controlled via onboard buttons or the companion mobile app.

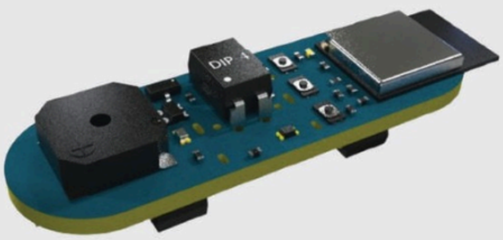
Key Features:

- Reliable smartphone pairing and real-time status sync.
- Color-coded LEDs show social status at a glance.
- Change status via wristband buttons or mobile app.
- Discreet vibration alerts for nearby users or "nudges".
- GPS map for locating other users, private profiles, and chat.
- Keeps LEDs off until a nearby band is detected, ensuring privacy

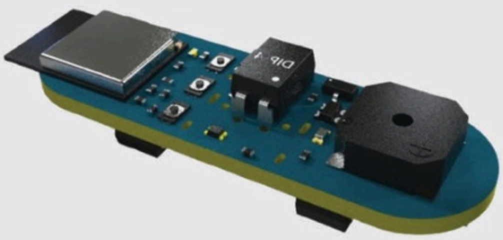


Application:

- Social networking and ice-breaking at events,Building connections in communities or meetups, Fun and non-intrusive way to signal availability.



Rendered PCB

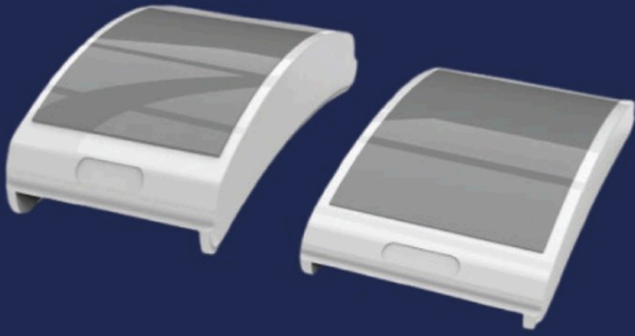


Rendered PCB

Mechanical Enclosure

nRF-based Ultra-Slim Smart Health Band

Muhammad Bilal Javaid



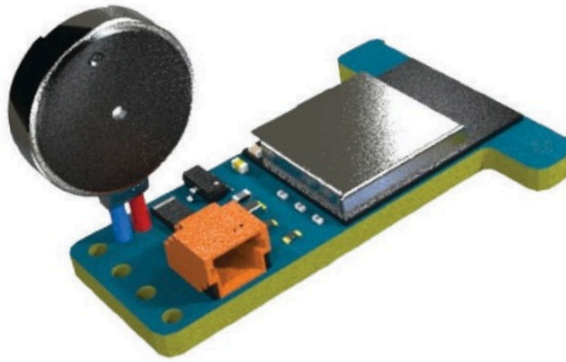
Overview & Key Features

Overview:

- The Ultra-Slim Smart Health Band is a lightweight wearable that offers accurate health monitoring in a sleek, comfortable design. With long battery life, gesture control, and seamless smartphone connectivity, it's ideal for fitness, wellness, and remote health care.

Key Features:

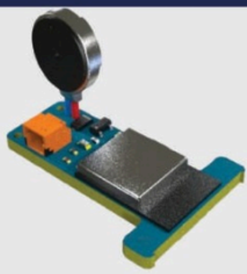
- 5.5 mm thickness, comfortable for all-day wear.
- BLE 5.0 using Nordic nRF52840 SoC for reliable smartphone & cloud sync.
- Precision biometric sensors for vital monitoring.
- Gesture detection for touchless control
- Haptic feedback for discreet alerts
- Ultra-low power optimization (2+ days of use per charge)
- OTA (Over-The-Air) firmware update support



Application:

- Remote Patient Monitorin, Personal fitness tracking, Medical IoT wearables.

Mechanical Enclosure



Rendered PCB

Mechanical Enclosure

nRF Based Smart Glasses

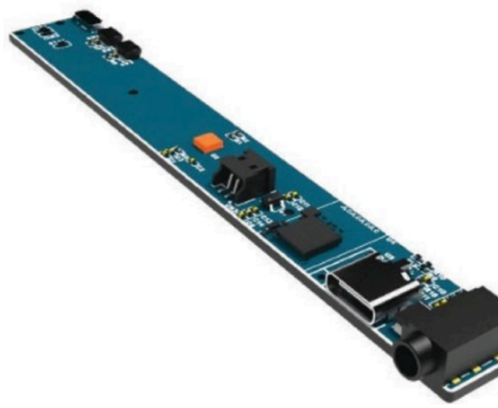
Wearable Assistive Cursor Control

Muhammad Bilal Javaid

Overview & Key Features

Overview:

- The nRF based wearable assistive technology solution designed to help individuals with mobility impairments control a computer or mobile device's mouse cursor through simple head movements. With a lightweight design, smooth real-time tracking, and wireless connectivity, this device offers an intuitive and user-friendly experience.

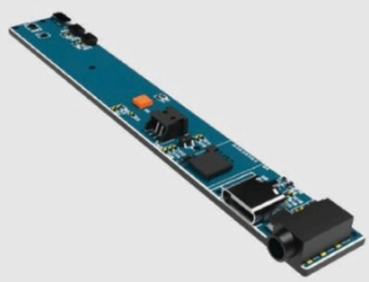


Key Features:

- Hands-free mouse navigation using head movements.
- Smooth and responsive control for precision movement.
- Comfortable for daily use.
- Easy Bluetooth pairing with computers and mobile devices.
- Built-in system to protect against overcharging and overheating.
- Designed specifically to support individuals with limited mobility.

Application:

- Assistive Technology,Hands-Free Computing,Educational & Rehabilitation Programs,Research & Development.



Rendered PCB

Rendered PCB

Mechanical Enclosure

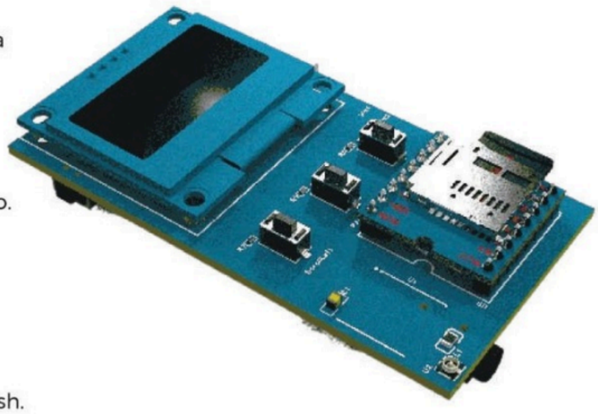
STM32-Based Pilgrimage Companion Device

Muhammad Bilal Javaid

Overview & Key Features

Overview:

- AL-Mueen is an STM32-based, event-driven pilgrimage companion that guides users through Tawaf, Sa'i, and Tasbeeh with a seamless bilingual experience. It combines a SH1106 OLED display, DFPlayer audio engine, and GNSS parser with a cooperative state machine and interrupt-driven inputs for reliable, real-time operation in demanding environments.



Key Features:

- Bilingual user experience with instant English/Arabic switching for text and audio.
- Easy-to-read screen with clear icons, arrows, battery level, and GPS status.
- Plays guidance and reminders exactly when needed.
- Provides accurate location and time updates.
- Smooth and quick response to button presses.
- Real-time toggling of language and GPS visibility with instant UI and audio refresh.
- Reliable and consistent performance for stress-free use.

Application:

- Pilgrimage guidance and ritual tracking (Tawaf, Sa'i, Tasbeeh),Real-time location and time assistance during Hajj/Umrah Bilingual guidance tool for accessible spiritual support,Portable worship aid with audio prompts and visual indicators.

nRF-Based Smart Shoe

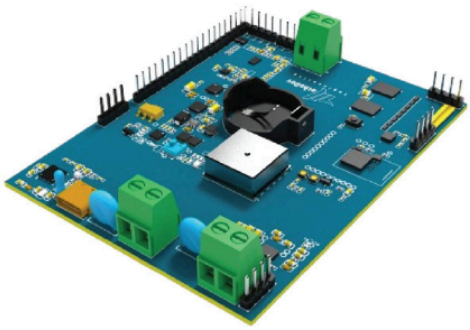
Adaptive Training Footwear

Muhammad Bilal Javaid

Overview & Key Features

Overview:

- The nRF-Based Smart Shoe is a next-generation wearable solution designed to combine adaptability, comfort, and real-time performance tracking. Built on Nordic Semiconductor's nRF52832 (BMD-300) for ultra-low-power Bluetooth connectivity, the system seamlessly collects and transmits motion and pressure data to a mobile device. Its ergonomic construction and intelligent sensing system make it an ideal tool for enhancing training experiences, particularly for beginners in skiing and other sports requiring precise posture and movement control.

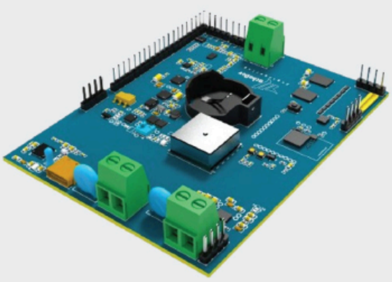


Key Features:

- Low-power Bluetooth connectivity for real-time data transmission.
- Tracks motion and magnetic field changes for accurate movement analysis.
- Monitors outdoor activity, location, and performance metrics.
- Enables cable-free, hassle-free charging.
- Provides detailed foot pressure mapping for performance feedback.
- Compact layout for integrating electronics within the shoe.
- Materials and structure adjust to the wearer's movements for maximum comfort.

Application:

- Ski Training Assistance,Sports & Fitness Tracking,Rehabilitation & Gait Analysis,Smart Wearables R&D.



Rendered PCB

Rendered PCB

Mechanical Enclosure

Client Feedback

Technology Officer for Electronic Product Development

Great to work with Muhammad and his team

★★★★★ **Project Budget: $4,550**

Pcb designer

Very professional team.

★★★★★ **Project Budget: $5,250**

PCB Layout

Muhammad and his team executed the project flawlessly with clear communication, quick responses, and efficient progress tracking. They handled changes smoothly and consistently aimed for fast solutions. Highly recommended for future projects.

★★★★★ **Project Budget: $12,000**

CAD design- Prototype

Muhammad and his team managed the project flawlessly from start to finish, with clear communication, fast responses, and excellent transparency via Google Docs. They efficiently handled changes and consistently delivered quick solutions. The client highly recommends them and would gladly work with them again.

★★★★★ **Project Budget:$3,500**

PCB and Electrical design for a photoreactor

I enjoy working with this group. They are talented.

★★★★★ **Project Budget: $15,324**

Electrical Engineer - IoT Kapton Heater Controller

Bilal and his team did good work. They are quick and communicate well, and are accommodating for any issues.

★★★★★ **Project Budget: $3,658**

Advance Existing Prototype - for Ultra Small Smart Flowmeter

Muhammad and his team delivered high-quality work by downsizing the PCB and choosing excellent components. Although firmware delivery took longer than expected, their accommodating nature and ability to bring in expert help led to a successful and satisfying project outcome.

★★★★★ **Project Budget: $18,000**

PCB Layout

Muhammad and his team managed the project flawlessly from start to finish, with clear communication, quick responses, and transparent progress tracking. They handled changes efficiently and delivered fast solutions. Highly recommended for future collaborations.

★★★★★ **Project Budget: $5,000**

Smart Alarm Clock With E-ink Display

Fast response time, good planning from the start and good support.
It was a pleasure to work with the team, and I hope to rehire soon again.

★★★★★ **Project Budget: $3,000**

Help Build Supplement Vending Machine Prototype

Muhammad Bilal and his team are very diligent, creative and hard working. their ability to be able to problem solve and create solutions for work moving forward has enabled the success of our project now and for the future. I would recommend to anyone.

★★★★★ **Project Budget:$ 5,000**

Schematic Design for Arduino Based Project with Stepper Motors

Exceptional product and service

★★★★★ **Project Budget: $17,312**

Automated Electric Shaver Development for Back Neck/Hairline

The team is extremely responsive and thorough. Highly recommend

★★★★★ **Project Budget: $3,658**

Thank You!

Thank you for your time and consideration. We would be happy to discuss our proposal further, address any questions you may have, and provide additional insights.

We look forward to your feedback and the opportunity to collaborate on the next steps.

CEO

MUHAMMAD BILAL JAVAID

200+	100+	30+	98%
Clients.	Project.	Countries.	Response rate