VIII. Project Management Framework

This section outlines the project management plan for developing the revised OdAR System, including timelines and budget allocations adjusted for the ranging enhancements. Below is the complete list as presented in both variations of your original prompt:

A. Timeline (6 Month Plan with Ranging Integration)

- **1. Month 1–2: Hardware Development**:
    - **Existing Tasks**: Finalize sensor array design, integrate ESP32, design enclosure, and develop initial PCB.
    - **Addition**: Ranging sensor selection and integration (e.g., ultrasonic/ToF/LIDAR) – 2 weeks.
    - **Addition**: Combined PCB design with ranging elements – 1 week.
- **2. Month 2–3: Data Collection**:
    - **Existing Tasks**: Collect baseline and compound exposure data for olfactory sensors.
    - **Addition**: Ranging calibration procedures (e.g., fixed-distance, multi-angle tests) – 1 week.
    - **Addition**: Combined olfactory-ranging data collection (e.g., simultaneous detection and distance mapping) – 2 weeks.
- **3. Month 3–4: AI Development**:
    - **Existing Tasks**: Train initial MLP/CNN/LSTM models on olfactory data.
    - **Addition**: Sensor fusion algorithm development (e.g., early/late fusion) – 2 weeks.
    - **Addition**: Spatial mapping model training (e.g., 3D gradient maps) – 1 week.
- **4. Month 4–5: System Integration**:
    - **Existing Tasks**: Integrate hardware, firmware, and software into a cohesive prototype.
    - **Addition**: Ranging-detection integration testing (e.g., combined accuracy validation) – 1 week.
    - **Addition**: Dynamic tracking validation (e.g., moving source tests) – 1 week.
- **5. Month 5–6: Testing & Documentation**:
    - **Existing Tasks**: Conduct full system tests, finalize performance reports, and draft initial patent docs.
    - **Addition**: Comprehensive ranging accuracy validation (e.g., static/dynamic metrics) – 1 week.
    - **Addition**: Enhanced patent documentation for ranging aspects – 1 week.

B. Budget Allocation ($275,000 - Revised)

- **1. Hardware: $85,000 (+$15,000)**:
    - **Existing Allocations**: $70,000 for sensor array, ESP32, enclosure, and initial PCB fabrication.

    - **Addition**: Ranging sensors and components (e.g., ultrasonic/ToF) – $8,000.
    - **Addition**: Integrated PCB redesign (with ranging) – $4,000.
    - **Addition**: Specialized testing equipment for ranging (e.g., distance targets) – $3,000.
- **2. Software Development: $90,000 (+$10,000)**:
    - **Existing Allocations**: $80,000 for firmware, drivers, and initial AI model development.
    - **Addition**: Sensor fusion algorithm development – $6,000.
    - **Addition**: Spatial mapping software – $4,000.
- **3. Expert Consulting: $75,000**:
    - Unchanged: Covers domain experts (e.g., olfactory science, AI, hardware engineering) for 6 months.
- **4. Patent and Documentation: $25,000**:
    - Unchanged: Funds patent filing, legal review, and technical documentation, now with enhanced focus on ranging aspects.

Notes

- **Completeness**: This fully preserves all details from both variations for **VIII. Project Management Framework**. The timeline (A) and budget (B) match the original content exactly, including existing tasks and ranging-related additions.
- **Pump Inlet Mechanism**: Not integrated here yet, as it was added to Hardware (Section I). It could affect the timeline (e.g., 1 extra week for pump integration) or budget (e.g., $2,000 for pump components)—let me know if you want that added!
- **Format**: Detailed narrative style per Variation 1, incorporating all outline points from Variation 2.