



REVIEWER'S REPORT

Manuscript No.: IJAR-56439

Title: Design, Development and Experimental Validation of a Hybrid Sensor Fusion Based Radar Detection System with Integrated RTC and Multi-Level Alert Mechanism.

Recommendation:

- Accept as it is
- Accept after minor revision.....
- Accept after major revision
- Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality			✓	
Clarity			✓	
Significance		✓		

Reviewer Name: Mr. Bilal Mir

Reviewer's Comment for Publication.

This manuscript presents the design and experimental validation of a hybrid sensor fusion-based radar detection system integrating ultrasonic sensing (HC-SR04), Doppler radar (HB100), servo-based angular scanning, camera verification, GSM-based SMS alerts, and multi-level alert mechanisms controlled by the ESP32 microcontroller. The study addresses an important limitation of traditional single-sensor detection systems by combining distance and velocity measurements through sensor fusion.

Strengths:

- Clear problem statement highlighting limitations of single-sensor systems.
- Well-structured system architecture divided into sensing, processing, alert, communication, and power management layers.
- Inclusion of mathematical modelling (ultrasonic, Doppler, servo scanning, and fusion logic), which strengthens technical grounding.
- Practical implementation with real prototype validation in indoor and semi-outdoor environments.
- Integration of multi-level alerts (LED, buzzer, controlled activation signal) and GSM-based remote notification enhances real-world applicability.

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Major Concerns:

- 1. Language and Formatting:** The manuscript contains grammatical errors, inconsistent spacing, figure referencing issues, and formatting irregularities that require careful editing.
- 2. Experimental Validation:** While experimental testing is mentioned, quantitative performance metrics (accuracy %, false positive rate %, response time comparisons, statistical validation) are not clearly presented in this section. More numerical evidence and comparative tables are required to substantiate claims of improved performance.
- 3. Novelty Clarification:** Hybrid sensor systems combining ultrasonic and Doppler modules are not entirely new. The manuscript should more clearly articulate the novel contribution (e.g., integration strategy, fusion algorithm, alert architecture, cost optimization, or controlled activation mechanism).
- 4. Safety Explanation:** The spark/activation module is described as a controlled mechanism; however, safety protocols, electrical isolation, and compliance considerations should be clarified in more detail.
- 5. Fusion Algorithm Depth:** The sensor fusion model is presented using a simple threshold-based logic (AND condition). The authors may consider discussing limitations of this approach and comparing it with probabilistic or weighted fusion models.

Overall Assessment:

The manuscript presents a practical and scalable prototype addressing real-time monitoring and controlled activation applications. The system design is technically coherent, and the integration of sensor fusion with multi-level alerts enhances reliability compared to single-sensor approaches. However, clearer quantitative validation, improved language quality, and stronger articulation of novelty are necessary before publication.

With minor revisions focused on clarity, quantitative evaluation, and presentation quality, the manuscript can be suitable for publication.