JGI JAIN DEEMED-TO-BE UNIVERSITY | FACULTY OF ENGINEERING AND TECHNOLOGY

Department of Information Science and Engineering

PCL Review PROGRESS REPORT		
Batch No	**16**	
Guide	**Dr. Chayapathi A R**	
PCL Project Title	**Range optimization of sensors**	
Review No	**0th review**	
Date of Submission	**3rd Feb, 2026**	
Date	**From:19th Nov , 2025**	**To: 2nd Feb , 2026**

Sl. No.	Student Name	USN	Signature with date
1	Smriti Singh	**23BTRIS040**	
2	Jeffrey Thomas	**23BTRIS016**	

Remarks by Guide

Progress: (Describe actual progress of current Review).

The project has successfully achieved its core objectives and is currently in a **fully functional implementation stage**. An **area-based sensor optimisation system** has been developed using **Python and Google OR-Tools (CP-SAT solver)** and integrated into an **interactive web application**.

The system enables users to define spatial environments, specify priority regions, and configure sensor parameters to compute an optimised sensor deployment. The optimisation results are visualised in real time through a user-friendly graphical interface. While the core system is complete and operational, final deployment to a public hosting platform is pending.

Work Completed So Far:

1. **Sensor Optimisation Model**
   A constraint-based sensor deployment model has been implemented using the CP-SAT solver. The model optimises sensor placement by maximising coverage of priority areas while minimising sensor usage and redundant overlap. It efficiently handles multiple scenarios within bounded computation time.

2. **Web Application Development**
   A fully functional frontend–backend web application has been developed. Users can define area dimensions, specify priority zones, and adjust sensor parameters. The backend processes inputs, executes the optimisation model, and returns results dynamically.

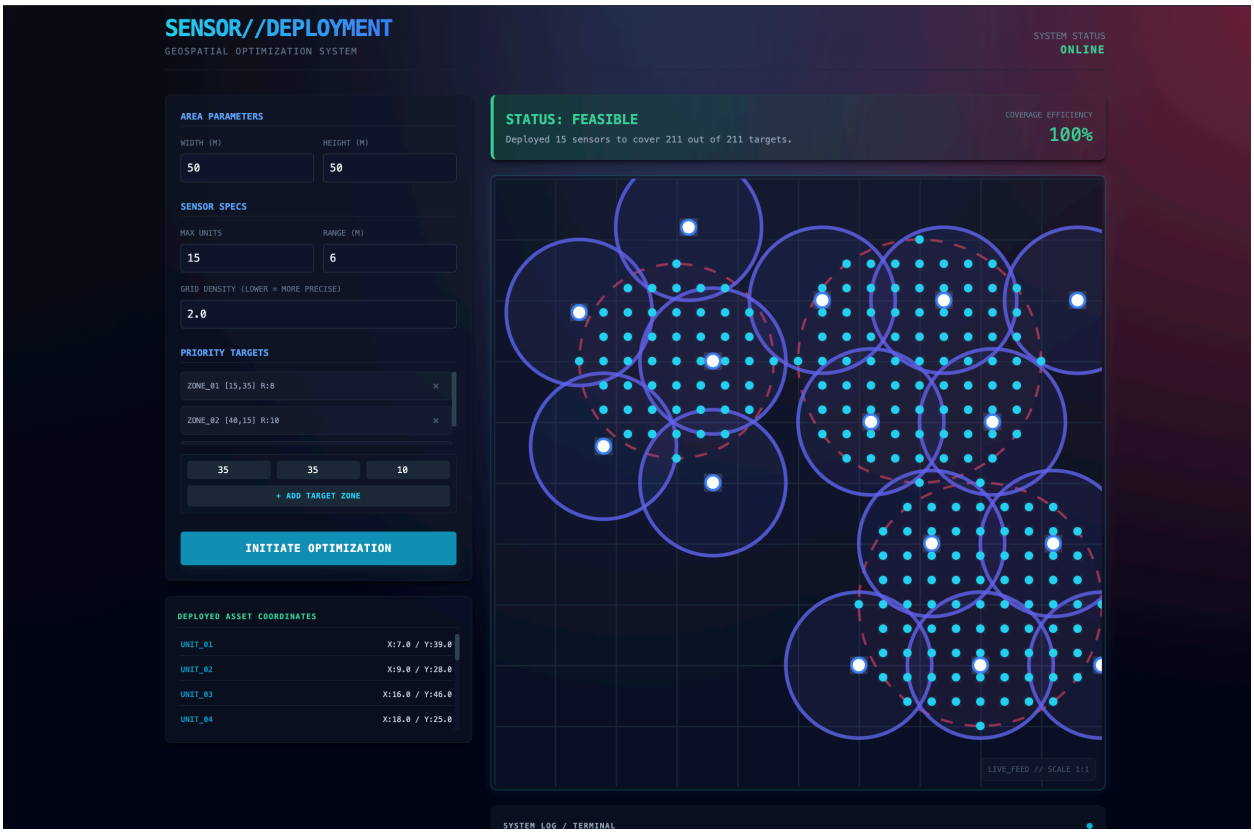
3. **Interactive Visualisation UI**
   An enhanced user interface visualises deployed sensors, coverage regions, and covered or uncovered sub-targets on an interactive canvas. Real-time updates allow users to immediately observe the impact of parameter changes on coverage.

4. **Real-Time Experimentation and Backend Performance**
   The system supports real-time experimentation by dynamically recalculating optimal deployments when sensor parameters are modified. Backend performance is optimised for responsiveness, with bounded solver execution time and reliable API responses.

Work schedule and expected results for the next Review

Thesis Paper Preparation

- Draft the complete thesis, including:
  - Problem formulation
  - System architecture
  - Optimisation methodology
  - Experimental results and analysis
- Add figures, flowcharts, tables, and academic references.
- **Expected Outcome:** A complete, well-structured thesis document ready for review.



References:

1. Smith, J., & Kumar, R. (2022). Optimal Sensor Deployment Strategies in Wireless Networks. International Journal of IoT Research, 15(4), 45–58.
2. Li, Y., & Chen, H. (2021). *Constraint Programming Approaches for Coverage Optimisation*. IEEE Transactions on Computational Intelligence, 12(3), 102–115.
3. Google OR-Tools Documentation. (2023). Retrieved from https://developers.google.com/optimization
4. Gupta, P., & Verma, S. (2020). Wireless Sensor Networks: Design and Applications. Springer, New York.

Guide	PCL Coordinator	HOD-ISE
(Signature with Date)	(Signature with Date)	(Signature with Date)