Training Day 12 Report:

Date: 10 *July,2025(Thursday)*

Location:*PG Block HPC Lab*

Guided by:*Training Instructors (Classroom-Based)*

Main Objective:

To understand overfitting and underfitting in ML models, learn the use of cross-validation, and start the methodology and component listing for the IoT+ML project report.

Summary of the Day's Work

Today's class covered the importance of balancing model fit, how cross-validation improves model reliability, and began formal report preparation with project methodology and hardware/software checklist.

Topics/Areas Covered:

- Overfitting, Underfitting, and Best Fit in ML
- Introduction to Cross Validation
- How Cross Validation helps avoid Overfitting/Underfitting
- Project Methodology Discussion
- Finalizing Report Format
- Started Component Listing for Project

Concepts Learned:

- **Overfitting:** Model performs well on training but poorly on test data.
- **Underfitting:** Model performs poorly on both training and test data.
- **Best Fit:** Balanced model that generalizes well.
- Cross Validation (e.g., K-Fold) helps validate model accuracy on different splits.
- Model should avoid both underfitting and overfitting for real-world tasks.

Tools / Platforms Used

- Python, sklearn (for cross-validation)
- Jupyter / Colab
- Word/Docs for report writing

Tasks Performed:

- Discussed examples of overfit and underfit models.
- Learned how cross-validation splits data and improves model selection.
- Started drafting the methodology section for our project report.
- Finalized components to be used in the project and started noting technical requirements.

Project Progress:

- Methodology section started (includes tools, algorithms, hardware).
- Component checklist prepared (e.g., ESP32, DHT11, PIR, NodeMCU, etc.).

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Observations / Reflections

Today's session helped me clearly understand the problems of overfitting and underfitting. Cross-validation gave me confidence about how to improve model performance. Starting with project methodology and listing components made things feel real and close to build stage.

Key Takeaways

- Can now identify underfitting/overfitting and use cross-validation.
- Launched the formal writing and planning stage for the major project.
- Understood technical component requirements for a functional IoT+ML build..