# Project Synopsis

## 1. Project Title

Intelligent Object Detection from Floor Plans using Deep Learning

## 2. Problem Statement

In architectural design and real estate, interpreting floor plans is a fundamental task. Manual analysis of floor plan images to identify doors, walls, and structural symbols is time-consuming and prone to errors. Existing CAD-based tools lack automation for symbol detection and semantic interpretation. There is a need for an automated system that can detect architectural symbols (e.g., doors, windows, furniture) in floor plan images using object detection techniques.

## 3. Objectives

- To design a system that automatically detects doors and other architectural symbols from floor plan images.

- To prepare and annotate labeled datasets for training a deep learning–based object detection model.

- To evaluate, refine, and improve detection accuracy while reducing false positives.

## 4. Scope of the Project

The system will analyze architectural diagrams and floor plans using state-of-the-art object detection algorithms (YOLO, Faster R-CNN). The detected symbols will be used for enhanced visualization, automated floor plan interpretation, and integration into architectural design workflows.

## 5. Methodology

- Collect and preprocess architectural floor plan datasets.

- Label architectural symbols (e.g., doors, windows, furniture).

- Train and fine-tune an object detection model (YOLO/Faster R-CNN).

- Evaluate model accuracy and optimize hyperparameters.

- Deploy the system for practical use in construction, real estate, and smart home applications.

## 6. Expected Outcomes

- Automated recognition of architectural symbols from floor plans.

- Faster interpretation and analysis compared to manual methods.

- Improved productivity for architects, real estate professionals, and interior designers.

- A scalable solution that can extend to 3D visualization and AR/VR applications.

## 7. Tools and Technologies

- Programming Languages: Python

- Frameworks/Libraries: TensorFlow, PyTorch, OpenCV, YOLO/Faster R-CNN

- Visualization Tools: Matplotlib, AutoCAD integration

- Deployment: Web-based/Standalone application

## 8. Applications

- Real estate – automatic visualization of properties.

- Construction – quick analysis of architectural layouts.

- Interior design – symbol recognition for space planning.

- Smart homes – integration with IoT systems for automation.

## 9. Conclusion

This project bridges the gap between manual architectural analysis and automated deep learning solutions. By leveraging object detection techniques, the proposed system enhances efficiency, accuracy, and productivity in industries that rely on floor plan interpretation and spatial analysis.