SMART INDIA HACKATHON 2024

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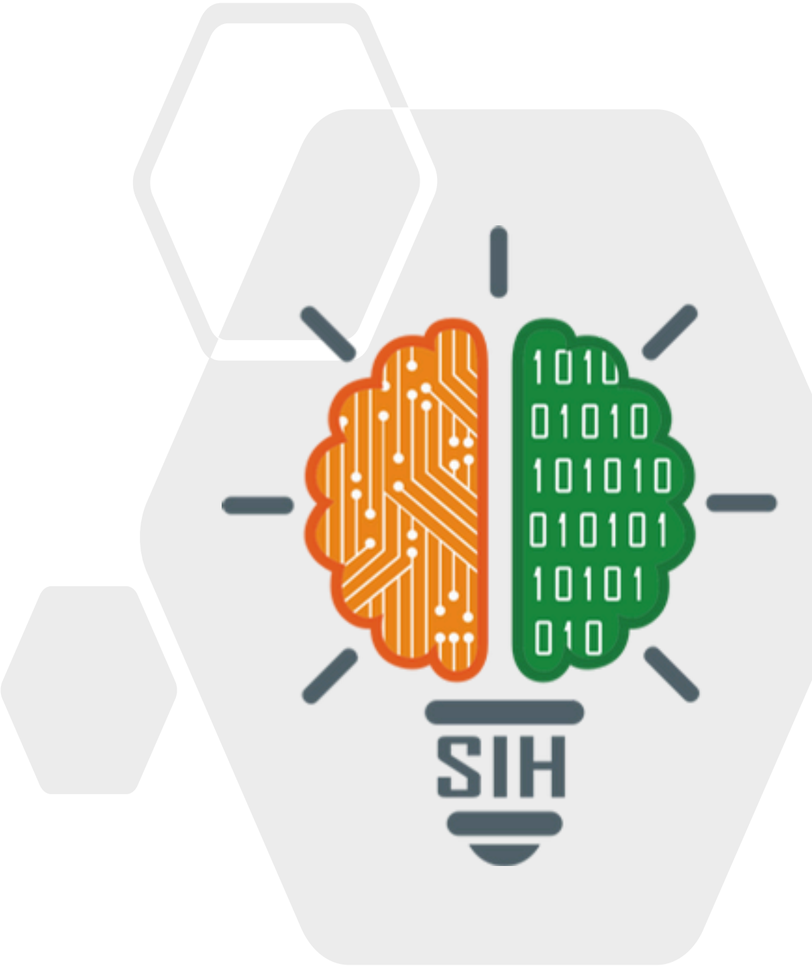
- **Problem Statement ID -** SIH1773
- **Problem Statement Title -**
  Conversion of 2D Blueprints into 3D Model
- **Theme -** Smart Automation
- **PS Category -** Software
- **Team ID -** 6789
- **Team Name -** Tekstatik



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D3CEPTION:

offline analysis of 2d blueprints and 3D virtual world generation

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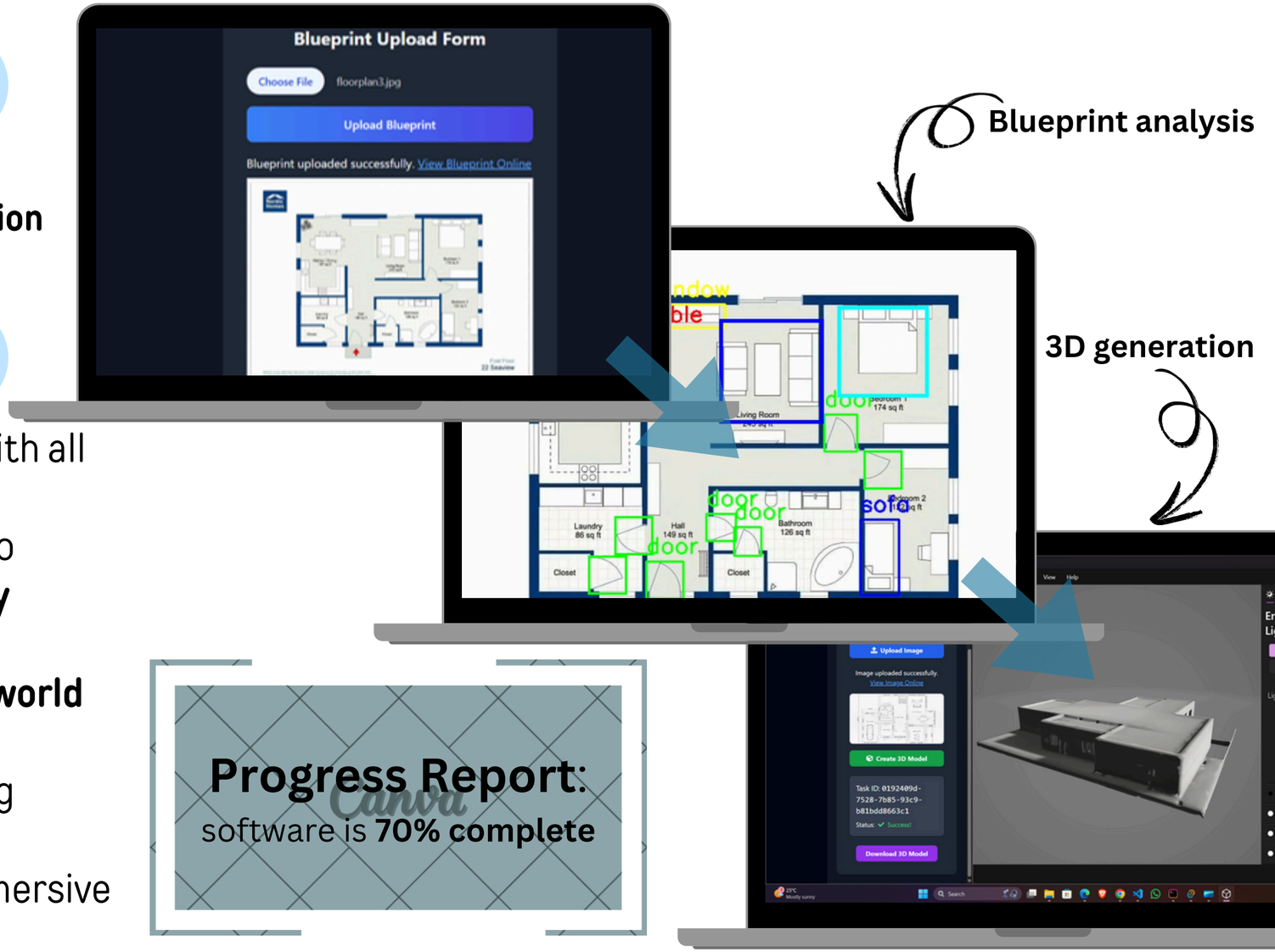
Problems

- **Low visualization of 2D blueprints**
- **No offline AR/VR generation and map integration**
- **Excessive user involvement required**

Solution

- **d3ception**, an **offline software** integrated with all tools to **enhance mission planning**.
- Utilizes an ML model for image processing to optimize 3D model construction and **identify potential security weak points**.
- Integrates Google Maps to **create a virtual world** for enhanced surroundings visualization.
- Generates a precise 3D model of the building based on the **blueprint and surroundings**.
- Creates a spatial environment for a fully immersive **virtual reality experience**.



Progress Report:
software is **70% complete**

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TECHNICAL APPROACH

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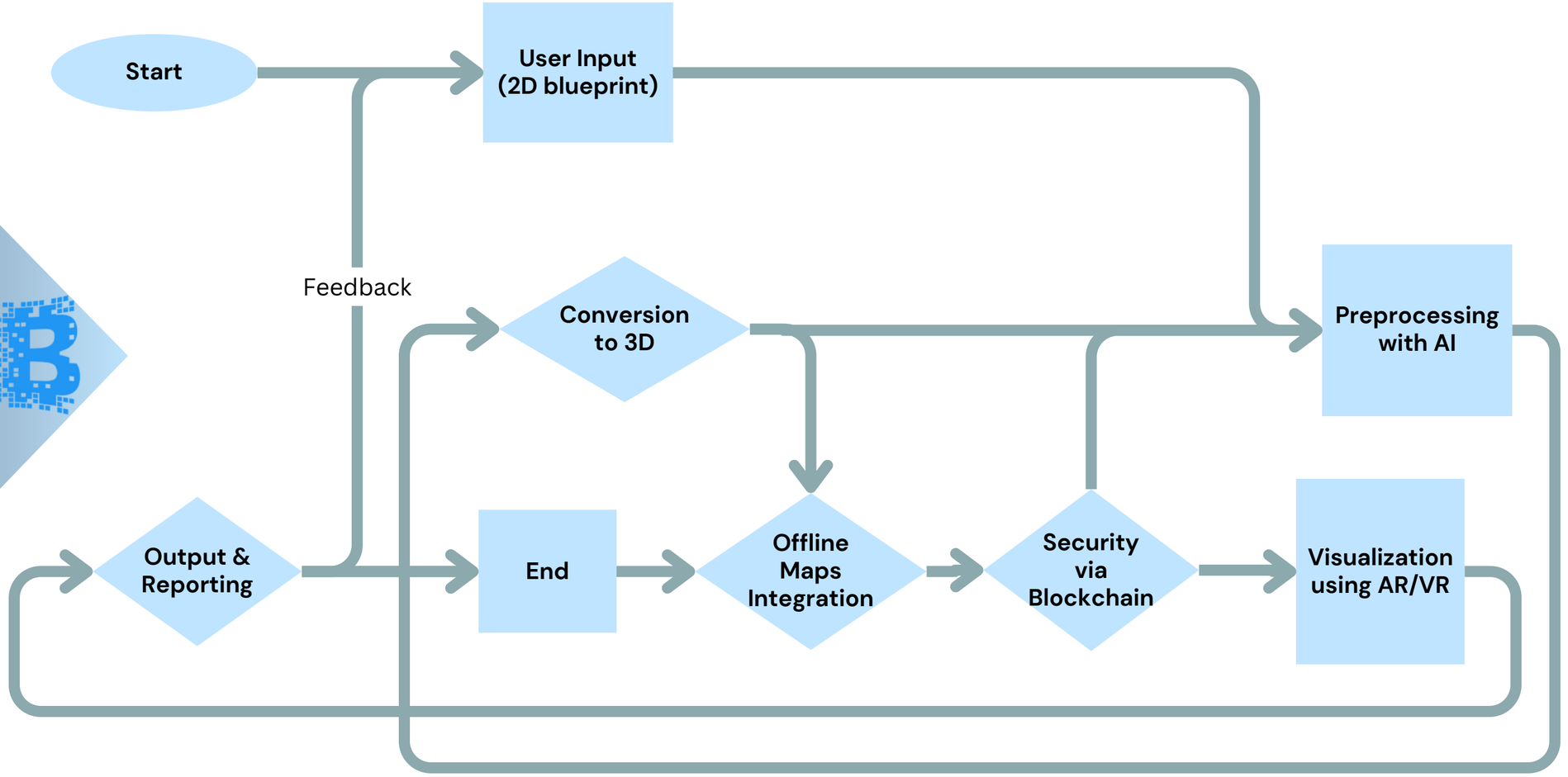

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FEASIBILITY AND VIABILITY

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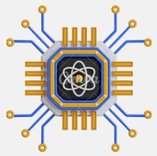
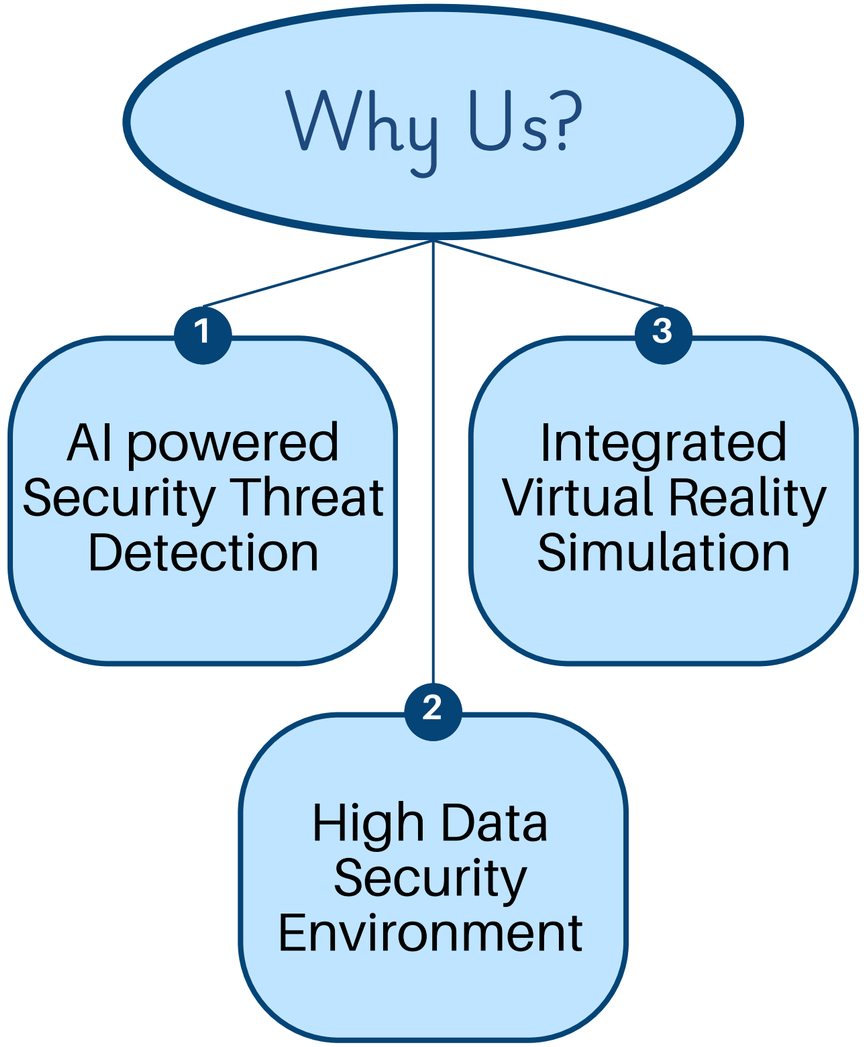
	Challenge	Reason	Strategy
1 	**Accurate Conversion from 2D to 3D**	Blueprints lack detailed depth information	Implemented structural analysis using ML
2 	**Mapping input parameters to 3D Model**	Misinterpretation of manual adjustments	Dynamic parameters according to analysis of model
3 	**Limited Computing Power**	Computationally expensive in offline environment	Optimized 3D generation algorithms
4 	**Integration to Satellite Imagery**	Synchronizing geographic data	Preloading and caching data



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IMPACT AND BENEFITS

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Impact:

- Time saving and increases operation intel
- Automated process with minimal user intervention.
- Requires minimal user supervision.
- Virtual simulation for better training and precision

Benefits:

Social:

- Increased public safety.
- Improved design communication.

Economic:

- Reduced project costs.
- Early flaw detection.

Environmental:

- Sustainable planning integration.
- Minimized physical waste.

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RESEARCH AND REFERENCES

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Resources followed:

- https://www.meshy.ai/blog/how-to-convert-2d-images-to-3d-models-using-ai
- https://pytorch3d.org/docs/visualization
- https://tauri.app/v1/guides/development/development-cycle
- https://eos.com/blog/free-satellite-imagery-sources/

Research Paper:

www.mdpi.com/2673-4117/5/2/42

3. Three-Dimensional Reconstruction

It is commonly accepted that to create valid and complete 3D digital models, three types of information are needed: geometric information, i.e., the shape and dimensions of each component; semantic information, i.e., component categories and additional characteristics and attributes; and topological information, i.e., the relationship between building components [14]. **Figure 1** illustrates the methodology usually employed to acquire this information and create a 3D digital model of a building based on its existing documentation.

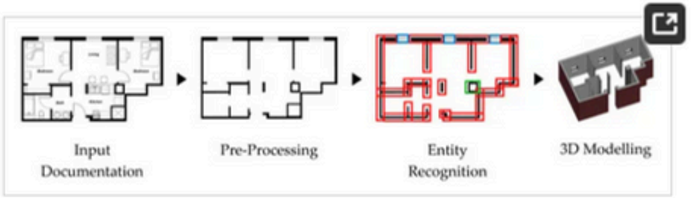

Figure 1. Methodology of 3D reconstruction.

External tools used:

- https://www.meshy.ai/workspace/image-to-3d
- https://threejs.org/
- https://www.autodesk.com/products/revit/overview

Project Links:

Youtube Video: bit.ly/d3ception-demo-video

Github Repo: github.com/IshaanMinocha/d3ception_tekstatik

Downloadable Demo: d3ception-tekstatik.netlify.app