**Project Design Phase**

**Solution Architecture**

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| Date | 16 April 2025 |
| Team ID | SWTID1744120590 |
| Project Name | Survey App |
| Maximum Marks | 4 Marks |

**Solution Architecture:**

**🔹 1. Objective**

To provide a scalable, web-based platform that enables users to upload images/videos of buildings, generate 3D models using Meshroom, analyze structural health using AI, visualize outputs, and download detailed reports — all from a browser interface.

**🔹 2. Technology Solution to Business Problem**

| **Business Problem** | **Technology Solution** |
| --- | --- |
| Manual, slow structural inspections | User-uploaded media, automatic AI-based assessment |
| Expert-driven, costly analysis | Cloud-based AI models and 3D processing |
| Limited access to structural health info | Browser-based visualizations and PDF reporting |
| No standardization in defect communication | Auto-generated, structured health reports |

**🔹 3. Solution Description & Behavior**

* **Frontend (Web UI):**
  + Built with Tailwind CSS, React.js
  + Users upload videos/images
  + Select FPS rate, track progress, interact with 3D/PLY models
* **Backend Services:**
  + Flask/FastAPI to handle uploads, job queues, processing status
  + Meshroom CLI for frame extraction and 3D reconstruction
  + AI pipeline for defect detection & health assessment
* **Visualization Layer:**
  + **Three.js** / **Potree** for real-time browser-based rendering
* **Report Generation:**
  + PDF module with visuals, scores, and insights
* **Storage:**
  + Object storage (e.g., S3-compatible) for uploaded media & results

**🔹 4. Features, Development Phases & Requirements**

| **Phase** | **Features** | **Requirements** |
| --- | --- | --- |
| Phase 1 | Upload → Process → 3D View | Meshroom setup, Flask API, Tailwind UI |
| Phase 2 | AI defect detection | Trained model, inference API |
| Phase 3 | PDF report generation | Report template, export engine |
| Phase 4 | Multi-user access & history | User auth, database setup |
| Phase 5 | Drone input, mobile upload | Mobile-responsive UI, file conversion |

**🔹 5. Specifications for Definition, Management & Delivery**

* **APIs** for uploading, progress tracking, results retrieval
* **Job Queue** to manage Meshroom and AI tasks asynchronously
* **File Format Standards:** JPEG, MP4, PLY, OBJ, PDF
* **Security**: Encrypted uploads, role-based access
* **Performance**: Scalable job runners, CDN for assets
* **Monitoring**: Logging, error tracking, usage stats

