**Project summary**

**What we are doing**

- Developing an AI-driven system for real-time anomaly and anatomy detection in medical imaging (CT, MRI, Ultrasound).

- Target anomalies: organ shift, instrument misalignment, image distortion, tumors, bone/spine irregularities.

- Aim: Enhance accuracy, safety, and efficiency in image-guided surgeries.

**How we are doing it**

- Collecting diverse medical imaging datasets (Liver, Lung, Spine, Bone).

- Training deep learning models (nnU-Net v2, MONAI, PyTorch) for segmentation and anomaly detection.

- Using Python for development and FastAPI for inference pipeline.

- Building a web application (React/Next.js frontend, FastAPI backend) with real-time visualization, overlays, and alerts.

- Deploying on GPU-enabled cloud servers (AWS, Azure, GCP) with Docker & Kubernetes for scalability.

- Implementing confidence scores instead of binary alerts to help surgeons prioritize risks.

**Future aspects**

- Expand datasets to include more organs and pathologies.

- Enhance visualization with 3D rendering and AR/VR integration.

- Add secure authentication and compliance (HIPAA/GDPR) for real-world hospital use.

- Real-time integration with surgical robots and image-guided tools.

- Build a scalable platform for clinical trials and commercial deployment.