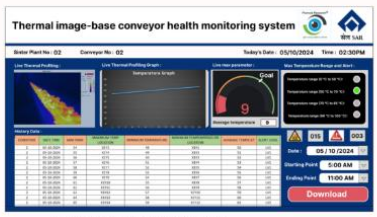
Conveyor Health Monitoring System (CHMS) & Thermal Profiling – DSP Sinter Plant

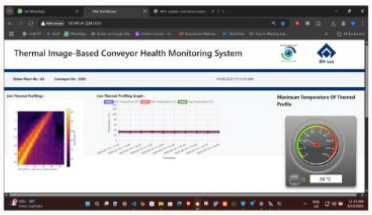
This project is a real-time Conveyor Health Monitoring System (CHMS) with thermal profiling, currently tested and running at the DSP Sinter Plant. The system uses a custom industrial thermal camera to continuously monitor conveyor belts and sinter material flow, capturing temperature distribution and trends along the belt. By analyzing thermal images and time-based temperature variations, the system helps detect abnormal heating, second ignition risks, belt misalignment, and process irregularities at an early stage. Integrated dashboards and historical data logs enable operators to take timely preventive action, improving plant safety, process stability, and conveyor reliability in harsh industrial environments.

Live Project view of the CHMS in DSP

Custom made Thermal Camera



UI Design of DSP Software



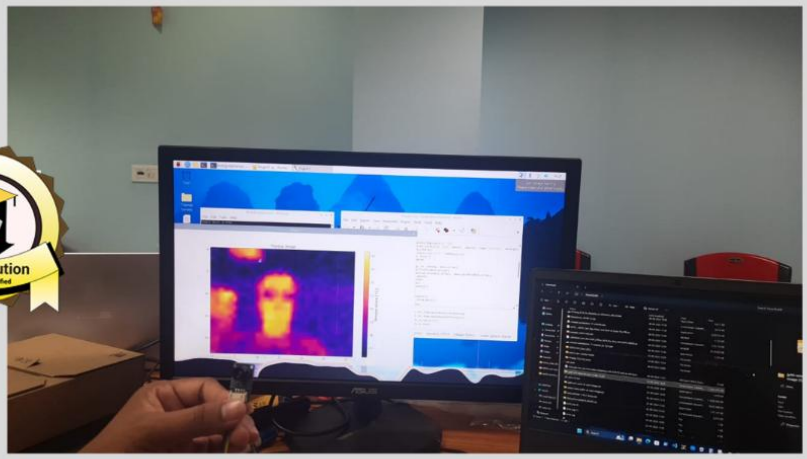
Original DSP Software Developed

Conveyor Health Monitoring System (CHMS) of DSP

Thermal Pattern Analysis for Human Body Using CNN & Computer Vision

This project involves thermal capturing and analysis of human body temperature patterns using a thermal camera, OpenCV, and CNN-based deep learning models. The system processes live thermal images to identify normal and abnormal heat distribution patterns across different body regions. By learning thermal signatures from image data, the solution enables non-contact monitoring of temperature behavior and anomaly detection, supporting early identification of irregular thermal conditions. The project demonstrates potential applications in health screening, safety monitoring, and research-oriented thermal diagnostics, combining real-time data visualization with AI-driven thermal pattern analysis.

Thermal image & Person Body Detect



Live Thermal Data Display and Thermal CNN Model Designing

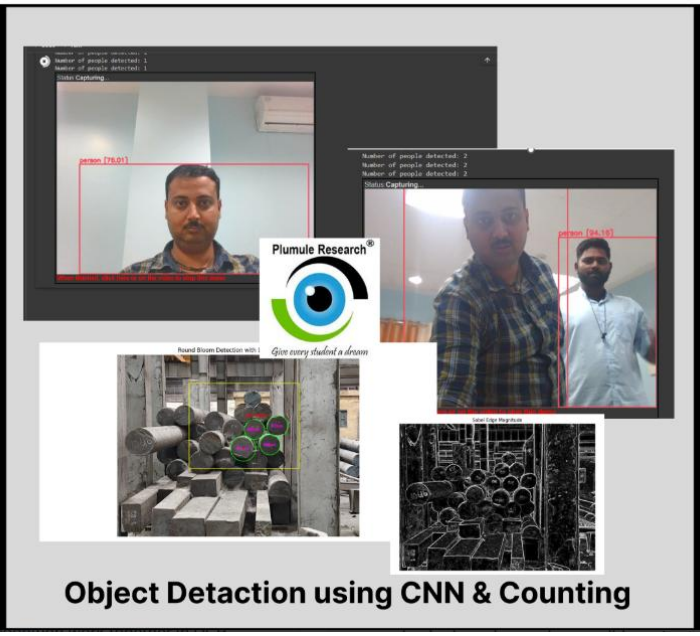
Thermal Camera Setup and CNN Use in the Thermal Camera

RCNN-Based OCR Model – Experimental Learning Project

This project is an experimental OCR model developed using RCNN/CRNN concepts and OpenCV to understand text detection and recognition behavior in real-world images. The model is tested on challenging scenarios such as train wagon and vehicle markings, where text appears with noise, uneven lighting, and complex backgrounds. The objective of the project is learning-driven, focusing on how region detection, character segmentation, and sequence recognition work together in OCR pipelines. It helps evaluate model accuracy, limitations, and preprocessing requirements, serving as a practical foundation for building industrial OCR systems in logistics, railways, and asset identification use cases.

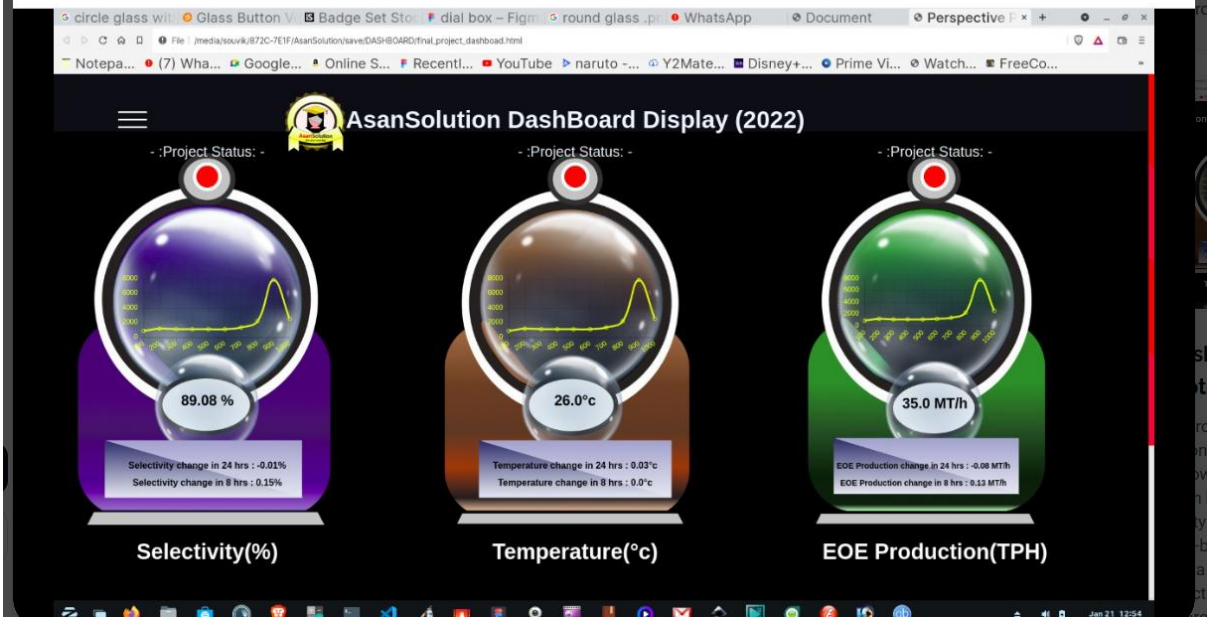
Object Detection & Counting Model Using CNN – Experimental Study

This project is a test and experimental object detection model developed using CNN-based computer vision techniques to understand real-time detection and counting behavior. The model is applied to face detection and employee counting, as well as industrial use cases such as counting billets and blooms in a stage or storage area. The objective of the project is to evaluate detection accuracy, object localization, and counting logic under varying conditions. It serves as a learning and validation exercise for applying AI-based vision models in workforce monitoring and industrial material tracking, forming a base for more robust, production-ready vision systems.



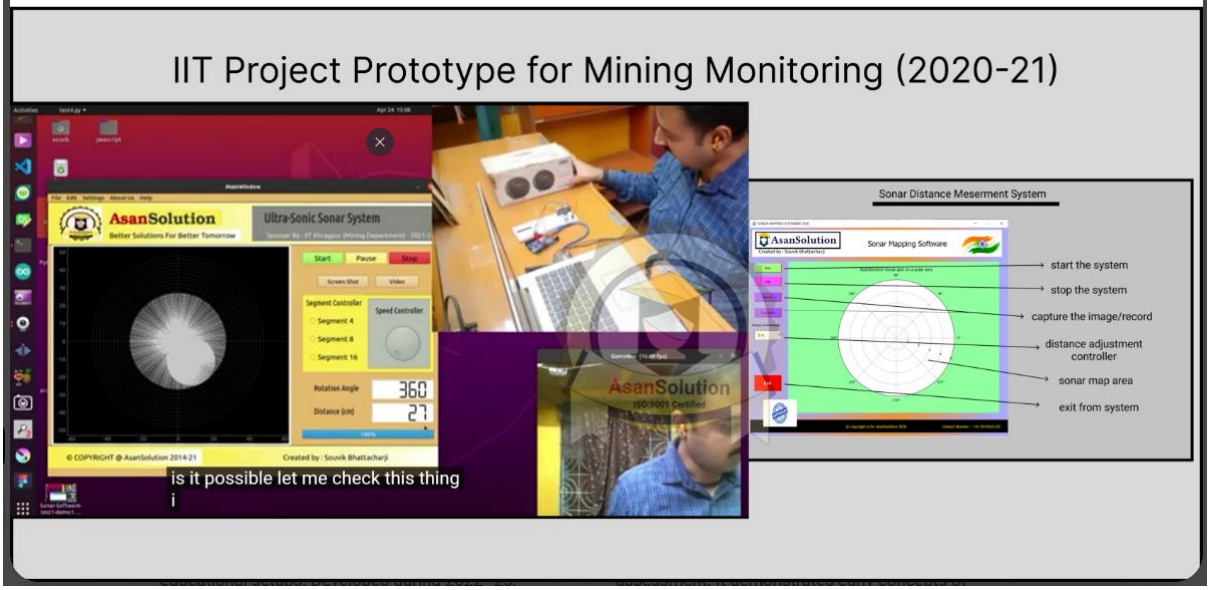
Live Data Dashboard & ANN-Based Analytics Prototype

This project is a prototype live dashboard developed as a concept demonstration for an NIT professor, showcasing how real-time industrial data can be visualized and analyzed through an HMI-style web interface. The system integrates Python-based ANN processing with Excel as a live data source, where parameter changes are reflected dynamically on the dashboard. The prototype displays key process indicators and their time-based variations, simulating live plant behavior and predictive analytics. Designed for experimentation and demonstration, it highlights the feasibility of data-driven HMIs, AI-assisted analysis, and rapid deployment using lightweight integration between Excel, Python, and web-based visualization.
 Link: https://www.youtube.com/watch?v=IH25mwNVWYg&t=34s



IIT Mining Monitoring Sonar System – Prototype (2020–21)

This project is a prototype sonar-based monitoring system developed for Dr. Samir Kumar Pal Sir as an exploratory research initiative in mining safety and subsurface observation. The system uses an ultrasonic/sonar sensing setup to scan waterless, empty mine areas up to ~5 meters range and generate a 2D planar projection of surrounding cavities from ground level. The prototype was conceived to study the feasibility of non-intrusive monitoring of abandoned mine pockets, with a long-term vision of observing deep voids (up to ~32 meters depth) for safety assessment. It demonstrates early concepts of sonar mapping, distance profiling, and visual HMI-based interpretation for underground mining applications. Link: https://www.youtube.com/watch?v=21zC7dIxRro&t=329s



Railway AQI Monitoring System – Preliminary HMI Design (CAAQMS)

This project presents a preliminary Ambient Air Quality Monitoring System (AQMS) HMI developed for Indian Railways and deployed at the Sealdah Railway Station DRM Office for testing and monitoring purposes. The system visualizes real-time air quality parameters such as PM2.5, PM10, CO, CO_2, VOC, temperature, and humidity, along with an overall AQI status indicator. Designed as a desktop and large-display HMI, the solution enables railway officials to continuously observe ambient air conditions within station premises, supporting environmental compliance, passenger safety, and data-driven decision-making for future large-scale deployment.