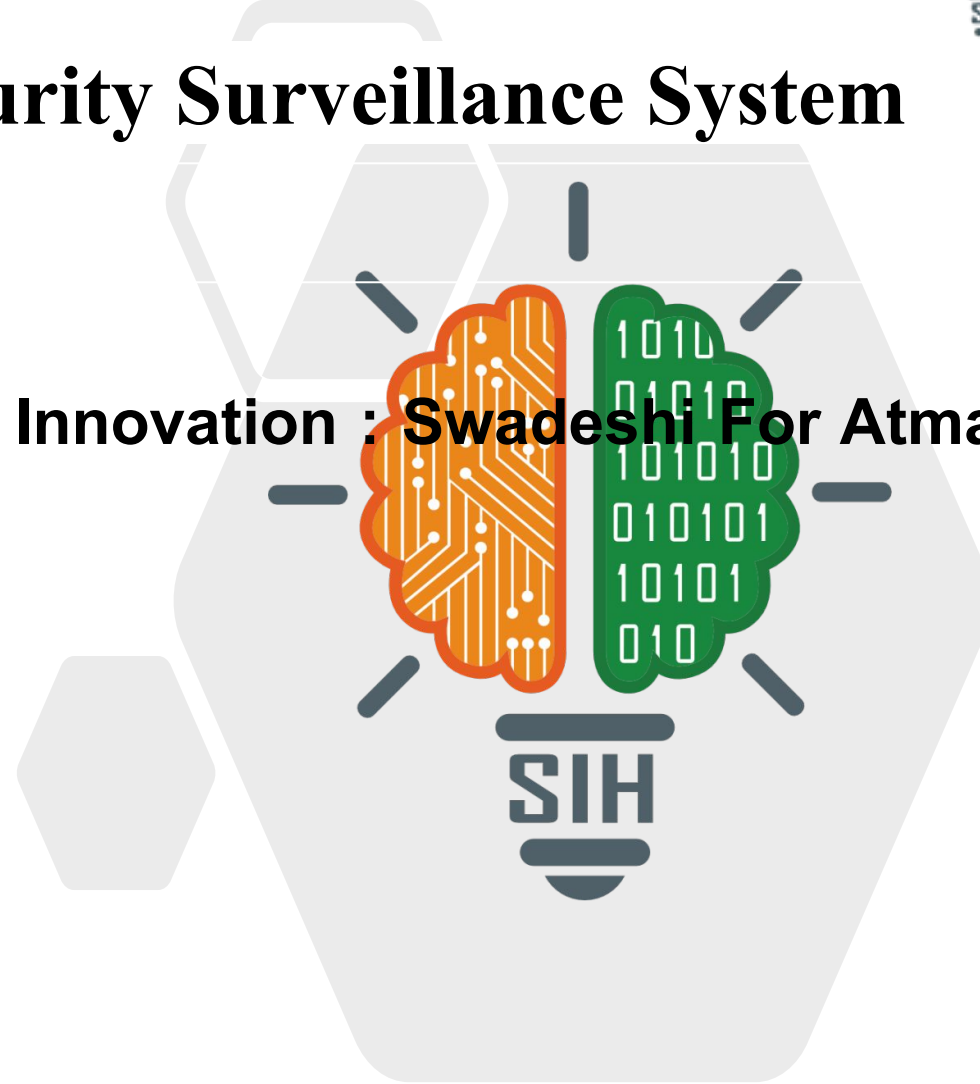# SMART INDIA HACKATHON 2025



## AI-Powered Automated Security Surveillance System

- **Problem Statement ID – SIH25135**

- **Problem Statement Title- Student Innovation : Swadeshi For Atma Nirbhar Bharath-Smart Automation**

- **Theme-  Smart Automation**

- **PS Category- Software**

- **Team ID-84846**

- **Team Name : Igniters**

# AI-Powered Automated Security Surveillance System
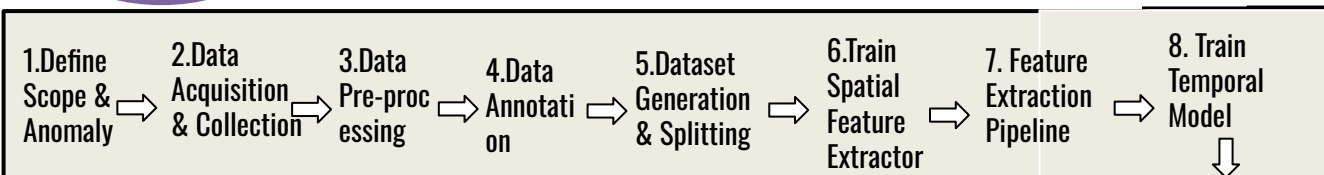
## Proposed Solution & Technical Approach 🛠️💡

**Problem: Security is Reactive.** ⌛

- **Legacy CCTV:** Only *records* the theft, does not *prevent* it.
- **Delay:** Response time is **15−30 minutes** on average.
- **Result: Inventory Loss** is guaranteed before help arrives.

**Solution: Predictive Intervention.** 🚀

- **System:** Upgrades cameras to **Intelligent Guardians**.
- **Core AI: YOLO + LSTM** analyze **Movement Sequences** to spot the act of stealing.
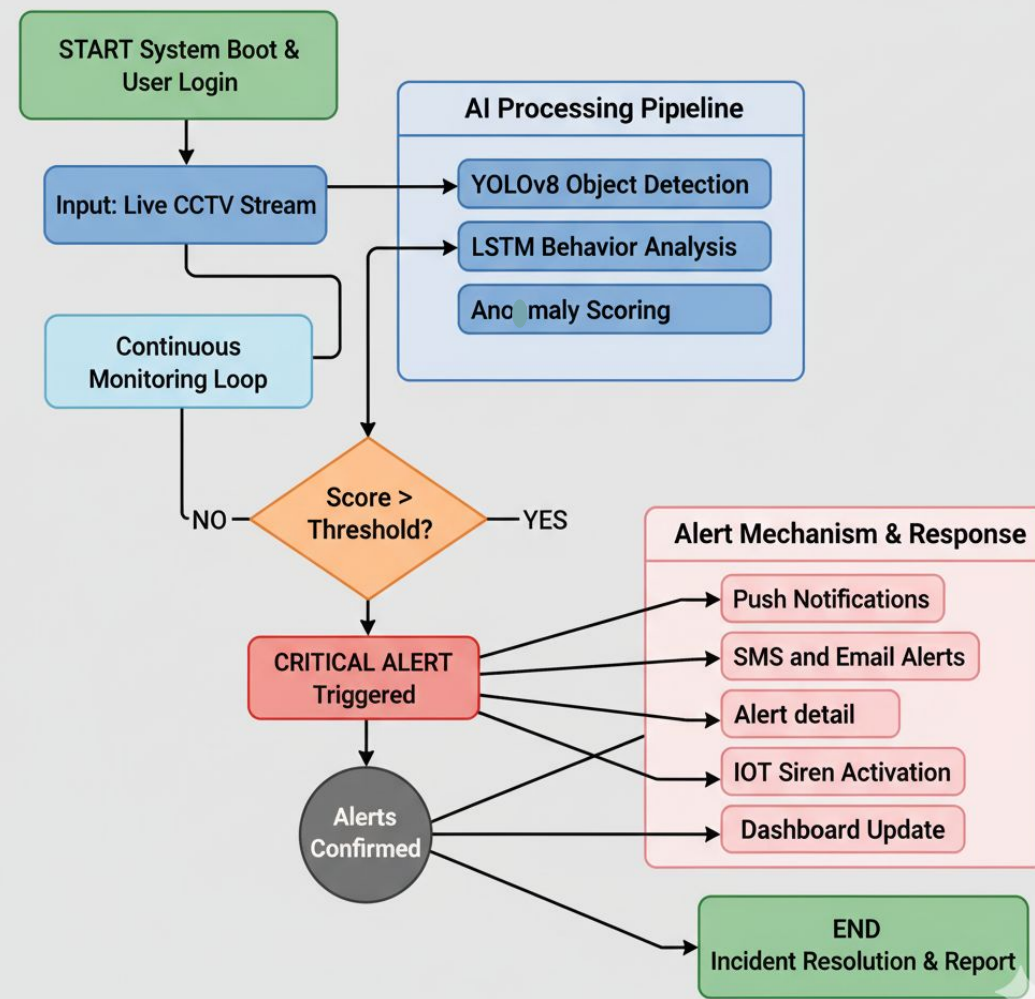- **Speed:** Direct dispatch in **under 3 minutes** to secure assets.



THE OLD WAY (REACTIVE & SLOW) 🕐

Guard Notices Incident (5+ Mins)

**FINAL RESULT: Crime Already Over** ⊗
Response Time: ~15 - 30 Minutes

NEW SECURITY SYSTEMS

AI CORE — YOLO (Detects) LSTM (Analyzes Actions)

App Alert (1-Tap Confirm)

DIRECT POLICE DISPATCH

**FINAL RESULT: Crime Interrupted** ✓
Response Time: ~1 - 3 Minutes

We Change Surveillance from a Recording Device to a PREVENTION System. 🚀



CAMERA SEES → AI FINDS PEOPLE → AI SPOTS THEFT ACTIONS → INSTANT THEFT WARNING → 1-TAP APPROVE → SENDS POLICE → THEFT STOPPED!

# TECHNICAL APPROACH

Igniters

1. Define Scope & Anomaly ⇨ 2. Data Acquisition & Collection ⇨ 3. Data Pre-processing ⇨ 4. Data Annotation ⇨ 5. Dataset Generation & Splitting ⇨ 6. Train Spatial Feature Extractor ⇨ 7. Feature Extraction Pipeline ⇨ 8. Train Temporal Model

⇩

9. Anomaly Threshold Calibration

⇩

10. Model Optimization

⇩

11. Edge/Server Deployment

⇩

12. Real-Time Inference Pipeline

⇩

13. Alert Mechanism Implementation

⇩

14. Continuous Monitoring (MLOps)

⇩

15. Model Retraining & Iteration

## Core Technologies Stack:

| Category | Technology | Function |
|----------|-----------|----------|
| Language | Python | Core Development |
| Detection | YOLO v8 | Real-time object tracking |
| Analysis | LSTM | Suspicious behavior analysis |
| Framework | PyTorch | Model development foundation |
| Alerts | Firebase | Instant push notifications |
| Edge Device | RPi / ESP32 | Local deployment and siren control |

## *AI-Powered Real-Time Anoamily Detection System

START System Boot & User Login

Input: Live CCTV Stream

Continuous Monitoring Loop

**AI Processing Pipeline**
- YOLOv8 Object Detection
- LSTM Behavior Analysis
- Anomaly Scoring

Score > Threshold? — NO / YES

CRITICAL ALERT Triggered

Alerts Confirmed

**Alert Mechanism & Response**
- Push Notifications
- SMS and Email Alerts
- Alert detail
- IOT Siren Activation
- Dashboard Update

END Incident Resolution & Report
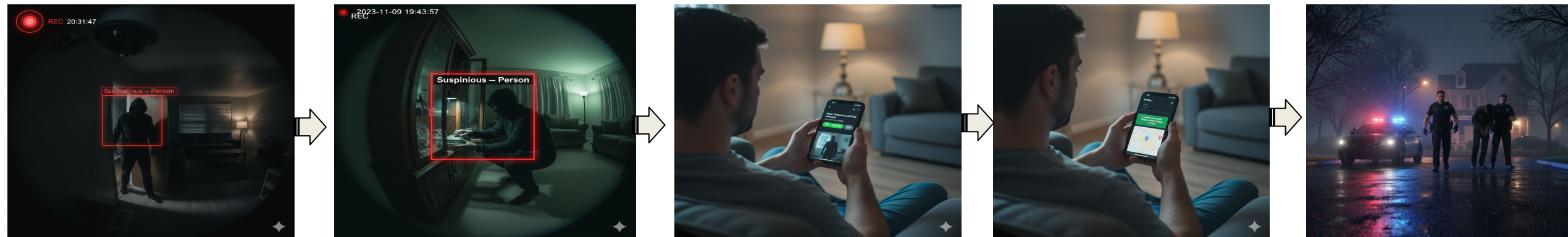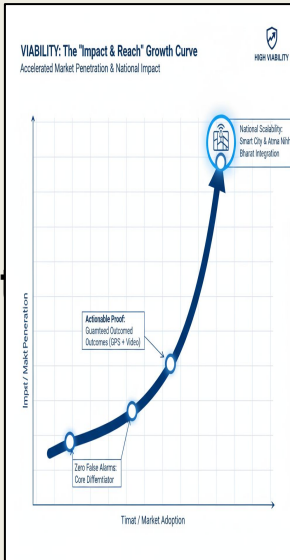
# FEASIBILITY AND VIABILITY

## 1 . FEASIBILITY (How It's Built) 🛠️

- 🧠 **Core Tech:** Uses **YOLO v8** (Object Detection) + **LSTM** (Behavior Analysis).
- 💰 **Low Cost:** Runs on **Moderate Hardware** using **Open-Source** tools.
- ⚡ **Optimization:** Achieves speed via **Edge Deployment** and **Model Optimization** (GPU/Quantization).
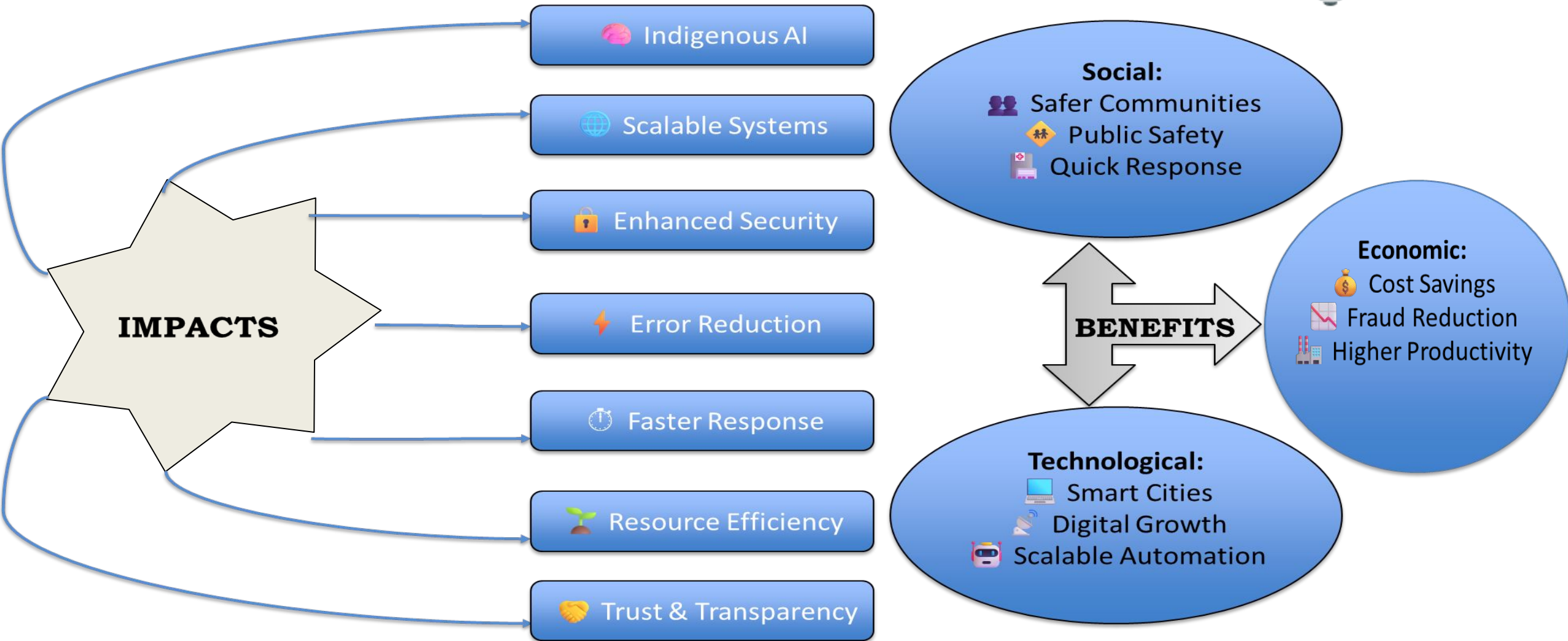
**FEASIBILITY: Technology Readiness & Efficiency**
Horizontal Bar Chart of Core Strengths

| | |
|---|---|
| Core Tech Power | 5/5 (State-of-the-Art) |
| Cost Efficiency | 4/5 (Strong Value Proposition) |
| Deployment Speed | 5/5 |
| Resource Usage | 4/5 (Maximized Speed/Latency) |
| Optimization | 5/5 (Minimized Licensing Cost) |

(High Performance Achieved)
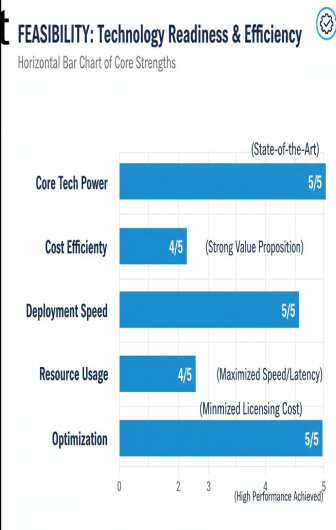
## 2. VIABILITY (Market & Impact) 🌍

- 🚫 **Zero False Alarms:** Detects **Suspicious Action** (not just motion).
- 🚨 **Actionable Proof:** Provides **GPS + Pre-event Video** → **Guaranteed Arrest**
- 🇮🇳 **National Scale:** Ready for **Smart City** & **Atma Nirbhar Bharat**. **High Scalability**.

**VIABILITY: The "Impact & Reach" Growth Curve**
Accelerated Market Penetration & National Impact

HIGH VIABILITY

National Scalability: Smart City & Atma Nirbhar Bharat Integration

Actionable Proof: Guaranteed Outcomes (GPS + Video)

Zero False Alarms: Core Differentiator

Impact / Makt Penetration
Timat / Market Adoption

# RESEARCH AND REFERENCES

## REFERENCES

[1] Bhagya Divya, Shalini, Deepa, Baddiel, Sravya Reddy, "Inspection of suspicious human activity in the crowdsourced areas captured in surveillance cameras", International Research Journal of Engineering and Technology (IRJET), December 2017.

[2] U.M. Kamthe, C.G. Patil "Suspicious Activity Recognition in Video Surveillance System", Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), 2018.

[3] U.M. Kamthe, C.G. Patil "Suspicious Activity Recognition in Video Surveillance System", Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), 2018.

## Links related to Research Work:

| Topic | Link Title & Description | URL |
|---|---|---|
| Intelligent Surveillance Overview | AI-Powered Surveillance Systems:How AI Boosts Safety Discusses intelligent video analytics,anomaly detection,and the benefit of proactive threat detection, which matches your core claim. | source link |
| YOLO + CNN-LSTM Architecture | An intelligent Surveillance System for Detecting Abnormal Behaviors on Campus using YOLO and CNN-LSTM Networks - Directly uses the combination of YOLO for object detection and a variant of LSTM for action detection/identification. | source link |
| Real-Time Threat Detection | AI-Powered threat detection in surveillance systems: A real time data processing framework - Focuses on the low-latency, real-time analysis framework needed for immediate response. | source link |