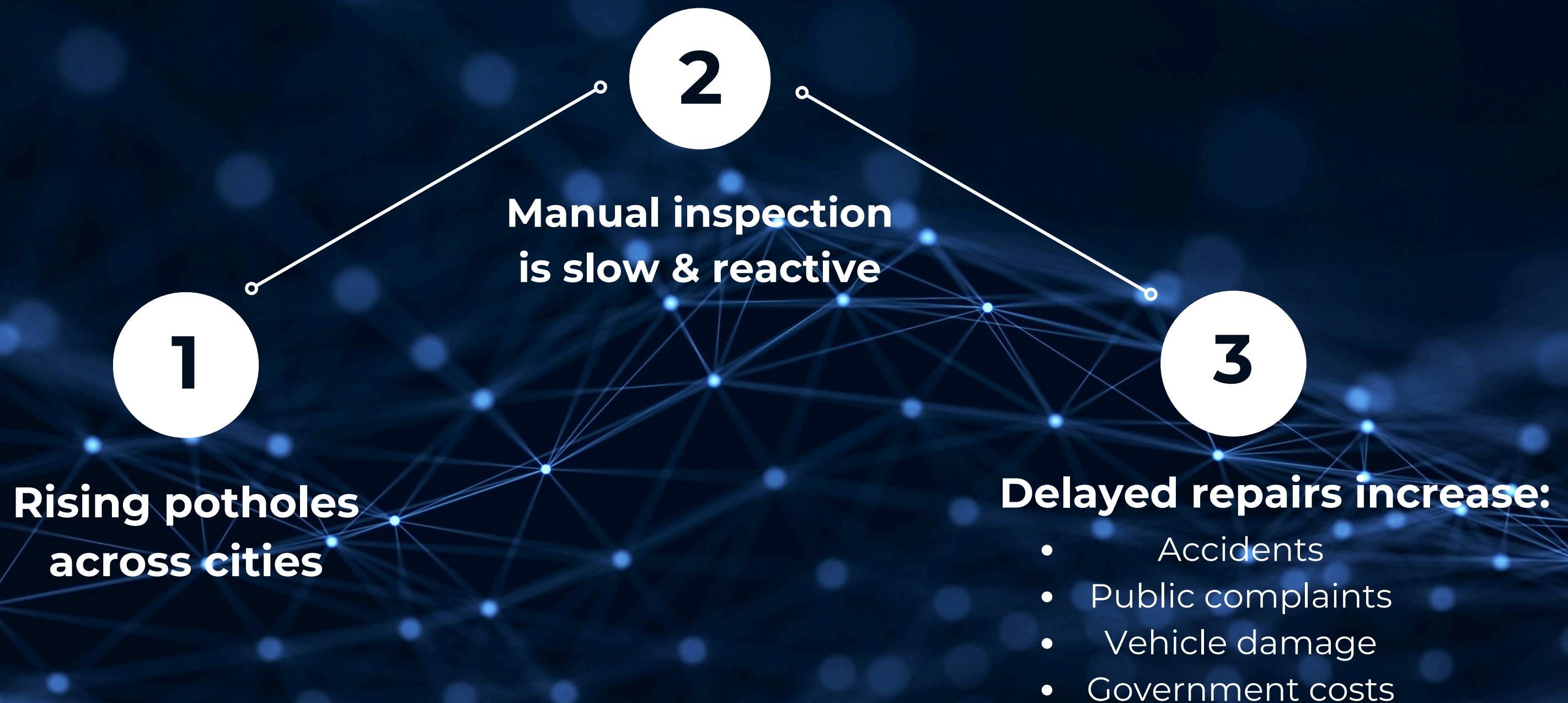


AI-POWERED AUTONOMOUS POTHOLE DETECTION & REPAIR SYSTEM

Safer Roads. Smarter Cities.

PROBLEMS AND IMPACT

THE ROAD INFRASTRUCTURE CRISIS



Pothole-Related Fatalities in India (2019–2024)



9,438 Total Deaths Due to Pothole Accidents (2019–2024)

Rising Road Maintenance Costs (INR Crores)



↑ 111% Increase from 2020 to 2025

- POTHOLE-RELATED FATALITIES ALONE ACCOUNT FOR OVER 9,438 DEATHS IN THE LAST FIVE YEARS.
- MAINTENANCE COSTS HAVE INCREASED 111% FROM 2020 TO 2025 — YET THE PROBLEM PERSISTS

OUR SOLUTION

FULLY INTEGRATED AI + ROBOTICS SYSTEM

AI Detection

Uses a trained computer vision model (like YOLO) to scan live road footage and automatically identify potholes in real time using bounding-box detection.

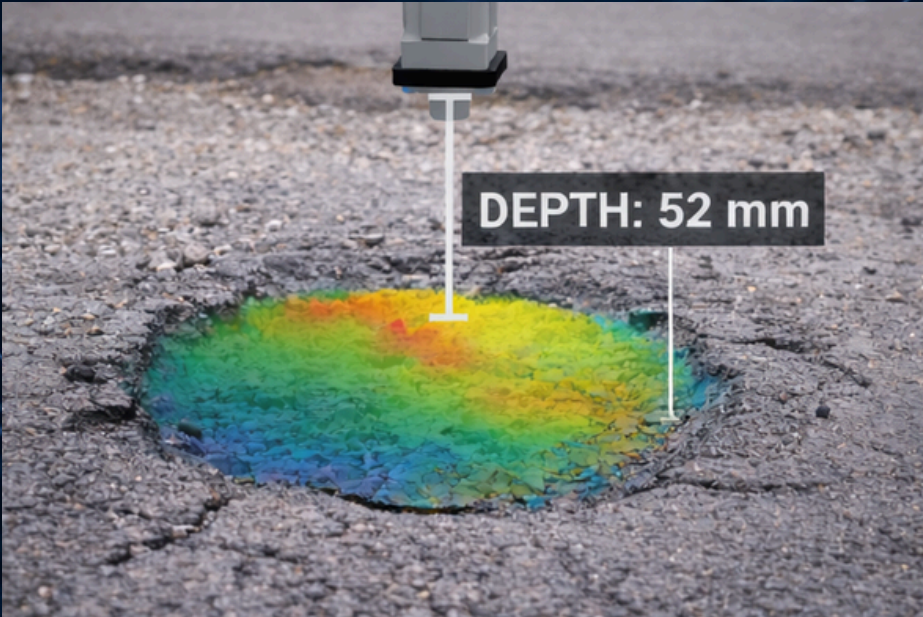
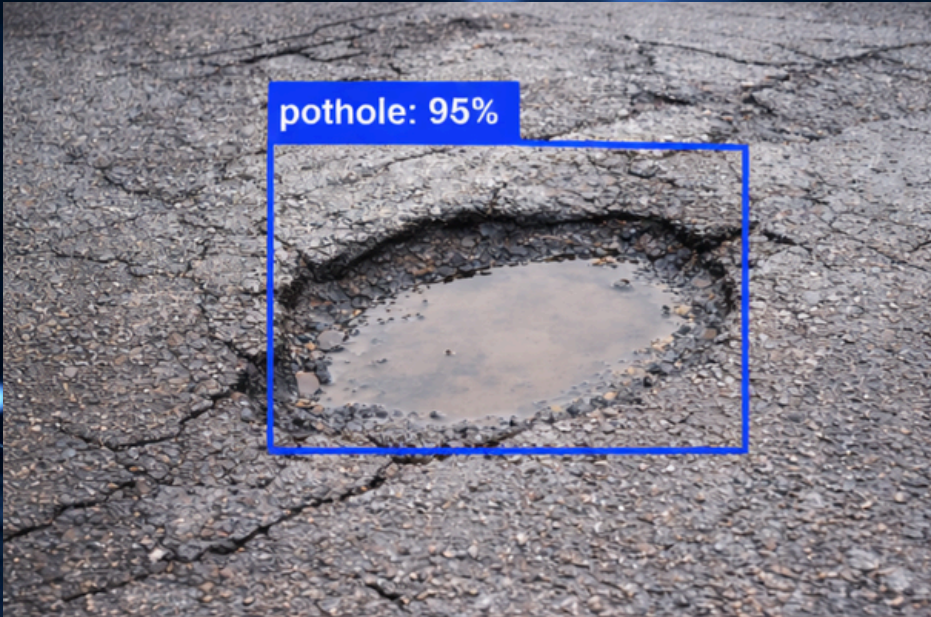
Smart Measurement & Severity Classification

After detection, the system estimates pothole width, depth, and volume using vision-based depth analysis, then classifies severity to determine the appropriate repair method.

Autonomous Repair Robot

A robotic unit executes the repair process by cleaning the pothole, dispensing calculated material, compacting it, and leveling the surface — all guided by AI-generated measurements.

WORKFLOW



TECHNOLOGY & INNOVATION

YOLO-based Computer Vision

Real-time object detection model that accurately identifies potholes from live road footage.

Depth Estimation / Sensor Fusion

Combines camera and sensor data to calculate pothole dimensions and severity.

Embedded Robotics

Controls mechanical repair components to execute automated pothole filling and leveling.

Cloud Analytics Dashboard

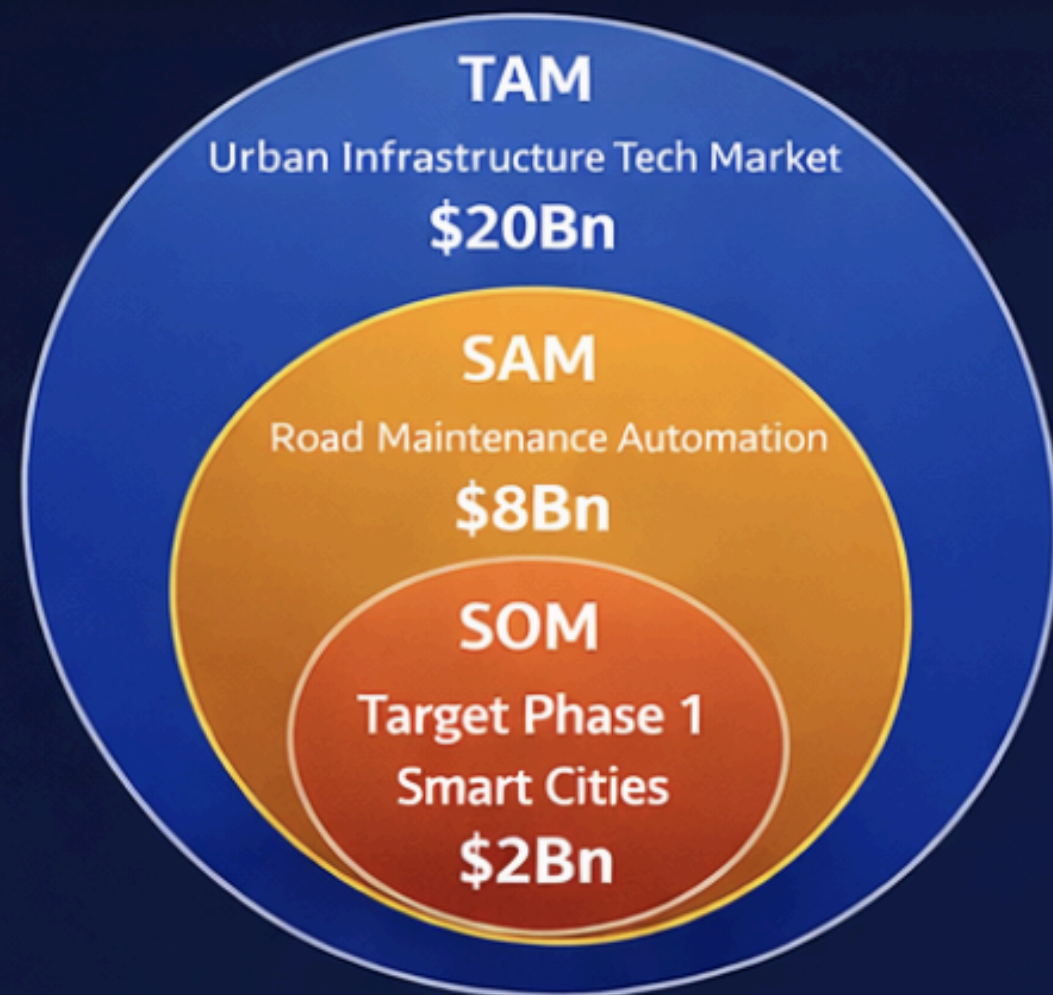
Provides real-time monitoring, reporting, and data insights for municipal authorities.

Python + ROS + Edge AI

Enables intelligent on-device processing and robotic coordination with low latency.

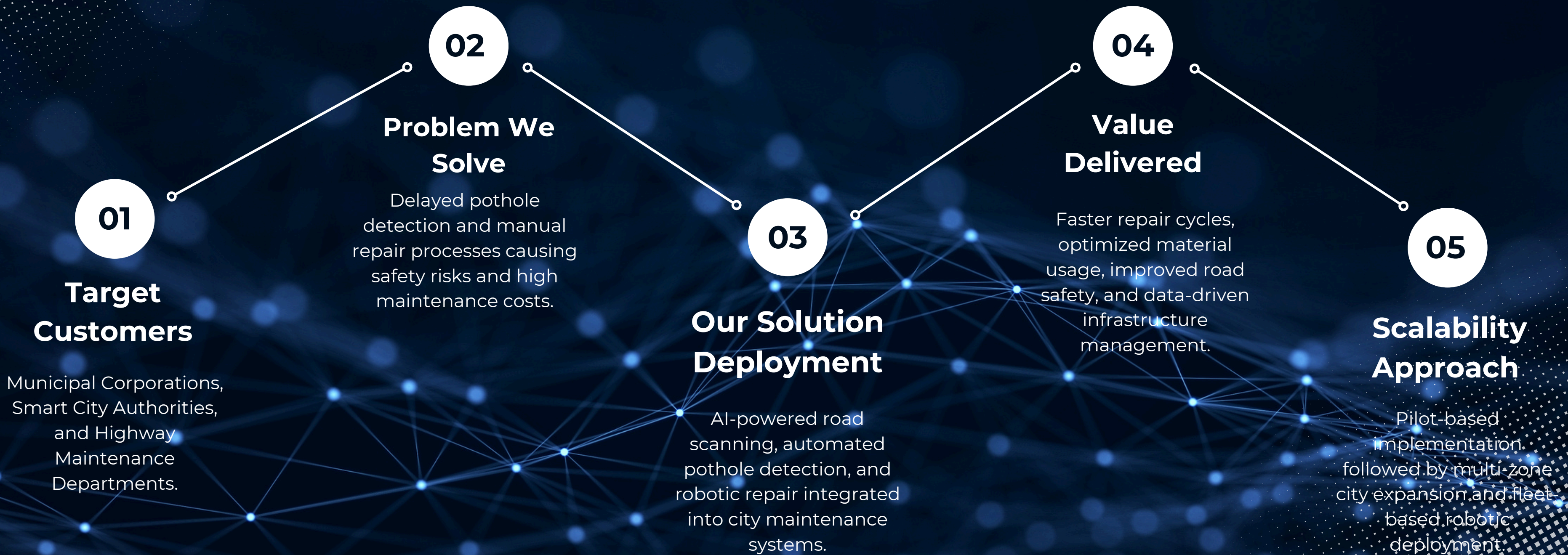
MARKET OPPORTUNITY

TAM - SAM - SOM Market Opportunity



- **TAM (\$20B) – Total Addressable Market**
The complete global urban infrastructure technology market, including all smart road and city maintenance solutions.
- **SAM (\$8B) – Serviceable Available Market**
The portion of the market focused specifically on road maintenance and automation solutions.
- **SOM (\$2B) – Serviceable Obtainable Market**
The smart cities segment we plan to enter first during our pilot phase.

BUSINESS MODEL



PROGRESS AND FUTURE PLAN

CURRENT STATUS

- ✓ AI Detection Model Built
- ✓ Real-Time Phone Detection
- ➔ SOON Severity Classification
- ➔ SOON Prototype Development

FUTURE PLAN

- AI Optimization
- MVP Robot
- Pilot Deployment
- Smart City Collaboration

Pilot



**City
Deployment**



**Multi-city
Expansion**

WHY THIS PROJECT MATTERS (CORE IMPACT & VALUE)

Safety Impact

Reduction in pothole-related accidents and faster repair response time

Economic Impact

Lower long-term road maintenance cost and reduced vehicle damage claims.

Operational Impact

Real-time road monitoring and automated detection → decision → repair

WHY NOW?

- Rising urbanization
- Smart City initiatives
- Increasing road accident statistics
- Growing infrastructure spending

FUNDING REQUIREMENT

(PROTOTYPE DEVELOPMENT)

ESTIMATED COST TO BUILD ONE FULL PROTOTYPE MACHINE : ₹14 LAKHS

MECHANICAL STRUCTURE & CHASSIS

(₹2 – ₹3 LAKHS)

- Custom metal chassis fabrication
- Welding & structural assembly
- Industrial wheels & suspension

MOTORS, ACTUATORS & DRIVE SYSTEM

(₹2 – ₹2.5 LAKHS)

- High torque DC motors
- Motor drivers
- Linear actuators
- Drive control system

REPAIR MECHANISM

(₹3 – ₹4 LAKHS)

- Material dispensing unit
- Storage tank
- Cleaning air compressor system
- Mini compaction roller attachment

SENSORS & VISION SYSTEM

(₹2 – ₹3 LAKHS)

- Industrial camera
- Depth sensor / stereo camera
- Basic LiDAR (optional)
- Ultrasonic proximity sensors

EMBEDDED & AI HARDWARE

(₹1.5 – ₹2 LAKHS)

- Jetson Orin / Xavier / Nano
- Raspberry Pi backup controller
- Microcontrollers
- Power management system

POWER SYSTEM

(₹1 – ₹1.5 LAKHS)

- Lithium battery pack
- Battery management system
- Charging system

THANKYOU