



# Bal Road Guard:

## Smart Pothole Detection & Autonomous Repair System

A modular system for road damage identification, prioritization, and automated repair

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### 1. INTRODUCTION



- Manual road inspections
- Slow response time
- No data-driven prioritization

### 2. OBJECTIVES



- Vision model + adaptive classification database
- Priority-based repair decision-making
- Modular autonomous repair workflow

### 3. MATERIALS & METHODS



- 500K+ labeled images / month
- YOLO-based detection
- Web analysis platform (Phase 1)
- Modular robotic system

### CORE MODULES



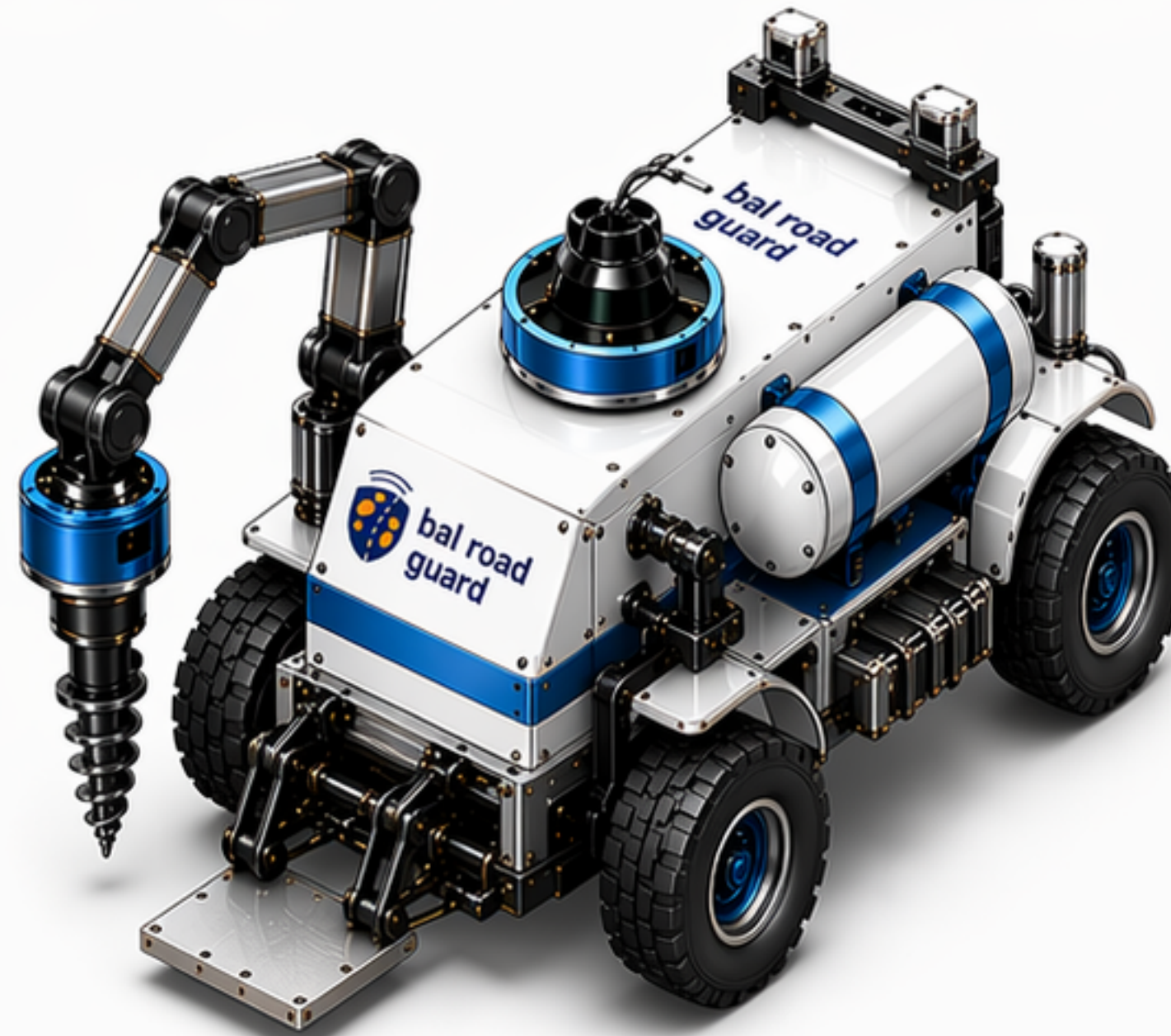
Detection Module



Mobile Platform



Drilling / Actuation Module



### KEY PERFORMANCE (PHASE 1)



Detection Accuracy  
**90%+**  
on test dataset



Analysis Time  
**< 3 min**  
per road image



Priority Classification  
**3 Levels**  
High / Medium / Low

### PRIORITY CLASSIFICATION (EXAMPLE)



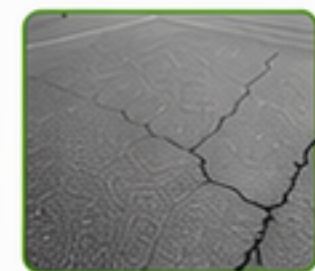
**HIGH**

Large, deep  
pothole



**MEDIUM**

Medium-sized  
crack



**LOW**

Small crack,  
low impact



### DATA-DRIVEN IMPROVEMENT

- Accumulate data from every repair
- Continuously improve model and repair strategy
- Support smart city infrastructure management

### INNOVATION & ADVANTAGES



**Modular Design**  
Flexible modules for  
easy upgrades and  
maintenance



**Autonomous Workflow**  
End-to-end workflow  
from detection to  
repair



**Cost Efficiency**  
Reduces labor cost  
and improves  
resource utilization

### NEXT STEPS



- Expand dataset and improve model generalization
- Field testing in real-world environments
- Integrate full autonomous repair workflow
- Explore multi-robot collaboration

