IS2113 Community Informatics (ICT for Developments)

# SMART WASTE MANAGEMENT SYSTEM

Presented by Group 18

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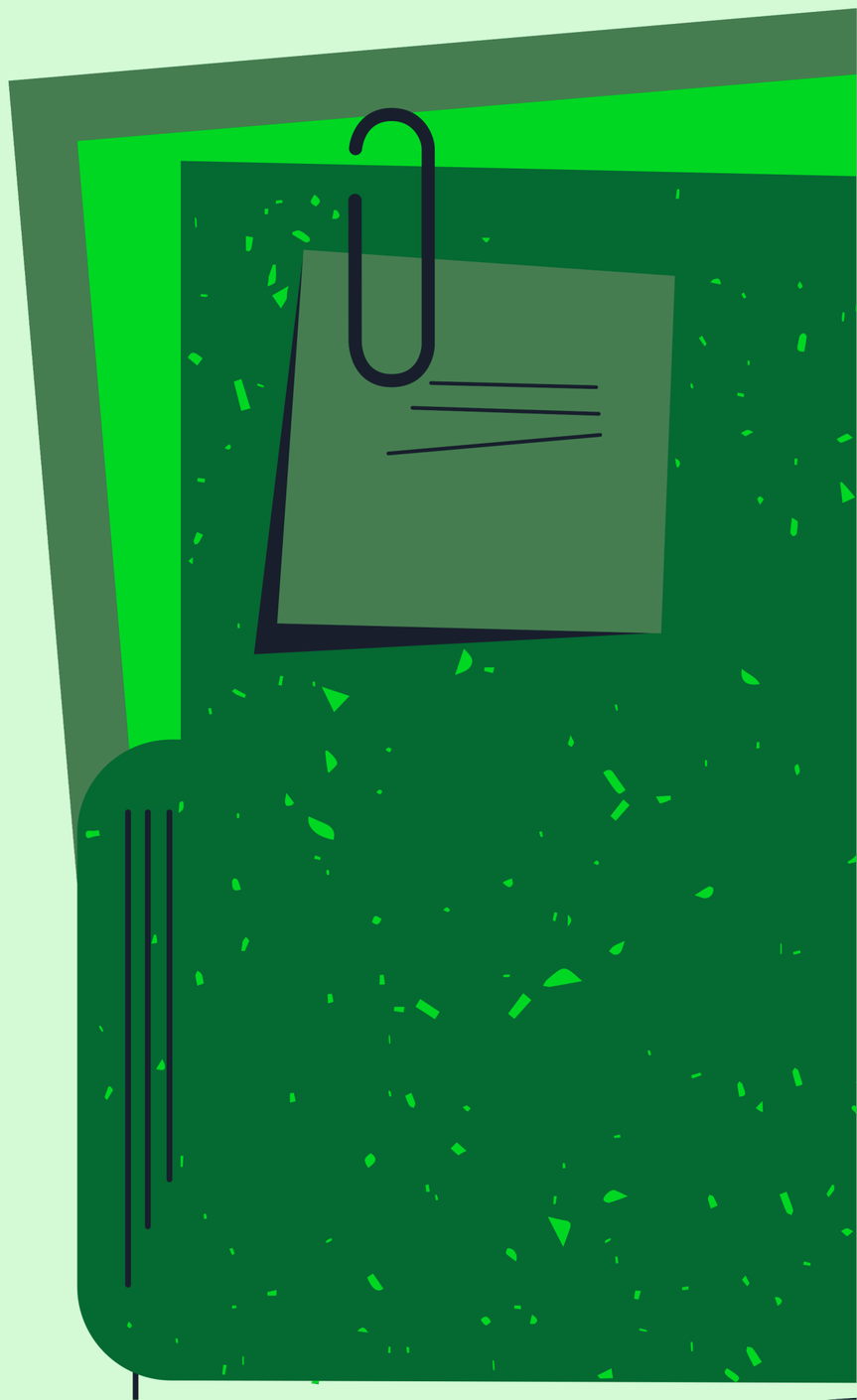
# Agenda

1. Problem Statement & Impact Analysis
2. Proposed ICT-Based Solution
3. Prototype & System Architecture
4. Key Features & User Interfaces
5. Benefits, Feasibility, & Scalability
6. Challenges & Solutions



# Problem Statement

**Affected Areas** - Urban and high-density communities

**Issues**

- Poor Waste Management and Urban Pollution in Sri Lanka.
- Overflowing waste bins.
- Illegal dumpings.
- Inefficient waste collection systems.
- Impact on public health and Environmental degradation.

# Impact Analysis

## Environmental Impact

- Increased greenhouse gas emissions
- Soil and water contamination
- Urban Flooding

## Social Impact

- Health hazards in communities
- Reduced quality of life in polluted neighborhoods

## Economic Impact

- Higher operational costs for waste management
- Loss of tourism and local revenue

## Community Impact

- Mental Well-Being Impact
- Decreased quality of life

# Proposed ICT based Solution

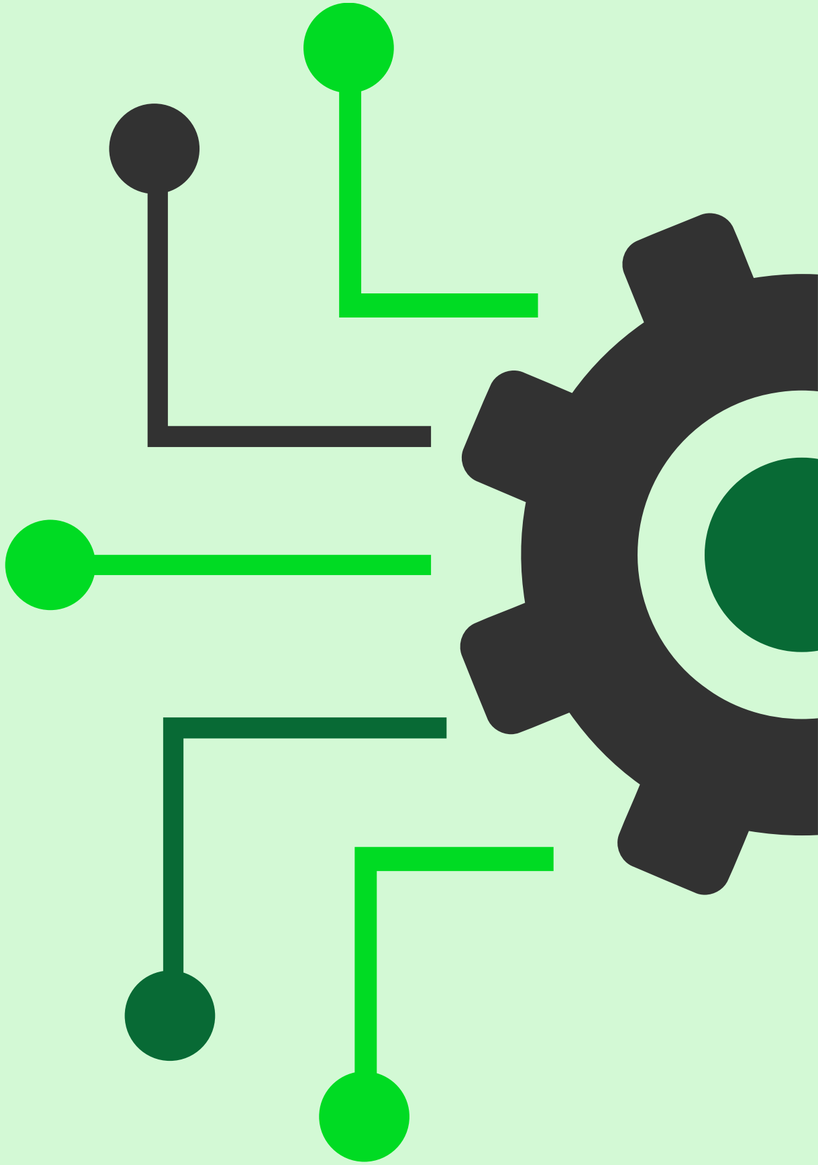
## SMART WASTE MANAGEMENT SYSTEM (SWMS)

ECOTRACK

- **IoT Sensors** - Installed in waste bins to monitor fill levels in real time
- **Mobile App** - For residents, waste collectors, and authorities
- **Cloud-Based Analytics** - Optimizes collection routes and monitors system performance

# System Architecture & Prototype Overview

- **System Flow** - IoT Sensors in Bins → Transmit data (fill-levels, alerts) via wireless networks
- **Cloud Platform**- Stores and processes sensor data
- **Mobile App Interface** - Displays real-time information and collection schedules to different users
- **Prototype Demo** - Interactive UI screens showing bin status, schedules, and reporting features



# DEMO

# Key Features Of The Proposed Solution

ECOTRACK

## Citizens

- Waste Reporting (Photos + Location)
- Smart Bin Locator
- Collection Schedule Tracking

## Waste Collectors

- Optimized Routes Guidance
- Real-Time Bin Monitoring
- Collection Tracking

## Waste Centers

- Dashboard with live sensor data
- Real-Time Monitoring and Data Analytics
- Operational Optimization
- Incident management
- Optimized route planning for collection vehicles

# Benefits & Impact

**For Citizens**

- Convenient Waste Disposal
- Increased Awareness
- Healthier Surroundings

**For Waste Collectors**

- Higher Collection Frequency
- Lower Operating Costs
- Optimized Driving Routes
- Better Collection Schedules

**For Waste Centers**

- Real-Time & Predictive Analytics
- Enhanced Waste Tracking
- Operational Efficiency

# Feasibility, Scalability & Sustainability

## Feasibility

Leverages low-cost IoT sensors and widely available mobile platforms for efficient, scalable, and cost-effective waste management solutions.

## Scalability

Adaptable from urban to rural areas, the system integrates with municipal waste management for mass deployment and expands into industrial and business operations.

## Sustainability

Generates income via public-private partnerships and ad revenues from smart bins. Reduces environmental impact through efficient waste collection and recycling.

# Challenges & Solutions

### High cost of IoT-based bins

- Secure government-private funding.
- Implement phased rollout for gradual bin deployment.
- Promote local manufacturing to cut costs.

### Limited Internet Access in Rural Areas

- Use low-cost, low-bandwidth tech
- Deploy LoRaWAN for data transmission in low-connectivity areas.

### Resistance to adoption

- Run awareness campaigns for citizens and stakeholders.
- Offer incentives like rewards or discounts for participation.

### Bin Vandalism or Theft

- Use tamper-resistant bins with GPS tracking.
- Educate communities to prevent vandalism.

### Data Privacy & Security

- Use strong encryption and secure data storage.
- Ensure compliance with data laws like GDPR.

### Low digital literacy of collectors

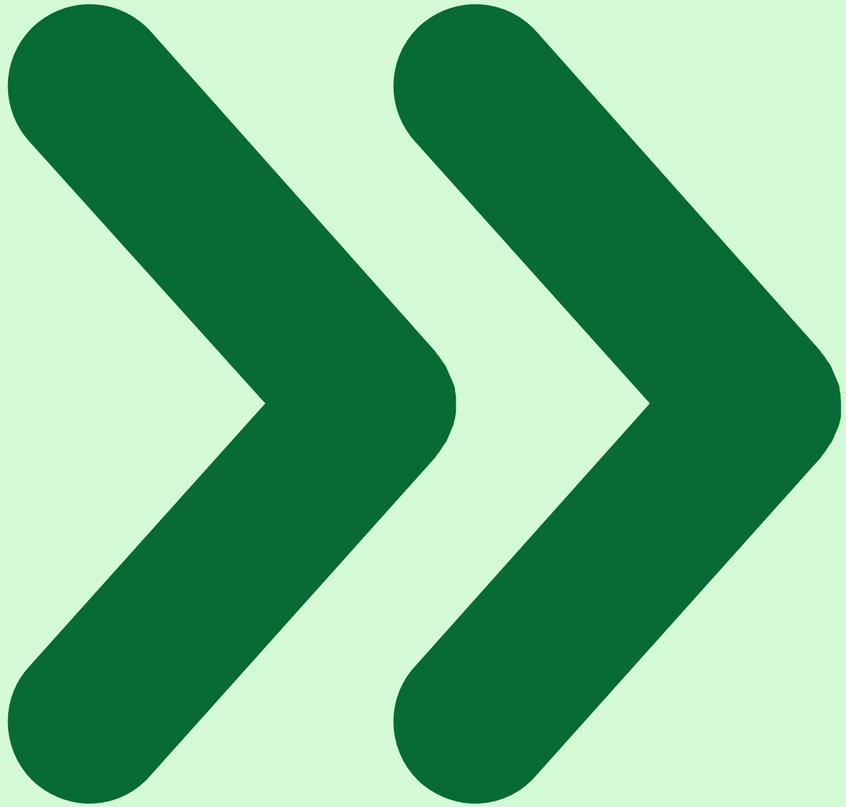
- Provide training programs.
- Develop a user-friendly, multilingual app.
- Use visual guides.

# Conclusion & Next Steps

The Smart Waste Management System addresses urban pollution through real-time monitoring and efficient waste collection.

Next Steps

- Engage with local authorities and community groups
- Proceed with pilot deployment and collect performance data



**Let’s work together for a cleaner, healthier urban environment!**

# THANK YOU!

# ECOTRACK