SMART REAL-TIME TOILET STATUS TRACKING SYSTEM

Presented by
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INTRODUCTION

Public toilets in train are essential facilities for passengers. However, poor cleanliness, lack of realtime status visibility, and delayed cleaning lead to unhygienic conditions, health risks, and passenger dissatisfaction. To address this issue, this project proposes a low-cost Real-Time Toilet Cleanliness & Status Tracker combined with an Automated Toilet Cleaning Device. The system uses a manual switch placed outside the toilet door that, when pressed, initiates an automatic floor and toilet wash cycle and updates the toilet usability status in real time. The solution is designed to be simple, affordable, scalable, and suitable for government transport systems like bus terminals and depots.

PROBLEM STATEMENT

Real-Time Cleanliness & Toilet Status Tracker

Problem: Passengers don't know which toilet is usable/clean .

SURVEY METHODOLOGY

A simple field and questionnaire-based survey was conducted to the people travelling in HowrahNew Delhi Duronto Express Train.

Method:

- Short questionnaires (offline)
- Observation of toilet usage frequency

Question asked:

- How often do you travel in train?
- Do you experience dirty or unhygienic train toilet?
- What issues have you faced?
- Have you ever avoided using the toilet due to hygiene concern?
- How would you rate toilet cleanliness in trains?
- What are your thoughts to improve the toilet cleanliness?

SURVEY RESULT

Sample Size: 8

Observation	Percentage
• Passengers dissatisfied with toilet cleanliness	75%
• Toilets found dirty during peak hours	88%
• Passengers willing to use automated system	75%

Conclusion from Survey

A real-time status indicator and instant cleaning mechanism is strongly needed.

AS-IS PROCESS (CURRENT SYSTEM)

1. Passenger uses toilet
2. Toilet becomes dirty
3. No indication outside the toilet
4. Next passenger enters unknowingly
5. Cleaner arrives based on schedule
6. Complaints are registered but the process is slow

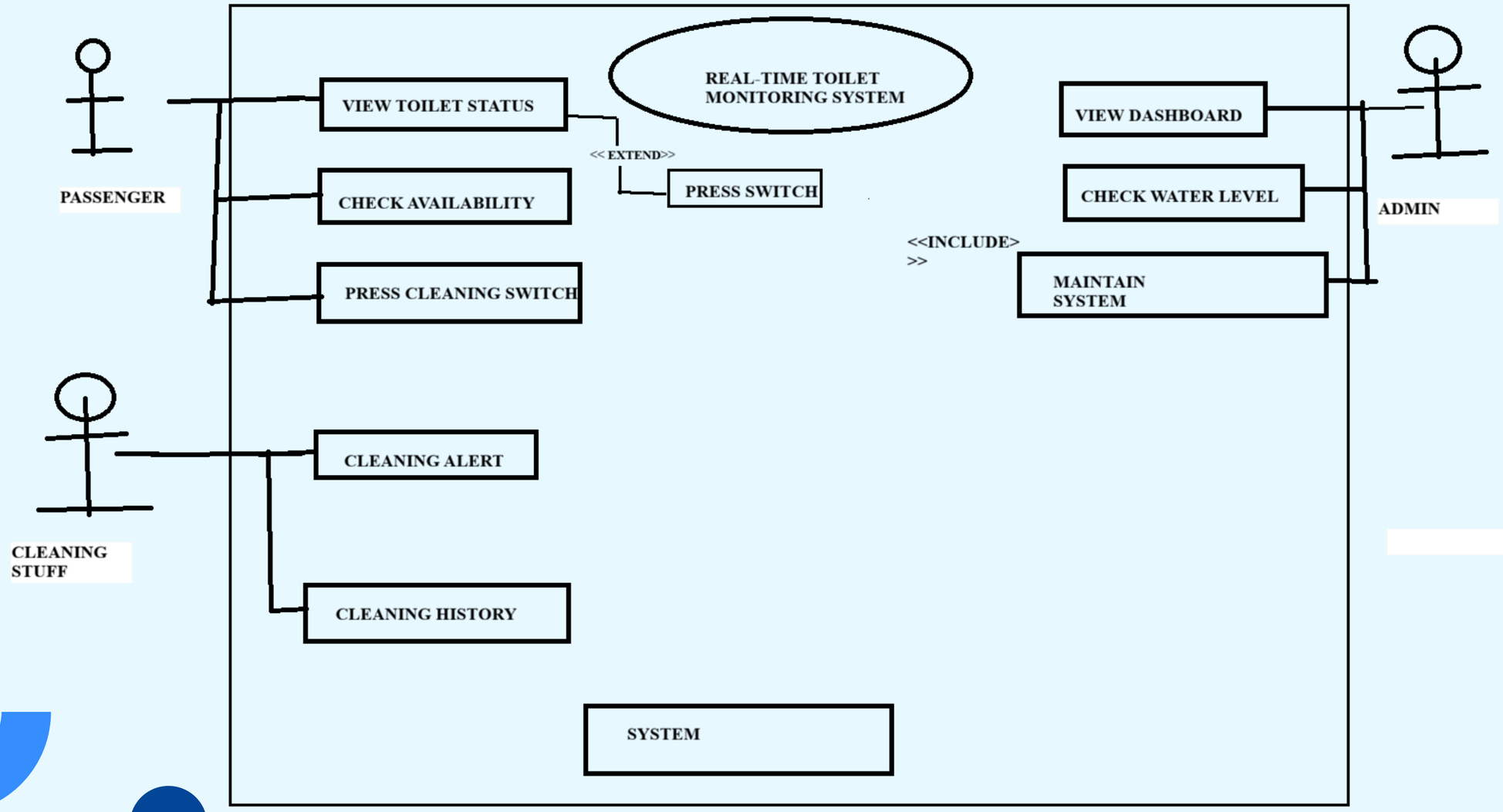
TO-BE PROCESS (PROPOSED SYSTEM)

1. Passenger exits toilet
2. Passenger presses cleaning switch outside door
3. Automated wash cycle starts
4. Floor and toilet are cleaned
5. Toilet status updated to “Clean & Ready”
6. Next passenger uses hygienic toilet

IMPROVEMENTS:

It will help instant cleaning anytime they want to if they feel the place is dirty or unhygienic just by clicking a button outside the door of the toilet. And it will clean the entire toilet space within a small span of time. No extra labour require to monitor or repititive cleaning by them. It will also help in reducing complaints.

USE CASE DIAGRAM



PROPOSED SOLUTION ARCHITECTURE

CORE COMPONENTS:

- PUSH BUTTON SWITCH (OUTSIDE TOILET)
- MICROCONTROLLER (IT WILL CONTROL THAT STATUS UPDATION)
- WATER PUMP
- SOLENOID VALVE
- SPRAY NOZZLES (FLOOR + TOILET BOWL)
- STATUS INDICATOR (LED / DISPLAY)
- POWER SUPPLY (12V / ADAPTER)

WORKING PRINCIPLE:

- SWITCH PRESS → CONTROLLER ACTIVATES PUMP → WATER SPRAYED → STATUS UPDATED

INNOVATION IN THE SYSTEM

User-triggered automated cleaning

- No complex sensors (reduces cost)
- Real-time usability indication
- Minimal electronics
- Can work offline (no internet required)
- Instant cleanliness without any intervention

Key Innovation:

Combining manual intent (switch) with automatic execution, eliminating false sensor readings.

DATA SECURITY

- No personal data collected
- No camera or microphone used
- Optional usage count stored locally
- If IoT is added later
    - Encrypted communication
    - Read-only dashboard
    - No user identification

BENEFITS

For Passengers:

- Passenger will get a better experience in train journeys with hygienic toilets
- Visible toilet status after every use

For Authorities:

- Reduced passenger complaints
- Lower labor cost by hiring less cleaning staff

For Cleaning Staff:

- Less manual effort as it is already cleaned with sprays through sensors
- Focus on maintenance instead of repeated cleaning

CONCLUSION

The proposed Real-Time Cleanliness & Toilet Status Tracker with Automated Cleaning Device is a simple, low-cost, and practical solution to a major public hygiene problem. By using a manual switch-triggered automated wash system, the design avoids complex sensors and reduces cost while ensuring cleanliness and real-time usability. This system is scalable, maintainable, and ideal for transport facilities, especially in developing regions where affordability and reliability are critical.

THANK YOU