



# Overcrowding Detection in Buses Using Sensors

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# Introduction to Overcrowding Issues

## Rush hour crowding

Buses in Indian cities are regularly overcrowded.

## Consequences

Pushing, discomfort, and passenger injuries happen frequently.

## Need for solution

An intelligent detection solution is required to manage and mitigate overcrowding.

# Problem Statement

## Passenger safety is compromised

When passengers crowd near doors, injuries happen

## Current systems is stuck

No affordable or reliable real-time monitoring system available.

## Requirement

A system for real-time overcrowding detection and alerts.





Bus overscroudling pattlesation



# Existing Counting Methods

## Cameras

Expensive and privacy concerns.

## Infrared Sensors

Limited detection distance and everything has to be aligned accurately.

## Manual Counting

Results are never consistent and not reliable.

## Mobile Apps

Not always accurate or time.

# Literature Review Insights

## Sensor types used

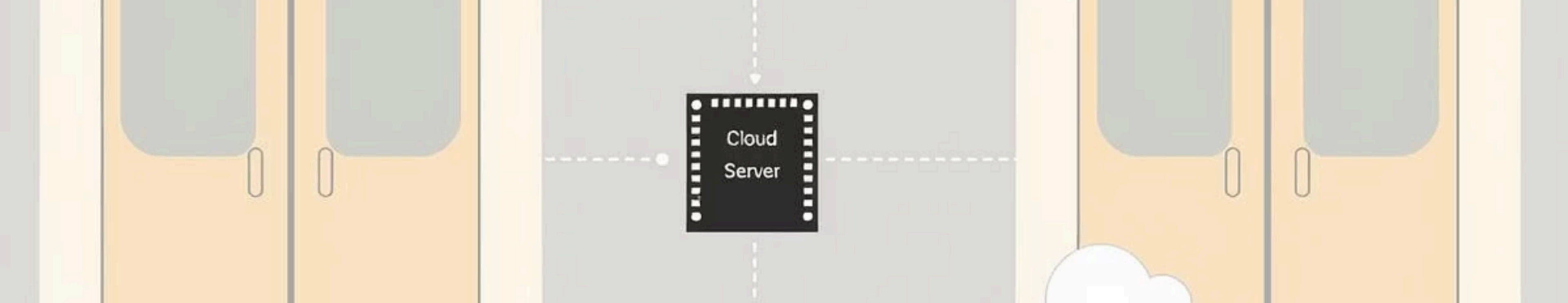
Infrared, ultrasonic, weight sensors are being used in this research.

## Issues

High cost and low accuracy are common barriers.

## Gap Identified

The need for simple, affordable, real-time sensor system is required.



# Proposed Sensor-Based System

Use  
ultrasonic/infrared  
sensors

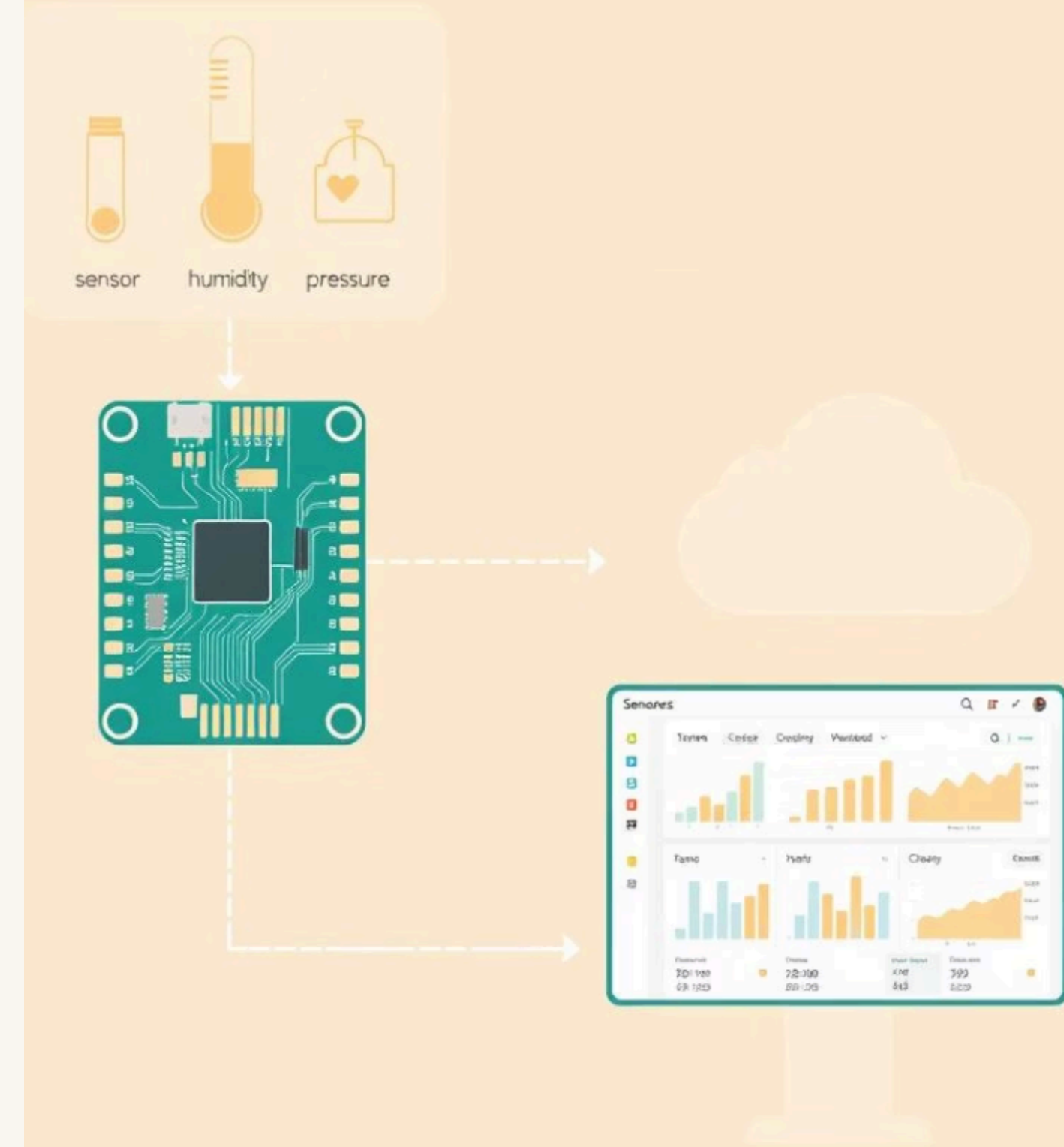
Connect to  
microcontroller  
(Arduino)

Send crowd indication  
to cloud monitoring  
platform.

Sending alerts when  
crowd limit is  
exceeded

# Data Flow and Dashboard Visualization

- 1 Distance Detection using
- 2 Transmit data via MQTT protocol
- 3 Live crowd monitoring on dashboard
- 4 Alerts sent to drivers and passengers



# Project Budget Breakdown

Arduino Uno	\$35
Ultrasonic Sensors (2x)	\$20
Buzzer and Door Module	\$20
Cloud Setup	Free or low-cost
<b>Total Estimated Cost</b>	<b>\$100</b>



# Project Timeline (Gantt Chart)

- 1. Week 1: Analyze problem
- 1. Week 2: Plan and research
- 1. Week 3: Literature review
- 1. Week 4: Design and setup
- 1. Week 5: Report writing and review

# Conclusion and Future Steps

## Benefits of system

Enhances safety by monitoring crowd behavior and status in real-time.

## Impact

Reduction in overcrowding risks for

## Future work

AI/ML for passenger load selling