Intelligent Traffic Management System

A **Smart City** Project

PTIT Hexa

Introduction

Team members

- Vũ Hoàng Phát
- Trần Tuấn Hải
- Đặng Phước Trường Sinh

- Lương Trương Đại
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- Trịnh Thanh Sơn

Supervisor: Huỳnh Trọng Thưa, PhD

We are from Posts and Telecommunications Institute of Technology

I. Current Situation

- **HCM City:**
    - over 4,400 traffic jam
    - 24 hotspot areas.
- **Hanoi capital:**
    - 37 congestion points

Source: tuoitre.vn and VTV in 2023

I. Current Situation

Congestion

Pollution

I. Current Situation

Two main reasons:

Inefficient Traffic Light Timings

Lack of Driver Responsibility

I. Current Situation - Traffic light timing

aboard:

- Rule-based

- Machine learning

- Deep learning

    - YOLO

    - CNN/LSTM

    - RL

in Vietnam:

- methods for timing traffic lights based on traffic density have been applied.

- Traffic police are stationed to manually adjust lights when necessary.

Result: >90% accuracy

I. Current Situation - Traffic light timing

But…

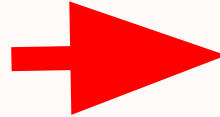# I. Current Situation - Lack of Responsibility

We realize…

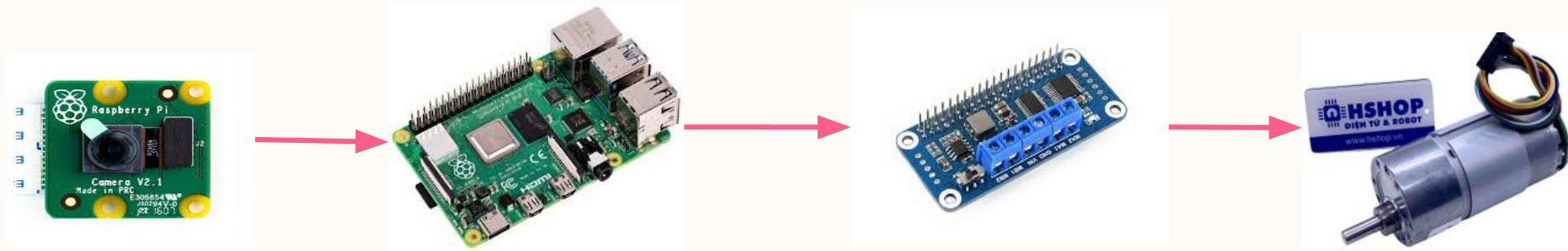# II. Why Our System is Necessary
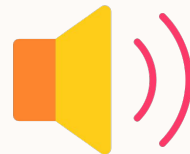

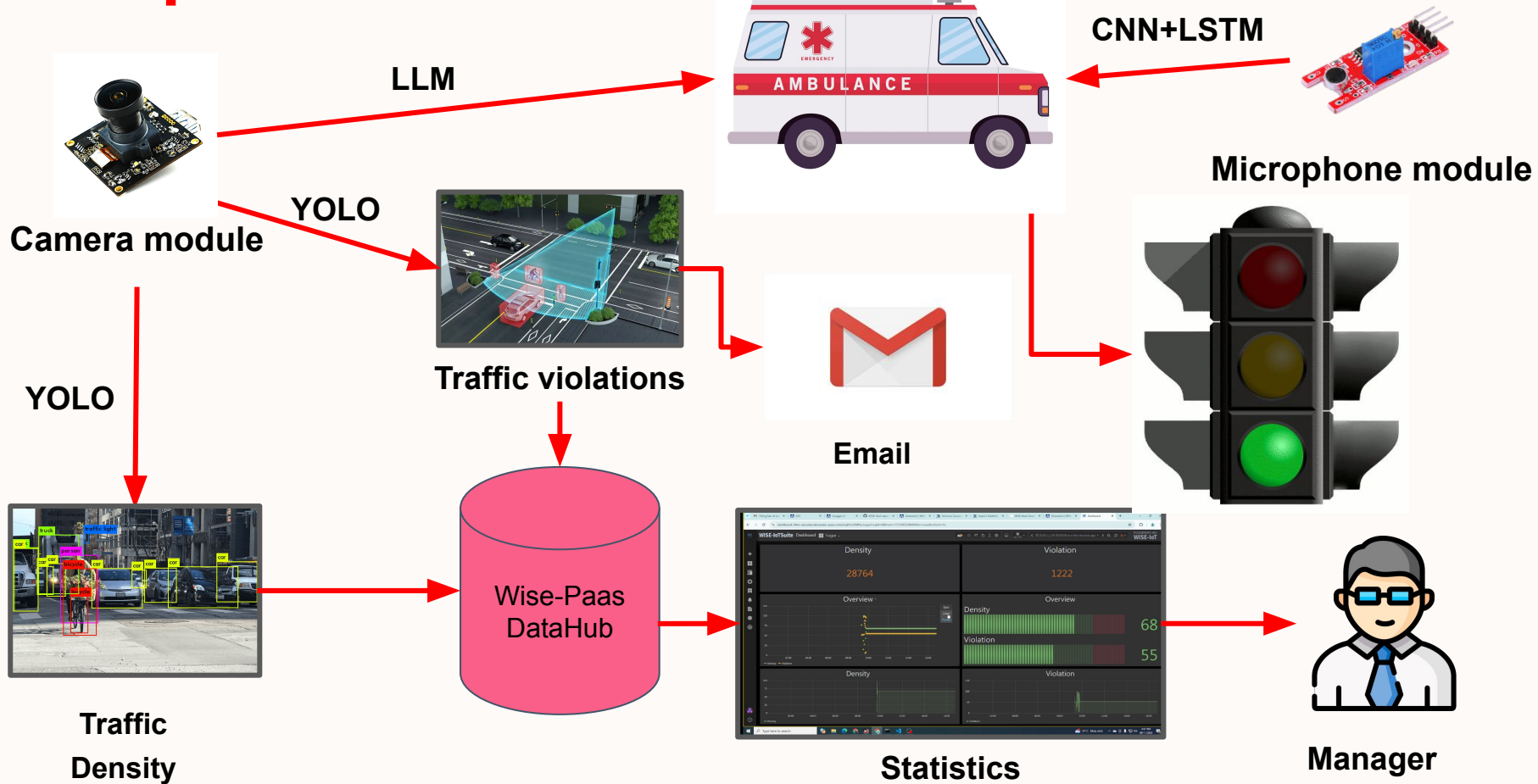Lack of Driver Responsibility

Congestion

Pollution

III. Setup

-The Raspberry Pi capture traffic images using the Camera Module

-Send signals to the Driver HAT to control the motor, allowing a full 180-degree rotation for comprehensive coverage.

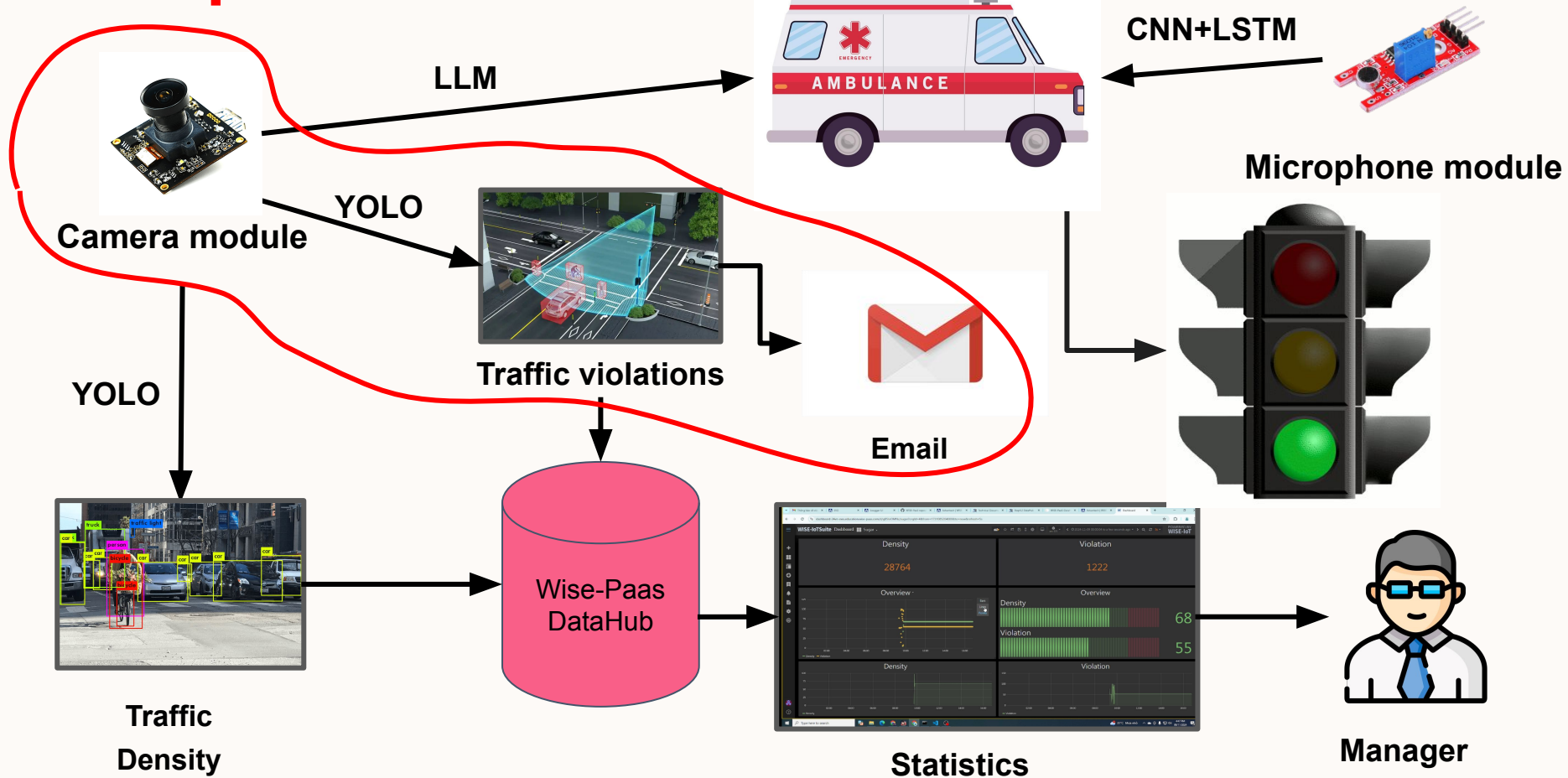# III. Setup

IV. Pipeline

Camera module

LLM

YOLO

YOLO

Traffic violations

Traffic Density

Wise-Paas DataHub

Email

Statistics

CNN+LSTM

Microphone module

Manager

IV. Pipeline - 1

IV. Pipeline - 1

main reasons for traffic congestion

lane encroachment

illegal parking

running red lights

IV. Pipeline - 1

main reasons for traffic congestion

lane encroachment
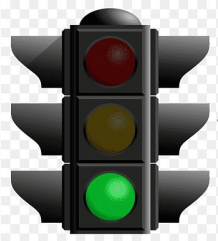
Detect cars/buses/trucks moving at speeds greater than 0 for more than 20 seconds in the motorcycle lane.

Detect motorcycle moving at speeds greater than 0 for more than 20 seconds in the cars/buses/trucks lane.

IV. Pipeline - 1

main reasons for traffic congestion

illegal parking

Detect vehicles with a speed of 0 for more than 5 minutes.
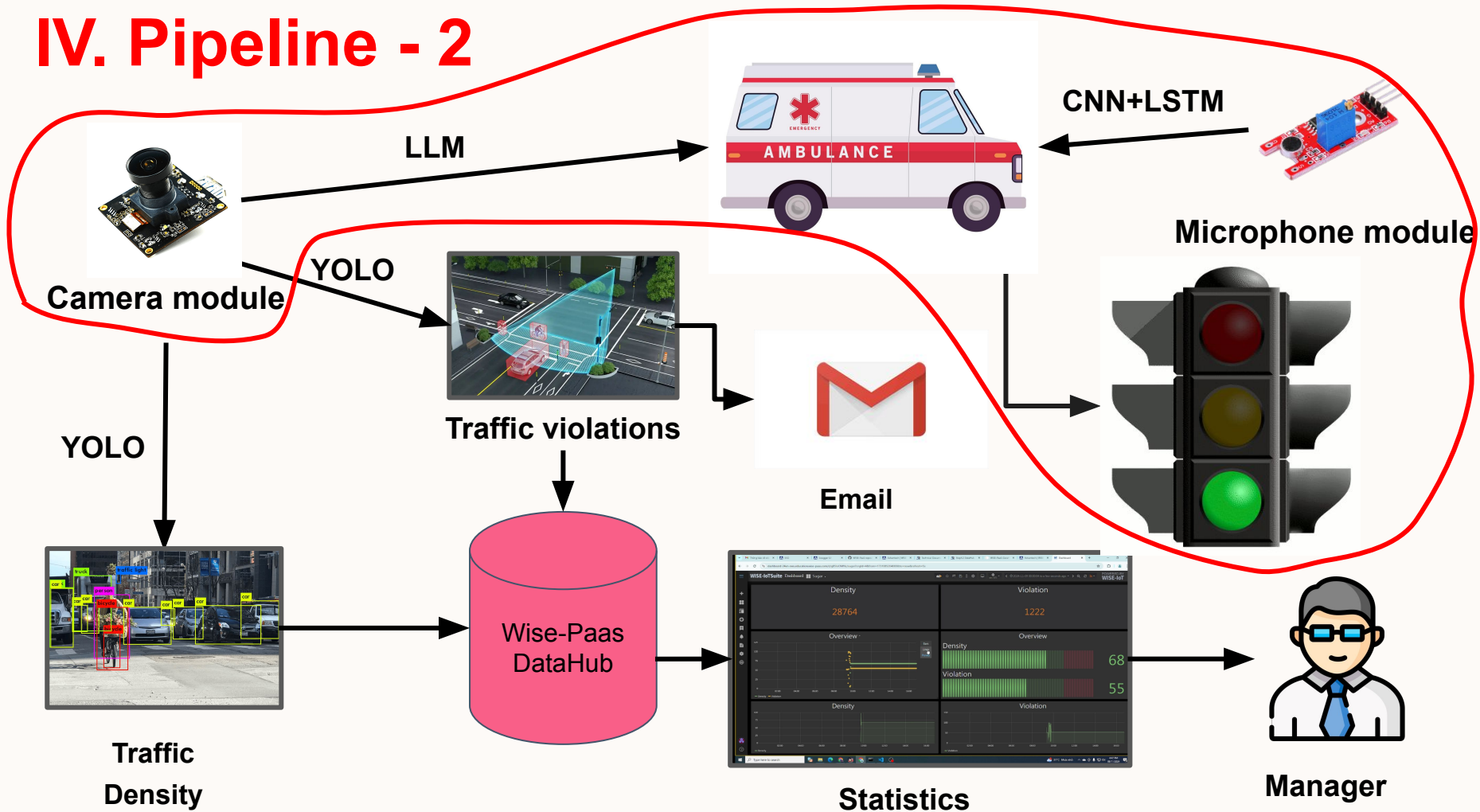
IV. Pipeline - 1

main reasons for traffic congestion

Detect vehicles positioned outside the lane markings during a red light.

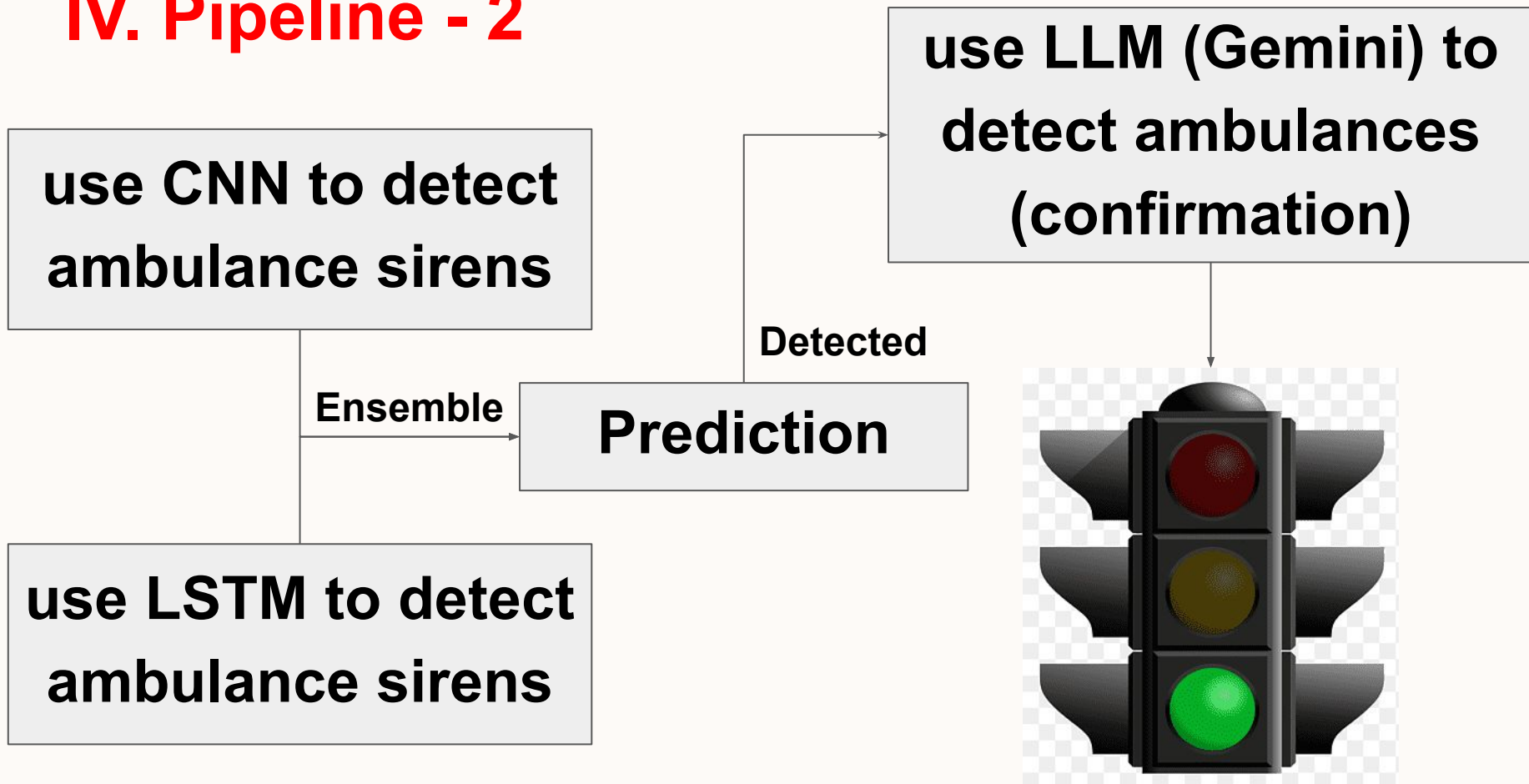running red lights

IV. Pipeline - 2

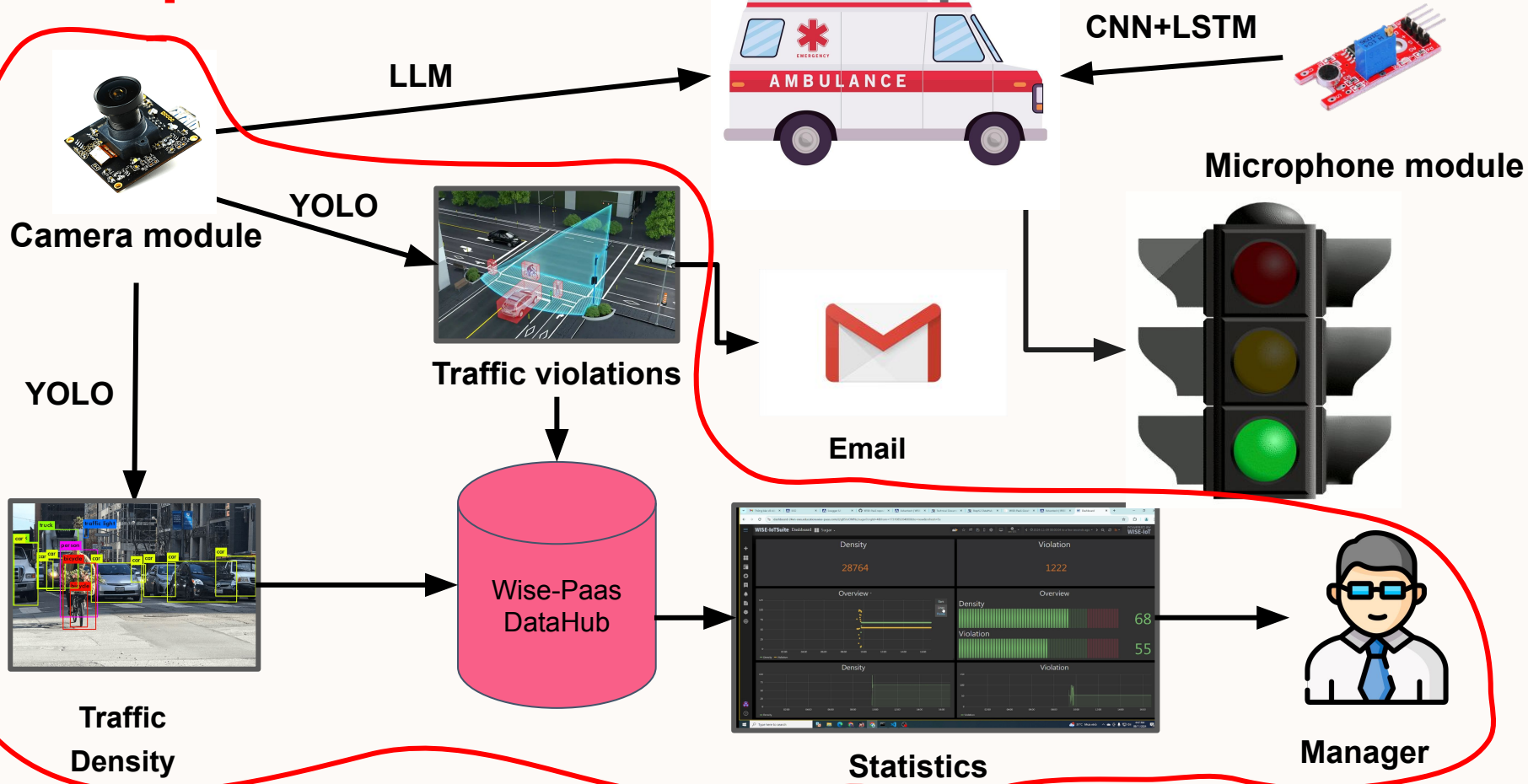**Camera module**

CNN+LSTM

LLM

YOLO

YOLO

Microphone module

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IV. Pipeline - 2

use CNN to detect ambulance sirens

use LLM (Gemini) to detect ambulances (confirmation)

Ensemble

Detected

Prediction

use LSTM to detect ambulance sirens

IV. Pipeline - 3

Camera module

CNN+LSTM

Microphone module

LLM

YOLO

YOLO

Traffic violations

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VII. Our roadmap

Discussion

Thank you
for listening