NUMBER PLATE DETECTION AND POLLUTION MEASUREMENT

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ABSTRACT

This project aims to develop an ANPR and pollution monitoring system using computer vision and machine learning techniques. The proposed system utilizes image processing algorithms to detect and recognize the license plates of vehicles and collects data on their emissions levels. The system can provide real-time data on traffic patterns and pollution levels, enabling authorities to implement effective measures to reduce air pollution. The project has the potential to contribute significantly to environmental sustainability and public health by providing a reliable and efficient means of monitoring and regulating vehicle emissions.

Keyword : - *ANPR - automatic number plate detection*

1. INTRODUCTION

Automatic Number Plate Recognition or ANPR is a technology that uses pattern recognition to 'read' vehicle number plates. In simple terms ANPR cameras 'photograph' the number plates of the vehicles that pass them. This 'photograph' is then fed in a computer system to find out details about the vehicle itself. ANPR consists of cameras linked to a computer. As a vehicle passes, ANPR 'reads' Vehicle Registration Marks – more commonly known as number plates - from digital images, captured through cameras located either in a mobile unit, in-built in traffic vehicles or via Closed Circuit Television (CCTV). The digital image is converted into data, which is processed through the ANPR system. We proposed a method mainly based on edge detection, OCR operation and Finding Rectangles in a Vehicle Image

Owning a vehicle today is not merely a symbol of luxury but has become a necessity. However, considering vehicles, any catastrophic situation can take place. Therefore there is always an urgent need to arrange appropriate measures to increase the safety, security as well as monitor the vehicles to avoid any mishap. It would help us in the situations such as: Instantaneously obtain vehicle details using image processing. Allowing an agency to detect the location of its vehicles. Automatically notify the user if there are traffic violations registered to the vehicle. One such measure is the use of a vehicle tracking system using the GPS (Global Position System). Such a tracking system includes a mechanized device that is equipped in a vehicle. Using software present at an operational base, it helps track the location of the vehicle. This base station is used for monitoring purposes. It is accompanied by maps such as Google maps, Here maps, Bing maps etc for the representation of the location. picture at ANPR can be used to store the images captured by the cameras as well as the text from the license plate, with some configurable to store a photograph of the vehicle.

Systems commonly use infrared lighting to allow the camera to take the any time of the day. A powerful flash is included in at least one version of the intersection monitoring cameras, serving both to illuminate. 9 The picture and to make the offender aware of his or her mistake. ANPR technology tends to be region specific, owing to plate variation from place to place

2. METHEDOLOGY

The Fig -1 shown below explains the complete flow of the methodology along with the objectives
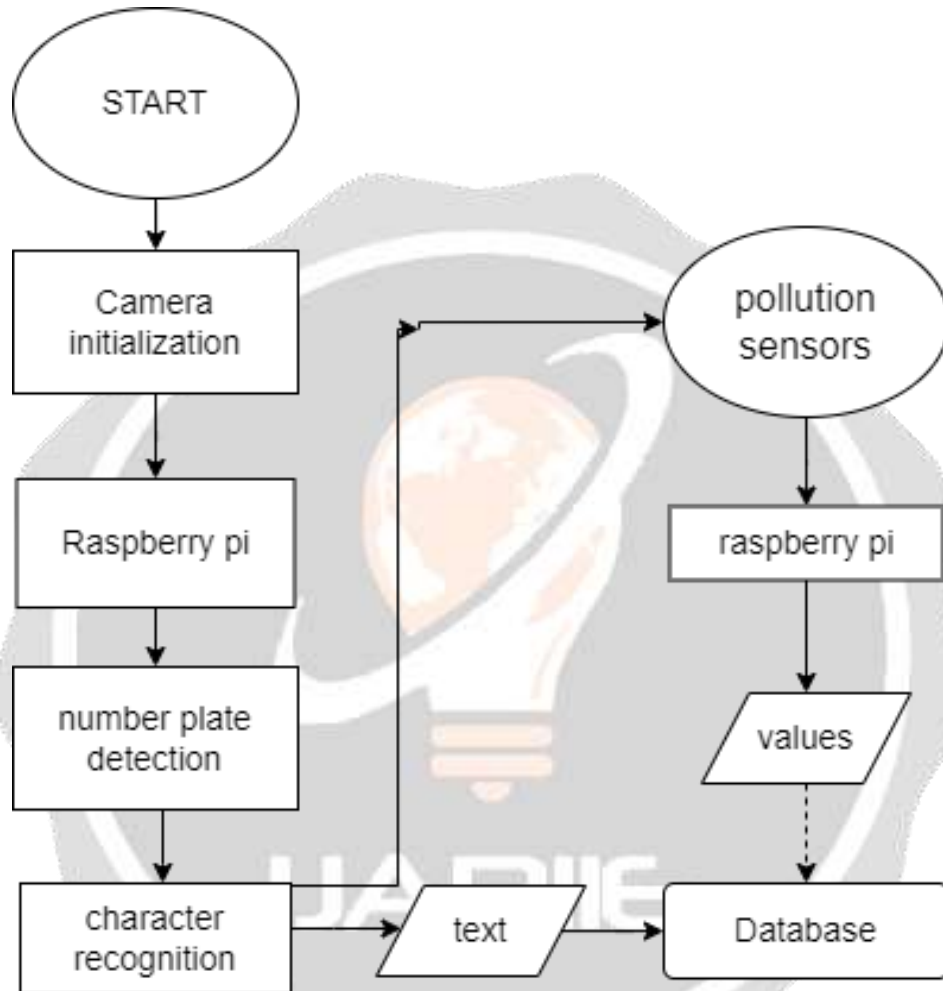
Fig -1: Methodology

2.1 MODULE EXPLANATION

Camera module*: -* A camera module is a self-contained component that incorporates an image sensor, processing circuitry, and an optical system for capturing and processing digital images or videos. It is typically used in electronic devices such as smartphones, tablets, laptops, and digital cameras. The image sensor is the heart of a camera module, and it converts light into electrical signals. The processing circuitry then converts these signals into digital data, which can be stored or transmitted. The optical system, including the lens and other components, focuses the light onto the sensor and can affect factors such as focal length, aperture, and image quality. There are various types of camera modules available, ranging from low-resolution modules for basic applications to high-end modules.

Raspberry pi: - The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation. It is a credit card-sized computer that plugs into a monitor or TV, and it uses a standard keyboard and mouse. The Raspberry Pi is designed to promote the teaching of basic computer science in schools and in developing countries. However, it has also gained popularity among hobbyists, makers, and tinkerers who use it for a wide range of projects, from home automation to robotics to media centers.

The Raspberry Pi is available in various models, with different specifications and price points. The latest model, Raspberry Pi 4, features a quad-core ARM Cortex-A72 CPU, up to 8GB of RAM, Gigabit Ethernet, dual-band Wi-Fi, Bluetooth 5.0, USB 3.0, and two micro-HDMI ports capable of supporting dual 4K displays

MQ 7 GAS SENSOR :- MQ-7 is a gas sensor module that is designed to detect levels of carbon monoxide (CO) in the air. It is commonly used in electronic devices such as air quality monitors, gas leak detectors, and smoke detectors. The MQ-7 sensor module is based on the metal oxide (MOX) sensor technology. It consists of a tin dioxide (SnO_2) sensing element that is heated to a high temperature (around 350°C) to increase its sensitivity to CO gas. When CO gas is present in the air, it reacts with the SnO_2 sensing element, causing its resistance to decrease. The change in resistance is then measured and converted into an electrical signal that can be processed by a microcontroller or other electronic circuitry.

The MQ-7 sensor module is relatively small and easy to integrate into electronic devices. It operates on a low voltage (typically 5V) and has a high sensitivity to CO gas, with a detection range of 20-2000 ppm. However, it may also be sensitive to other gases, such as alcohol and other hydrocarbons, which can affect its accuracy. Overall, the MQ-7 sensor module is a cost-effective and reliable solution for detecting carbon monoxide gas in the air, and it is widely used in a range of applications where air quality monitoring is essential for safety and health reasons.

MQ 135 GAS SENSOR: - MQ-135 is a gas sensor module that is designed to detect levels of several hazardous gases in the air, including ammonia (NH_3), nitrogen oxides (NO_x), benzene, smoke, and other pollutants. It is commonly used in electronic devices such as air quality monitors, gas leak detectors, and smoke detectors. The MQ-135 sensor module is based on the metal oxide (MOX) sensor technology.

 It consists of a sensing element that is made of tin dioxide (SnO_2) and a heating element that heats the sensing element to a high temperature (around 350°C) to increase its sensitivity to the target gases. When the target gas is present in the air, it reacts with the SnO_2 sensing element, causing its resistance to decrease. The change in resistance is then measured and converted into an electrical signal that can be processed by a microcontroller or other electronic circuitry.

Database: - Database refers to a network of remote servers that are accessed over the internet to store, manage, and process data, rather than using a local server or personal computer. In the cloud computing model, users can access computing resources such as processing power, storage, and software applications on demand and pay only for what they use.

 Cloud computing has become increasingly popular in recent years due to its scalability, flexibility, and cost-effectiveness. It allows businesses and individuals to store and access data from anywhere in the world, collaborate with others remotely, and reduce the need for physical infrastructure and maintenance costs.

3. implementation
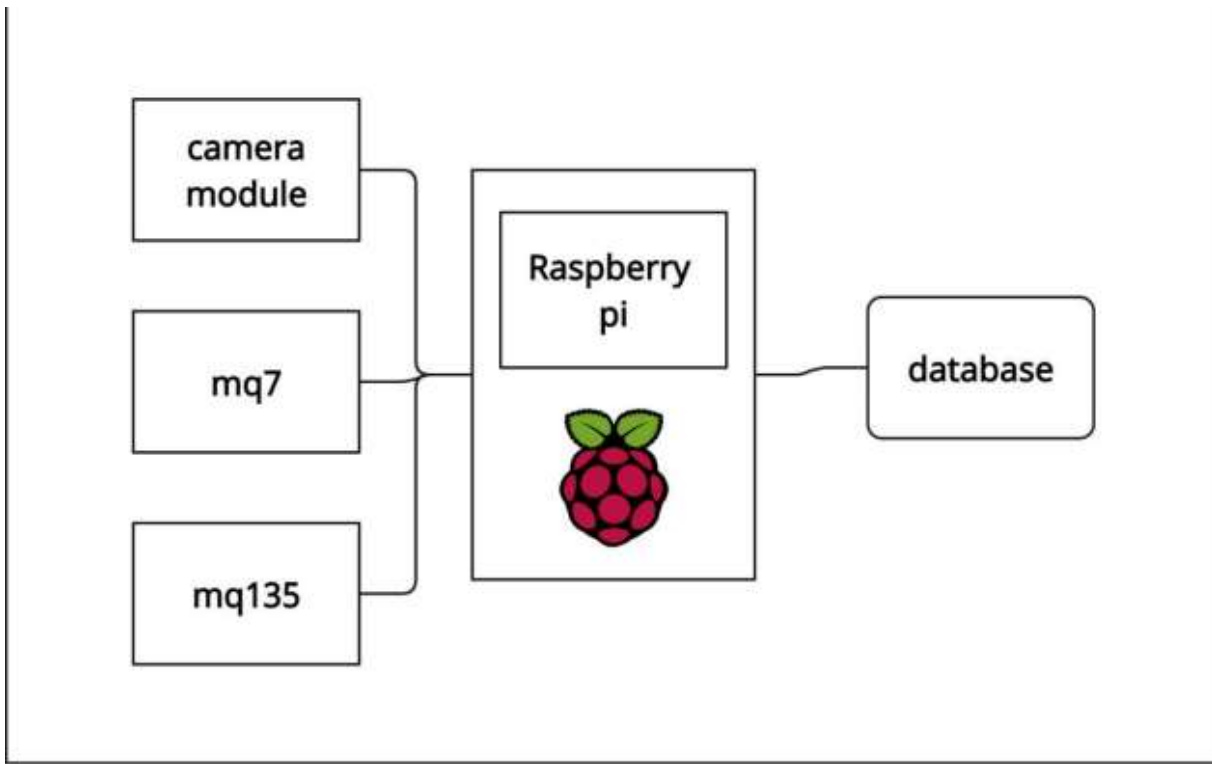

fig -2: Block diagram

3.1 Algorithm

1. recognize the number plate
2. generate text from number plate
3. read pollution sensor values
4. add both values to database
5. display the result

4. CONCLUSIONS

In conclusion, the number plate detection and pollution measurement project has shown promising results in its ability to accurately detect and recognize license plates from images or video feeds, as well as measure the level of pollution emitted by vehicles on the road.

This project has important applications in traffic management, environmental protection, and law enforcement. By detecting and tracking license plates, traffic authorities can identify traffic violations and enforce traffic regulations more effectively. Moreover, by measuring the pollution levels of vehicles, authorities can take steps to reduce harmful emissions and promote cleaner air.

Overall, this project has demonstrated the potential of technology to solve complex social and environmental problems. As such, it represents a valuable contribution to the fields of computer vision, environmental science, and transportation engineering. With further development and refinement, this project has the potential to make a significant impact on society by promoting cleaner, safer, and more efficient transportation systems.

5. REFERENCES

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