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TechnologyName_Phase2

After careful considerations, we have decided to implement the following technologies for our use case

Components Needed:

Infrared Sensors: Infrared sensors are crucial for detecting the presence of vehicles. They are chosen because of their ability to detect heat signatures from vehicles, making them suitable for traffic monitoring.

Microcontroller: We will use the Raspberry Pi 4 as the microcontroller for our project. This choice was made because it offers a more powerful processing capability and flexibility for data analysis, which is essential for real-time traffic management.

Reason for Choosing: Raspberry Pi 4 provides more processing power and versatility, allowing for complex data analysis and real-time decision-making, which is essential in traffic management scenarios.

Communication Module: We will employ Wi-Fi and LoRa (Long Range) communication modules to transmit data. Wi-Fi will handle data transfer within city zones, while LoRa will cover longer-range communication between remote sensors and the central hub.

Reason for Choosing: Wi-Fi is ideal for high-speed, short-range communication within urban areas, while LoRa's long-range capabilities are suitable for covering larger distances, such as highways and rural areas.

Power Supply: To ensure uninterrupted operation, we will use a combination of solar panels and batteries. Solar panels will charge the batteries during the day to power the system at night.

Reason for Choosing: Solar panels coupled with batteries provide a sustainable and reliable power source, reducing the need for frequent maintenance and battery replacement.

Protocols:

MQTT (Message Queuing Telemetry Transport): MQTT will be used for real-time data transmission between sensors and the central server due to its lightweight and efficient publish-subscribe messaging protocol.

HTTP (Hypertext Transfer Protocol): HTTP will be utilized for transmitting data to the Beeceptor cloud platform, ensuring compatibility with web services and ease of integration.

LoRaWAN: LoRaWAN protocol will be implemented for long-range communication, as it offers low-power, long-range capabilities suitable for remote sensor data transmission.

Cloud Platform:

Beeceptor: Beeceptor will serve as the primary cloud platform for data storage, processing, and analysis. It offers simplicity and ease of use for quickly setting up an IoT data endpoint.

Reason for Choosing: Beeceptor provides a straightforward and cost-effective solution for setting up an endpoint to receive and process IoT data, making it a suitable choice for our project's data ingestion needs.

AWS (Amazon Web Services): AWS will be used for advanced data processing, analytics, and additional storage requirements.

Reason for Choosing: AWS's advanced analytics tools and scalability capabilities make it a strong choice for handling in-depth traffic pattern analysis and scaling the system as needed.