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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.