Phase 2: Innovation

Concepts used in this project:

1. Parking Area Full Indicator:

    - When the parking area reaches full capacity, the main entrance gate remains closed, preventing additional vehicles from entering.
    - Vehicles are directed to the next available parking area or facility, ensuring efficient space utilization.

2. IR Sensors for Vehicle Counting:

    - Infrared (IR) sensors are utilized to count both incoming and outgoing vehicles.
    - These sensors provide real-time data on the number of vehicles within the parking area.

3. Status Indicator Lights:

    - Red and green lights serve as status indicators, making it easy for drivers to identify parking slot availability.
    - A red light signifies an occupied parking slot, while a green light indicates a vacant slot.

    1. Driver Assistance:

        - The status lights help drivers efficiently choose available parking slots from a distance, reducing the time spent searching for a spot.

    2. Ultrasonic Sensor Monitoring:

        - Ultrasonic sensors, mounted in the ceiling above parking slots, monitor vehicle occupancy.
        - Multiple sensors enhance accuracy, ensuring that objects obstructing one sensor do not trigger false occupancy readings.
        - The status light changes only when both sensors confirm the presence or absence of a vehicle.

4. Entry and Exit Time Tracking:

    - The system records entry and exit times when vehicles enter and leave parking slots.
    - This data is used to calculate the parking duration, and parking fees are generated accordingly.

5. QR Code Scanners in Parking Slots:

    - Each parking slot is equipped with a QR code scanner.
    - Users generate a QR code through the dedicated parking app, and this code is scanned when they park, allowing for user identification and tracking.

6. Motor-Controlled Slot Toll:

    - Motors control the opening and closing of parking slot toll gates.
    - Access to the slot is granted only when the user scans their QR code or token, confirming payment or authorization.
    - This mechanism ensures only authorized users can access the parking area.

7. User-Friendly Parking App:

    - A mobile app enables users to check real-time parking slot availability.
    - The app helps drivers find vacant slots easily, reducing congestion and wait times.

8. Vehicle Locator Feature:

    - Users can click a button in the app to locate their parked vehicle.
    - The system activates a light above their vehicle, making it easier to locate in the parking area.

9. Data Access for Maintenance:

    - Maintenance personnel can access system data through the app.
    - This access allows them to monitor system health, perform maintenance tasks, and address any issues promptly.

10. Rules and Regulations in the App:

    - The app provides information on parking rules and regulations, ensuring users are informed about guidelines and policies.

Components Used:

1. Arduino
2. RGB LED
3. QR Code scanner
4. Toll gates
5. Ultrasonic Sensor
6. IR sensor
7. LCD Display
8. Parking app
9. Jump wires
10. Buttons