**1. Introduction**

**1.1 Overview**

ParkSense is an **automated parking management system** designed for Asia Pacific College to enhance the efficiency of the basement parking facility. The system integrates **Arduino sensors, real-time monitoring displays, and a web-based dashboard** to improve parking space utilization and reduce manual supervision.

**1.2 System Features**

* **Real-time Parking Slot Monitoring**
* **Automated Entry & Exit Detection**
* **Centralized Dashboard for Analytics**
* **Display Boards for Available Slots**

**2. System Components**

**2.1 Hardware Requirements**

* **Arduino Uno / Arduino Wi-Fi** (for sensor integration)
* **Ultrasonic Sensors** (detects vehicle entry, exit and slot)
* **Monitor Display** (shows available slots)
* **Server/Computer** (stores and processes data)
* **Internet Connectivity** (for cloud-based monitoring)

**2.2 Software Requirements**

* **Arduino IDE** (for sensor programming)
* **MongoDB** (database for vehicle tracking)
* **Django Web Framework** (backend system)
* **HTML, CSS, JavaScript** (frontend interface)
* **Dashboard & Analytics Module**
* **Redis** (for caching and improving real-time data retrieval efficiency)

**3. User Guide**

**3.1 Accessing the System**

1. Open the ParkSense **web dashboard**.
2. Log in using your credentials.
   * **BMO Admin**: Give user role, manage data, export reports
   * **BMO Staff:** Monitor reports and oversee system status.

**3.2 Checking Parking Availability**

1. The **entrance display board** will show available slots.
2. **Users** can check parking availability before entering.

**3.3 Managing Entry and Exit**

1. When a vehicle **parks**, the sensor updates the slot count.
2. The system logs **slot entry time**.
3. When a vehicle **exits**, the sensor updates available slots.
4. The system logs **exit time** and removes the vehicle from the database.

**3.4 Viewing Reports & Analytics**

1. **BMO Staff** can log into the admin dashboard.
2. Navigate to **Reports > Parking Usage**.
3. View **daily, weekly, and monthly** slot utilization trends.

**4. Troubleshooting & FAQs**

**4.1 Common Issues & Solutions**

|  |  |  |
| --- | --- | --- |
| **Issue** | **Possible Cause** | **Solution** |
| No parking slot updates | Sensor not detecting vehicles | Check if the sensors are powered and properly installed |
| Dashboard not loading | Internet connectivity issue | Ensure Wi-Fi is working and the server is online |
| Incorrect slot count | Data synchronization delay | Refresh dashboard or restart system. Check also the hardware if it’s damaged |

**4.2 Frequently Asked Questions**

**Q: What happens if the sensors fail?**

* Manual checking of the hardware and base on analytics

**Q: How secure is the system?**

* Coordinate with the ITRO and **role-based access** ensure data security.

**Q: Can I access reports remotely?**

* Yes, authorized users can log in via the web dashboard.

**5. Contact Support**

For technical assistance, contact **Asia Pacific College IT Support, Team ImPossible** or refer to the official **GitHub repository** for updates and documentation.