Stables: The Parking App for Vaqueros

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Background

The growing population at the UTRGV Edinburg campus has led to an extreme parking issue. A majority of students drive around in circles hoping to find a parking spot. This usually leads to tardiness, congestion, and in some cases car collisions. This has become a large problem for Vaqueros and calls for an efficient solution to simplify the lives of UTRGV students on campus.

Problem/ Opportunity Statement

Our developing app, Stables, addresses campus parking inefficiencies by offering users real-time information about parking availability and personalized features to improve their parking experience.

Proposed Solution

As a solution, we are proposing a cross-platform mobile app created using Flutter, named Stables. Stables will provide real-time parking availability through an interactive map, role-based access, and a reward system for users who provide real-time updates.

The **interactive map** will be made up of manually created parking lot maps using publicly available satellite images. The map will display parking availability in real time using color-coded markers (green indicates available spots and red represents taken spots). Additional information about each parking lot will be displayed, including total number of available spots, the lot's current capacity, and the location of where the user last parked their vehicle.

For **data collection**, the app will use simulated sensor data to show real-world functionality. This will allow data collection for every car, regardless of if the user is using the

app. In an idealized version, sensors would be placed in each parking lot to keep track of available parking spots in real time and RFID tags would be placed in UTRGV parking permits, this would track vehicles entering and exiting lots, cross-referencing this data with sensor readings for accuracy.

The app will utilize **user roles**, each user will be assigned roles based on their parking permits (Zone 1, Zone 2, Zone 3). Campus security would be given access to an admin dashboard that would allow them to manually change availability in case of any reported errors. The dashboard will provide extra analytics about parking trends.

For **authentication**, a mock database will simulate UTRGV authentication. User register by entering the unique ID found on parking permits. Credentials are confirmed and they are given app access.

A **reward point system** will be used to encourage app engagement. Users will earn points for reporting incorrect parking availability, parking in less-crowded lots, and for consistent app usage.

Capstone Merit

This senior project proposal will demonstrate our ability to work with diverse technologies. The project incorporates diverse technologies:

- **Frontend**: Flutter for cross-platform compatibility.
- **Backend**: Node.js for API development and data management.
- **Database**: SQLite for parking data and user information.
- **Data Simulation**: JSON to mimic real-world sensor outputs.
- **Mapping**: Custom maps rendered with Flutter's CustomPaint widget.

The challenges we will face include designing a database for parking and user data, integrating simulated sensor data, and ensuring the app is user-friendly. Stables showcases our ability to tackle real-world problems using technical skills to finalize a solution.