PROJECT Proposal

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Title of your proposal:
ParkinUP: An Automated License Plate–Based Parking Time and Fee Monitoring System

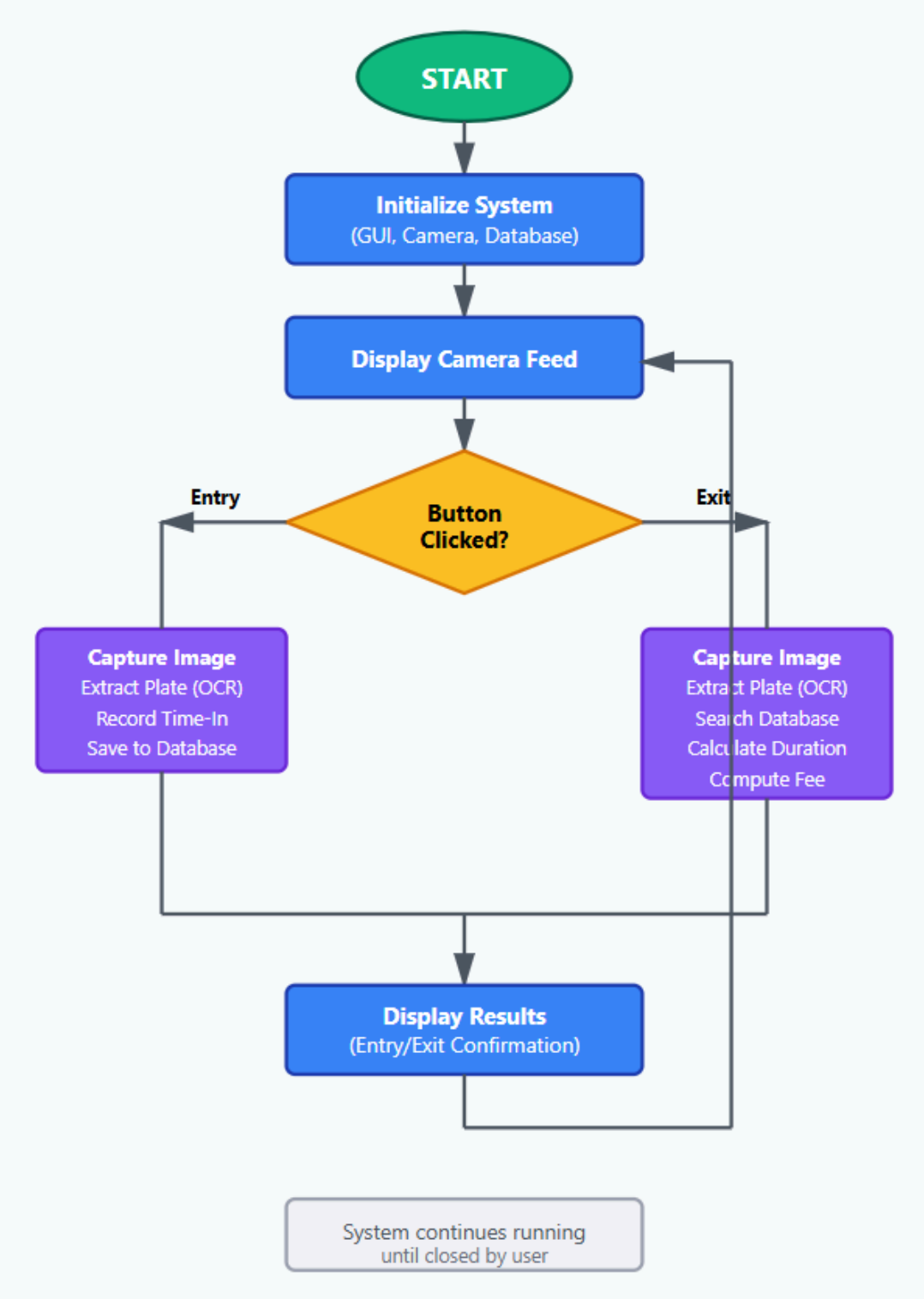
Description:
ParkinUP is a mobile and system-based application designed to automate the monitoring of parked vehicles through license plate recognition. The system records the license plate number, the time a vehicle enters, and the time it exits the parking facility. By computing the total parking duration, the system is able to automatically calculate the corresponding parking fee.
This project aims to reduce manual work, improve accuracy in billing, and provide a more efficient parking experience by using technology-based solutions commonly applied in modern smart parking systems.

Algorithm:
Pseudocode (Python with Tkinter/PyQt):

```
# Import Libraries
import tkinter, cv2, pytesseract, sqlite3, datetime

# Initialize System
CREATE GUI window
SET parking_rate = 10.00
INITIALIZE camera
CONNECT to database

# Main Loop
WHILE system_running:
   DISPLAY camera_feed

   IF user_clicks "Record Entry":
      CAPTURE image from camera
      plate_number = EXTRACT_PLATE(image)

      IF plate_number detected:
         time_in = GET_CURRENT_TIME()
         SAVE_TO_DATABASE(plate_number, time_in)
         DISPLAY "Entry Recorded"
      ELSE:
         DISPLAY "Error: Plate not detected"

   IF user_clicks "Record Exit":
      CAPTURE image from camera
      plate_number = EXTRACT_PLATE(image)
```

```
        IF plate_number detected:
            record = SEARCH_DATABASE(plate_number)

            IF record exists:
                time_out = GET_CURRENT_TIME()
                duration = CALCULATE_DURATION(record.time_in, time_out)
                fee = duration * parking_rate

                UPDATE_DATABASE(time_out, duration, fee)
                DISPLAY receipt(plate, time_in, time_out, duration, fee)
            ELSE:
                DISPLAY "Error: No entry record found"

# Helper Function
FUNCTION EXTRACT_PLATE(image):
    gray_image = CONVERT_TO_GRAYSCALE(image)
    edges = DETECT_EDGES(gray_image)
    contours = FIND_CONTOURS(edges)

    FOR each contour:
        IF contour is rectangular:
            plate_region = EXTRACT_REGION(contour)
            text = OCR_RECOGNITION(plate_region)
            IF VALIDATE_PLATE_FORMAT(text):
                RETURN text
    RETURN None
```

Flowchart:



Expected output:
After processing, the system will display and store the following information:

- Detected license plate number
- Recorded Time-In and Time-Out
- Total parking duration

- Automatically computed parking fee

Sample Output Table:

Plate Number	Time-in	Time-out	Duration	Parking Fee (₱10/hour)
PUP-12345	08:00 AM	10:00 AM	2 hours	₱20.00
ABC-7890	09:30 AM	01:45 PM	4 hours 15 mins	₱42.50
XYZ-5432	02:00 PM	02:30 PM	30 mins	₱5.00

Sample Receipt Output:

ParkinUP

Automated Parking System

Plate Number:	PUP-12345
Time-In:	08:00 AM
Time-Out:	10:00 AM
Duration:	2 hours
Rate:	₱10.00/hour
TOTAL FEE:	**₱20.00**

Thank you for parking with us!

Transaction ID: TXN-2024-001