GPS-BASED TOLL COLLECTION SYSTEM

LAB REPORT

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BONAFIDE CERTIFICATE

This is to certify that the project **GPS-BASED TOLL COLLECTION SYSTEM** with Register No. **RA2111003010227, RA2111003010238, RA2111003010234** is the bonafide work done by **MANAS GOEL , JASWANTH YALAVARTHI , SHRESTHA ROY** II Year/IV Sem B.Tech Degree Course in the **Practical Software Software Engineering and Project Management 18CSC206J** in **SRM INSTITUTE OF SCIENCE AND TECHNOLOGY,** Kattankulathur during the academic year 2022 – 2023.

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ABSTRACT

A GPS-based toll collection system is a technology that enables the automatic payment of tolls by using GPS to track and identify vehicles passing through toll plazas. This system aims to reduce traffic congestion and waiting time at toll booths, as well as increase transparency and accountability in toll collection. The system works by installing GPS sensors at toll booths that communicate with an electronic payment system. When a vehicle approaches the toll plaza, its GPS location is identified, and the toll fee is automatically deducted from the driver's account. This abstract highlights the key features of GPS-based toll collection systems and their benefits, including increased efficiency, reduced traffic congestion, and improved revenue collection for toll operators.

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CONCLUSION

GPS-based toll collection systems have become increasingly popular
ound the world due to their numerous advantages over traditional toll collection methods. These systems are based on GPS technology, which enables the collection of tolls from vehicles automatically without the need for physical barriers or toll booths. The benefits of this technology include reduced traffic congestion, increased efficiency, reduced costs, and improved convenience for drivers.

One of the major advantages of GPS-based toll collection systems is their ability to reduce traffic congestion. By eliminating the need for toll booths or physical barriers, these systems allow vehicles to pass through tolling points without having to slow down or stop. This can help to reduce traffic congestion and improve the flow of traffic on highways and other busy roads.

Another benefit of GPS-based toll collection systems is their increased efficiency. With these systems, tolls can be collected automatically, without the need for manual intervention or the use of cash or tokens. This reduces the time required for toll collection, which in turn can help to reduce travel times for drivers and improve overall efficiency.

In addition to these benefits, GPS-based toll collection systems also offer cost savings for toll operators. With fewer toll booths and physical barriers required, the cost of infrastructure can be significantly reduced. Additionally, the use of automated toll collection can help to reduce staffing costs and improve overall operational efficiency.

For drivers, GPS-based toll collection systems offer increased convenience and ease of use. With these systems, there is no need to carry cash or tokens, or to stop and wait in line at toll booths. Instead, tolls are collected automatically, making the entire process faster and more convenient.

Despite these advantages, GPS-based toll collection systems are not without their challenges. For example, the initial cost of implementing these systems can be high, and there may be issues with accuracy and reliability in some cases. Additionally, there are concerns around privacy and security, as the use of GPS technology can potentially be used to track the movements of vehicles and drivers.

Overall, however, GPS-based toll collection systems have proven to be an effective and efficient method of toll collection, offering numerous benefits for both toll operators and drivers. As technology continues to advance, it is likely that these systems will become even more advanced and sophisticated, further improving their accuracy, reliability, and overall effectiveness.

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Appendix

CODE:
PYTHON:

```
import math



from flask import Flask, render_template, request


app = Flask(__name__)


__author__ = 'kai'


vehicle_database = {} # dictionary to store the vehicle details

@app.route('/regiVehi', methods=['POST'])

def register_vehicle():

   car_no = request.form['carno']

   owner = request.form['owner']

   model = request.form['model']

   vehicle_database[car_no] = {"model": model, "owner": owner, "payment_history": [],
"tot_tax": 0}

   return 'vehicle number %s has been registered successfully under %s name.<br/> <a
href="/">Back Home</a>' % (car_no, owner)


@app.route('/checkPayHist', methods=['POST'])

def check_payment_history():

   car_no = request.form['carno']

   if car_no in vehicle_database:

      payment_hist = vehicle_database[car_no]['payment_history']

      if len(payment_hist)>0:

         hist=''

         for payment in payment_hist:

            hist = hist + '      * Date : %s, Amount paid :
%.2f\n'%(payment['date'],payment['amount'])

         return "Payment History:\n%s <br/> <a href='/'>Back Home</a>"% (hist)

      else:

         return "No payment history found for the vehicle %.<br/><a href='/'>Back Home</a>"
```

```
% (car_no)
    else:
        return "Vehicle numbered %s not found in database.<br/><a href='/'>Back Home</a>" %
(car_no)


@app.route('/checkTaxAmount', methods=['POST'])
def check_tax_amount():
    car_no = request.form['carno']
    if car_no in vehicle_database:
        initial_longitude = float(request.form['inlo'])
        initial_latitude = float(request.form['inla'])
        final_longitude = float(request.form['fnlo'])
        final_latitude = float(request.form['fnla'])
        distance = math.sqrt((final_longitude-initial_longitude)*2 + (final_latitude-
initial_latitude)*2)
        tax = distance * 0.5
        vehicle_database[car_no]['tot_tax']+=tax
        return "Tax amount to be paid: Rs. %.2f <br/> Payment link : <a href='/rendDet'>click
Here</a><br/><a href='/'>Back Home</a>" % (vehicle_database[car_no]['tot_tax'])
    else:
        return "vehicle not found in databse.<br/ ><a href='/'>Back Home</a>"
@app.route('/rendDet')
def rend():
        return render_template('taxClearance.html')


@app.route('/taxClear', methods=['POST'])
def taxPayment():
        car_no = request.form['carno']
        taxp = vehicle_database[car_no]["tot_tax"]
        if car_no in vehicle_database:
                payment = {"date": "24-Apr-2023", "amount": vehicle_database[car_no]['tot_tax']}
                vehicle_database[car_no]["payment_history"].append(payment)
                vehicle_database[car_no]["tot_tax"]=0
                return "Total due tax paid is %.2f.</br>Payment completed!.<br/><a href='/'>Back
Home</a>" % (taxp)
        else:
```

```
            return "vehicle not found in database.<br/><a href='/'>Back Home</a>"


@app.route('/showDet', methods=['POST'])
def show_vehicle_details():
      car_no = request.form["carno"]
      if car_no in vehicle_database:
            v = vehicle_database[car_no]
            hist=''
            for x in vehicle_database[car_no]["payment_history"]:
                  hist+="       * Date : %s, Amount paid : %s.\n" % (x['date'], x['amount'])
            return "owner name : %s<br/>car model : %s<br/>payment history for this vehicle : %s<br/>total due tax on this vehicle : %.2f<br/><a href='/'>Back Home</a>" % (v["owner"], v["model"], hist, v["tot_tax"])
      else:
            return "Vehicle not found in database. <a href='/'>Back Home</a>"


@app.route('/')
def index():
   return render_template('index.html')


@app.route('/submitted', methods=['POST'])
def hello():
   choice = request.form['choice']
   if choice == "1":
      return render_template('regiVehicle.html')
   elif choice == "2":
      return render_template('checkPayHist.html')
   elif choice == "3":
      return render_template('checkTaxAmount.html')
   elif choice == "4":
      return render_template('showDet.html')
   elif choice == "5":
      return "<h1>Thank you for using our toll calculation and payment system!</h1><br/><a href='https://google.com'>click to exit page</a>"
   '''return 'Hello %s have fun learning python <br/>
        <a href="/">Back Home</a>' % (choice)'''
```

```
if __name__ == '__main__':
    app.run(host = '0.0.0.0', port = 3000)
```

HTML :

```
<html>
<head>
    <title>Toll Calculation and Payment Program</title>
    <style>
        /* Inline css to style the page */
        body {
            font-family: Arial, sans-serif;
            background-color: lightblue;
        }
        h1 {
            color: white;
            text-align: center;
        }
        p {
            color: black;
            font-size: 18px;
        }
        ul {
            list-style-type: none;
            margin: 0;
            padding: 0;
        }
        li {
            display: inline-block;
            margin: 10px;
            padding: 10px;
            border: 2px solid white;
            border-radius: 10px;
            background-color: green;
            color: white;
        }
        form {
            display: flex;
            justify-content: center;
            align-items: center;
        }
        label {
            margin-right: 10px;
        }
        input[type=number] {
            width: 50px;
        }
        input[type=submit] {
            margin-left: 10px;
```

```
            background-color: green;
            color: white;
            border: none;
            border-radius: 5px;
        }
    </style>
</head>
<body>
    <h1>Welcome to the toll calculation and payment program.</h1>
    <p>Please choose an option from the menu:</p>
    <ul>
        <li>1. Register the vehicle and take input of car number and model</li>
        <li>2. Check payment history</li>
        <li>3. Check the tax amount to be paid and show proceed to pay as
output</li>
        <li>4. Show vehicle details</li>
        <li>5. Exit</li>
    </ul>
    <form action="/submitted" method="post">
        <label for="choice">Enter your choice:</label>
        <input type="number" id="choice" name="choice" min="1" max="5"/>
        <input type="submit" value="Submit"/>
    </form>
    <script>
        // Inline javascript to validate the user's choice
        // Get the form element
        var form = document.querySelector("form");
        // Add an event listener for submit event
        form.addEventListener("submit", function(event) {
            // Get the choice element
            var choice = document.getElementById("choice");
            // Get the choice value
            var value = choice.value;
            // Check if the value is valid
            if (value < 1 || value > 5) {
                // Prevent the form from submitting
                event.preventDefault();
                // Alert the user
                alert("Please enter a valid choice between 1 and 5.");
                // Clear the choice value
                choice.value = "";
                // Focus on the choice element
                choice.focus();
            }
        });
    </script>
</body>
</html>
```

```html
<html>
<head>
    <title>Vehical tax amount</title>
    <link rel="stylesheet" type="text/css" href="static/styling.css">
</head>
<body>
    <h1>Welcome to the toll calculation and payment program.</h1>
    <form action="/checkTaxAmount" method="post">
        <label>Enter vehicle details:</label><br/>
        <p>enter vehicle number : </p>
        <input type="text" id="carno" name="carno"/><br/>
        <p>enter initial longitude : </p>
        <input type="text" id="inlo" name="inlo"/><br/>
        <p>enter initial latitude : </p>
        <input type="text" id="inlo" name="inla"/><br/>
        <p>enter final longitude : </p>
        <input type="text" id="inlo" name="fnlo"/><br/>
        <p>enter final latitude : </p>
        <input type="text" id="inlo" name="fnla"/><br/>
        <input type="submit" value="Submit"/>
    </form>
</body>
</html>
```

```css
    <style>
        /* Inline css to style the page */
        body {
            font-family: Arial, sans-serif;
            background-color: lightblue;
        }
        h1 {
            color: white;
            text-align: center;
        }
        p {
            color: black;
            font-size: 18px;
        }
        ul {
            list-style-type: none;
            margin: 0;
            padding: 0;
        }
        li {
            display: inline-block;
            margin: 10px;
            padding: 10px;
            border: 2px solid white;
            border-radius: 10px;
            background-color: green;
```

```
            color: white;
        }
        form {
            display: flex;
            justify-content: center;
            align-items: center;
        }
        label {
            margin-right: 10px;
        }
        input[type=number] {
            width: 50px;
        }
        input[type=submit] {
            margin-left: 10px;
            background-color: green;
            color: white;
            border: none;
            border-radius: 5px;
        }
    </style>
</head>
<body>
    <h1>Welcome to the toll calculation and payment program.</h1>
    <form action="/checkPayHist" method="post">
        <label for="choice">Enter vehicle details:</label>
    <p>enter vehicle number : </p>
        <input type="text" id="carno" name="carno"/>
        <input type="submit" value="Submit"/>
    </form>
</body>
</html>
```