

PROBLEM STATEMENT:

GPS TOLL-BASED SYSTEM SIMULATION USING PYTHON

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GPS TRACKER USING PYTHON

A GPS tracker is a device designed to calculate precise and accurate locations generally by receiving data from satellite sources and computing the exact coordinates of the desired location. To achieve this, we will utilize the **requests** library in Python, along with some other necessary libraries. We are also going to use **folium**, a Python library help us build the map that we are going to display at the end to the user.

This article covers all the steps with some necessary requirements on how we can make a GPS tracker in Python with ease. We will cover all the basic steps with clear and concise explanations.

Python is an interpreted programming language, which is slightly different than something like Arduino or programming in C. The program you write isn't compiled as a whole, into machine code, rather each line of the program is sequentially fed into something called a Python interpreter. Once you get the Python interpreter installed, you can write scripts using any text editor. Your program is run by simply calling your Python script and, line by line, your code is fed into the interpreter. If your code has a mistake, the interpreter will stop at that line and give you an error code, along with the line number of the error.

This application may be useful for

- Track your device online in real time;
- Record and review tracks, generate reports;
- Configure various kinds of events and notifications;
- Assign or schedule various tasks and delivery times;
- Communicate with the person at the other end using built-in chat function;
- Make photos and upload to user account with current location;
- Possibility to change tracking interval;
- If Internet is lost, application will save locations and upload them later;
- Possibility to control application via web browser using commands;
- Password protection;
- Application runs in background.

GPS Tracker Using Python

Below is the step-by-step procedure by which we can track the user location using its IP address in [Python](#):

Step 1: Install Necessary Libraries/Packages

In this step, we will install all the necessary packages or libraries required to create a GPS tracker in Python.

```
pip install folium
pip install requests
pip install selenium
pip install datetime
```

Step 2: Import Libraries

In this step, we will import all necessary libraries that are required in this project.

- Python3

```
#Importing all necessary Libraies
```

```
import requests from selenium import webdriver
```

```
import folium
```

```
import datetime
```

```
import time
```

Step 3: Creating a method to get the user coordinates.

In this step, we will be creating a user defined function to the user coordinates (i.e. longitude and latitude). We are requesting for users **ip address** info. This will return us a **json file**. Through this **json file**, we will extract user latitude, longitude, city and state.

- Python3

```
#this method will return us our actual coordinates
```

```
#using our ip address
```

```
def locationCoordinates():
```

```
    try:
```

```
        response = requests.get('https://ipinfo.io')
```

```

data = response.json()

loc = data['loc'].split(',')

lat, long = float(loc[0]), float(loc[1])

city = data.get('city', 'Unknown')

state = data.get('region', 'Unknown')

return lat, long, city, state

#return lat, long

except:

    #Displaying ther error message

    print("Internet Not avialable")

    #closing the program

    exit()

    return False

```

Step 4: Creating the object of the necessary library

In this step we will define a method **“gps_locator()”** with no parameter. Then, we will create a folium map object under

- Python3

```

def gps_locator():

    obj = folium.Map(location=[0, 0], zoom_start=2)

```

Step 5: Fetching Coordinates, City and State and Map Generation

In this step, we will fetch coordinates from our created method i.e. **locationCoordinates()**. From this coordinates, we will generate a map pointing to our

exact location with the help of folium library. We will consider doing all this work under try block to avoid any undesirable errors.

- Python3

try:

```
lat,long,city,state = locationCoordinates()

print("You Are in {},{}".format(city,state))

print("Your latitude = {} and longitude = {}".format(lat,long))

folium.Marker([lat,long], popup='Current Location').add_to(obj)

#We have specified our folder location here

#You should change this with your folder location

#where you want your file

fileName = "C:/screengfg/Location" + str(datetime.date.today()) + ".html"

obj.save(fileName)

return fileName

except:

#Displaying ther error message

print("Internet Not avialable")

#closing the program

exit()

return False
```

Step 6: Creation of main method and displaying the map.

In this method, we will create a a main method. Under this main method, we will call **gps_locator()** method. This method will return a file location. Through this file location, we will open that in our chrome browser using [selenium](#). We are also closing our browser with 30 seconds, in case user do not close it manually.

- Python3

```
if __name__ == "__main__":

    print("-----GPS Using Python-----\n")

    page = gps_locator()

    print("\nOpening File.....")

    dr = webdriver.Chrome()

    dr.get(page)

    time.sleep(30)

    dr.quit()

    print("\nBrowser Closed.....")
```

Complete Code Implementation

- Python3

```
# Importing Necessary Modules

import requests

from selenium import webdriver

import folium
```

```
import datetime

import time

# this method will return us our actual coordinates

# using our ip address

def locationCoordinates():

    try:

        response = requests.get('https://ipinfo.io')

        data = response.json()

        loc = data['loc'].split(',')

        lat, long = float(loc[0]), float(loc[1])

        city = data.get('city', 'Unknown')

        state = data.get('region', 'Unknown')

        return lat, long, city, state

        # return lat, long

    except:

        # Displaying ther error message

        print("Internet Not avialable")

        # closing the program

        exit()

        return False
```

```
# this method will fetch our coordinates and create a html file

# of the map

def gps_locator():

    obj = folium.Map(location=[0, 0], zoom_start=2)

    try:

        lat, long, city, state = locationCoordinates()

        print("You Are in {},{}".format(city, state))

        print("Your latitude = {} and longitude = {}".format(lat, long))

        folium.Marker([lat, long], popup='Current Location').add_to(obj)

        fileName = "C:/screengfg/Location" + \

            str(datetime.date.today()) + ".html"

        obj.save(fileName)

        return fileName

    except:

        return False

# Main method

if __name__ == "__main__":

    print("-----GPS Using Python-----\n")
```



```
# function Calling

page = gps_locator()

print("\nOpening File.....")

dr = webdriver.Chrome()

dr.get(page)

time.sleep(4)

dr.quit()

print("\nBrowser Closed.....")
```

Output

```
-----GPS Using Python-----
You Are in Kolkata,West Bengal
Your latitude = 22.5626 and longitude = 88.363

Opening File.....

Browser Closed.....
>>> |
```

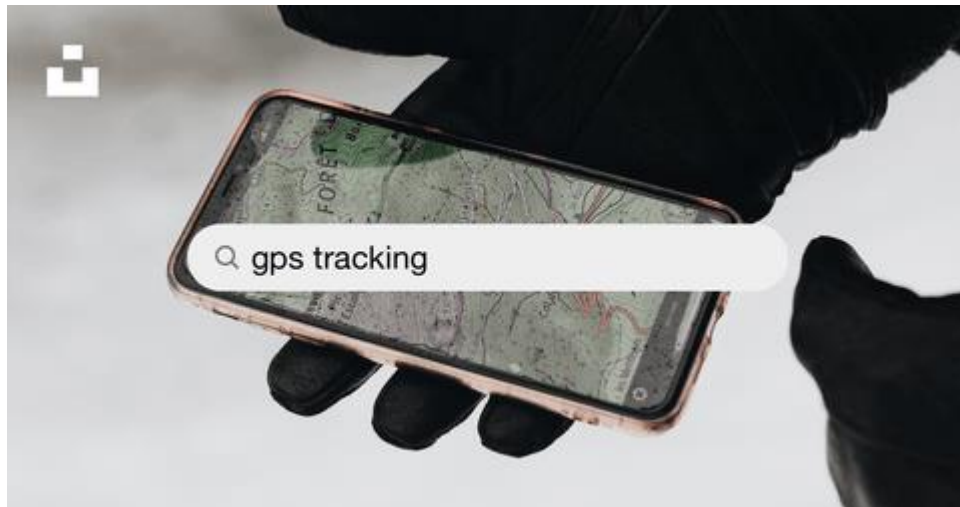
What is GPS tracking?

GPS tracking is a technology that uses satellite signals to determine the precise location of a device or vehicle in real-time. GPS stands for Global Positioning System, and it was originally developed by the United States Department of Defense for military use. Today, GPS tracking is used in a variety of applications, including fleet management, asset tracking, and personal tracking.

How does a GPS Tracker work?

GPS tracking works by using a network of satellites orbiting the Earth to transmit signals to GPS receivers on the ground. These receivers can be located in devices such as smartphones, tablets, or dedicated GPS tracking units. The GPS receiver calculates its location by triangulating its position based on the signals it receives from multiple satellites. In order to utilize GPS tracking, it is necessary to have a device equipped with a GPS receiver and an internet connection. There is a range of GPS tracking apps and devices available on the market, each serving different needs with a variety of features and capabilities. Some

GPS tracking devices are specifically designed for fleet management or asset tracking, while others are more suitable for personal tracking purposes or anti-theft security.



Applications

First and foremost, GPS tracking can be particularly useful for preventing theft. By attaching a GPS tracker to valuable assets, such as vehicles or construction equipment, a business can quickly locate the asset if it is stolen and aid in its recovery. GPS tracking can also be used to monitor the movements of employees, ensuring that they are following company policies and procedures.

GPS tracking can be used in a variety of industries and fields, including transportation, logistics, and fleet management. There are many businesses that could benefit from using GPS tracking. For example, a delivery company could use GPS tracking to optimize routes, reduce fuel consumption, and improve customer service by providing real-time updates on the location of packages. A construction company could use GPS tracking to monitor the location and movement of equipment, improving efficiency and reducing the risk of theft. GPS tracking can also be useful for tracking the location of company vehicles and ensuring that they are being used for business purposes.

Fleet Management

The capability of GPS tracking to furnish real-time location data can be especially useful for fleet management, as it allows for the visualization of the precise location of vehicles at any given moment. This can help you to optimize routes, vehicle utilization and reduce fuel costs, as well as improving the efficiency and productivity of your fleet.

GPS tracking can also be used to collect a range of other data, such as speed, distance travelled, and fuel consumption. Thereby vehicle performance can be monitored and other areas for potential efficiency improvement can be identified.

Asset tracking

GPS tracking can also be useful for asset tracking, as it allows you to keep track of valuable assets such as machinery, equipment, and tools. This can help you to prevent loss or theft, as well as ensuring that your assets are being used effectively and efficiently.

Personal Tracking

One additional application of GPS tracking is personal tracking, such as keeping track of the whereabouts of loved ones or monitoring your belongings. This can provide peace of mind and help to ensure the safety and security of individuals. In addition to providing real-time

location data, GPS tracking can also offer a range of other features and benefits. For instance, many GPS tracking devices and apps allow you to set up alerts and notifications. This can be useful for a variety of purposes, such as ensuring that vehicles are being driven safely, or alerting you if an asset has been moved without authorization.

Overall, GPS tracking is a powerful technology that has a wide range of applications. It allows you to track the location of devices and vehicles in real-time, and it can be useful for fleet management, asset tracking, and personal tracking. It can help prevent theft, optimize routes, reduce costs and improve productivity. Whether you are a business owner, a fleet manager, or simply someone who wants to keep track of loved ones, GPS tracking can provide valuable insights and help you to stay connected and informed.