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## Developing Location based Web Applications with W3C HTML5 Geolocation

\*Rahul Sharma and \*\*Bhanu Priya

\* Assistant Professor, Department of Computer Applications

G.G.M Science College, Jammu, Jammu and Kashmir, India

\*\* Assistant Professor, MAM College, Jammu, Jammu and Kashmir, India

\*Corresponding author:Rahul Sharma

### Abstract

HTML5 is used for developing rich interactive web applications. Using HTML5 one can create applications that can run on different devices from smart phone to desktop. Developing web applications with rich set of features requires understanding of different frameworks like HTML5, CSS3, JavaScript etc. HTML5 includes features like Canvas, Audio, Video, Application caches, Geolocations, Webstorage, indexedDB and so on. Programmer can use these features as per requirements to develop the WebApplications. This research paper will examine HTML5 Geolocation feature and use one of the popular map APIs (Google Map) to display user device location.

**Keywords** :HTML5, W3C Geolocation, Google Map

### I. INTRODUCTION

Geolocation is a technology that uses the data acquired from mobile, computer, routers, tablets, camera or any other network connected device to find the actual physical location. Finding geographical position of a person, device, place is referred as geolocation. Finding location has not been that easy earlier but with the introduction of Global Positioning System (GPS) enabled devices things have changed. With the help of GPS satellites placed in the orbit has enhanced the capability to precisely determine the location. Position on the map as a single point is comprised of two components longitude and latitude. Longitude and Latitude information is used by the GPS software to depict location on the map.[1] Thus a service running on the network enabled devices that use geolocation to show facts may be termed as location-based service. For example a location-based service can show the location of all ATMs in vicinity of user's current location. With the wide spread use of smart phones and mobile applications using geolocation applications are developed using different platforms be it ios, android, Web Applications. Applications like Yelp, Google Latitude, Foursquare, Gowalla, Glympse, Shopkick etc make use of user's location. Thus native applications for each platform are developed. HTML5 has introduced Geolocation API that make use of JavaScript to capture user's latitude and longitude which is sent to the back end web server to do various location-aware things like finding local businesses or showing your location on a map.

The rest of the paper is organized as follows. HTML5 Geolocation Basics are explained in section II. Designing HTML5 Geolocation Web Page and results are presented in section III. Concluding remarks are given in section IV.

### II HTML5 GEOLATION BASICS

#### A. W3C HTML5 Geolocation APIs –

W3C HTML5 Geolocation APIs allow client-side device to retrieve geographical position (longitude, latitude, heading etc) information using JavaScript. Devices (smart phones, tablets, desktop) with latest browsers allow user to use Geolocation APIs Table below shows browsers and OS that support Geolocation API [1]

Refer Table 1

Older versions of Web Browsers do not support W3C Geolocation API specifications.

### The Geolocation API Interface

Geolocation programming interface provided by W3C HTML5 provide access to the longitude and latitude information of the hosting device Global Positioning system(GPS), Radio Frequency Identification(RFID), WiFi and Bluetooth MAC addresses etc are used for inferring the location information of the device.[8]

Refer Table -2 JavaScript Objects supported by HTML5 Geolocation API Specifications

HTML5 provides Geolocation object, Geolocation object is used by Javascript language to programmatically determine the location information of the hosting device. Position object stores the information acquired by the browser.[8]

Table -3 Methods provided by Geolocation Object

Position object specifies the current geographical location of the device. The various properties of position object are given the table below [8]

Refer Table -4 Properties of Position Object

PositionError object returns following error codes

ReferTable -5 PositionError error codes

This object can be used to gather geographical information of the device using JavaScript. Web Browsers which support W3C Geolocation API will have an object **window.navigator.geolocation**. [6]

Simple Implementation:

Code snippet that is used to check browser support is

```
if(window.navigator.geolocation){
    //Geolocation APIs supported
    Navigator.geolocation.getCurrentPosition(showCurrentPosition, errorHandler, options);
}else{
    //Browser does not support W3C Geolocation APIs
}
```

To get the device's current location invoke navigator.geolocation.getCurrentPosition method. getCurrentPosition method accepts three parameters callback, errorCallback and options. First argument specifies the call back method be invoked in case device's location is found. Secound argument errorCallback is the user defined method that is invoked in case there is any error in fetching the location of the device. Third argument is the PositionOptions that is used for setting options like enableHighAccuracy, timeout and maximumAge for retrieving the current geographical location of the device.

### III GEOLOCATION WEB PAGE

```
<!DOCTYPE html>
<HTML>
<BODY>
Click to view current location
<input type="button" value="Show Location" onclick="showlocation()"/>

<br/>
Latitude: <span id="latitude">..</span> <br>
Longitude: <span id="longitude">..</span>
<div id="mapContainer"></div>
```

```

<SCRIPT>
function showlocation(){
    navigator.geolocation.watchPosition(callback);
    if(window.navigator.geolocation){
        //Geolocation APIs supported
        Navigator.geolocation.getCurrentPosition(showCurrentPosition, errorHandler, options);
    }else{
        //Browser does not support W3C Geolocation APIs
    }
}

function showCurrentLocation(position){
    var deviceLatitude = position.coords.latitude;
    var deviceLongitude = position.coords.longitude;
    document.getElementById('latitude').innerHTML=deviceLatitude;
    document.getElementById('longitude').innerHTML=deviceLongitude;
    var imageURL = "http://maps.googleapis.com/maps/api/staticmap?center=" + deviceLatitude + "," +
        deviceLongitude + "&zoom=14&size=400x300&sensor=false";
    document.getElementById("mapContainer").innerHTML = "<img src =" + imageURL + ">";
}

function errorHandler(error){
    switch(error.code){
        case error.PERMISSION_DENIED:
            alert("Application does not have permission to use the location service");
            break;
        case error.POSITION_UNAVAILABLE:
            alert("Error in determining the location of the device");
            break;
        case error.TIMEOUT:
            alert("Failed to retrieve the device location in the specified time interval");
            break;
        case error.UNKNOWN_ERROR:
            alert("An unknown error has occurred");
    }
}
</SCRIPT>
</BODY>
</HTML>

```

Program 1: Demonstrating the use of Geolocation API to show device's current location.

### GEOLOCATION WEBPAGE

If Geolocation is supported by the browser, `getCurrentPosition` method is used to retrieve coordinates object 'position' in the callback method `showCurrentLocation`. Second argument to the `getCurrentPosition` specifies the error handler method. Mozilla Firefox and Internet Explorer display a prompt requesting user's permission to share location information to the Web Page as shown in the Figure 1 and Figure 2. On selecting 'Share Location' or 'Allow' web browser displays the latitude and longitude of user's device and shows the Google Map depicting the user's current location.

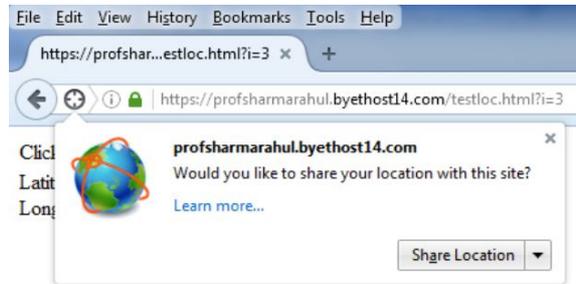


Figure 1. Mozilla Firefox Share Location Permission Prompt

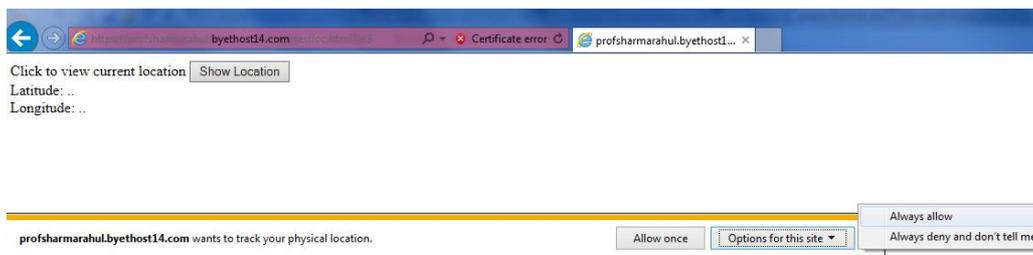


Figure 2. IE Share Location Prompt

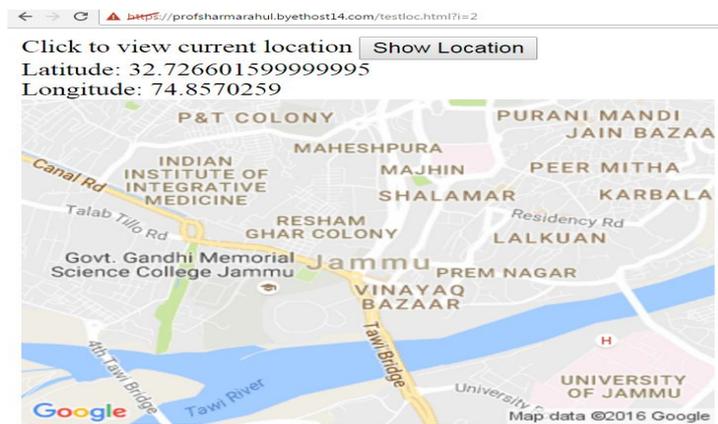


Figure 3. Google Chrome using HTTPS displaying device's current location

HTML5 Geolocation specifications retrieve geographical location of the hosting device, thereby potentially compromising the user's privacy. Due to the security concerns Google has made changes in the way the Geo Location feature works on non-secure origins. During experiments it was found that latest Chrome version 50 does not runs geolocation program when HTTP is used. Instead when HTTPS is used, geolocation feature in Google Chrome worked similar to other browsers. Web page must be served over HTTPS for using GeoLocation API's to work properly on Google Chrome.

#### IV.CONCLUSION

HTML5 offers new innovative features to rejuvenate the web experience. Rather than installing proprietary plugin on the browser, W3C HTML5 provides specifications to achieve cross-browser compatibility enabling the same code to run on user's client devices (PC, Laptop, Tablet, mobile etc). In this paper W3C Geolocation specifications and use have been specified. HTML5 Geolocation API can be used to develop location-aware applications.

Table -1 Geolocation API Support

Web browser/OS	Supported in versions
Internet Explorer	9.0+
Firefox	3.5+
Chrome	5.0+
Safari	5.0+
Opera	10.6+
BlackBerry	6+
Android	2.0+
iPhone	3.1+

Table -2 JavaScript Objects supported by HTML5 Geolocation API Specifications

Object	Description
Geolocation	Main object of API and is used to get the location information of the devices
PositionOptions	getCurrentPosition and watchPosition method accept PositionOptions as the third argument
Position	Specifies the current geographical location of the device
Coordinates	The Coordinates of the geographical location
PositionError	Gives error information to the callback method

Table -3 Methods provided by Geolocation Object

Method	Description
getCurrentPosition	Retrieves the current geographical location of the device
watchPosition	Continue to monitor the position and invoke callback function when position changes
clearWatch	Cancels an ongoing watchPosition process identified by the watchID argument

Table -4 Properties of Position Object

Attribute	Value	Unit	Description
Coords	Object	--	Specifies the geographical location of the device
coords.latitude	Double	Degrees	The latitude of the position.the value range is [-90.00 to +90.00

coords.longitude	Double	Degrees	The longitude of the position.The value range is [-180.00 to +180.00]
coords.accuracy	double or null	meters	The accuracy of position.
coords.altitude	Double or null	Meters	The altitude above the average sea level
coords.altitudeAccuracy	Double or null	Meters	The altitude accuracy of the position
coords.heading	double or null	degrees or null	Specifies the device's current direction of moment counting clockwise relative to true north.
coords.speed	double or null	meters/second	The speed of the device
Timestamp	DOMTimeStamp	Date Object	The date/time of the response.
Properties of PositionError object			
Property	Type	Description	
Code	Number	Specifies the numeric code of the error	
message	String	Specifies the human-readable description of the error.	

Table -5 Position Error error codes

Numeric Value	Constant	Description
	code	The code attribute must return the appropriate code from the following list
1	PERMISSION_DENIED	Failed to retrieve the location of the device because the application does not have the permission to use the Location Service.
2	POSITION_UNAVAILABLE	The location of the device could not be determined.
3	TIMEOUT	Failed to retrieve the location information within the specified maximum timeout interval.
4	message	This attribute stores the error message describing the kind of error that is encountered during the process and aids in debugging purpose.

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