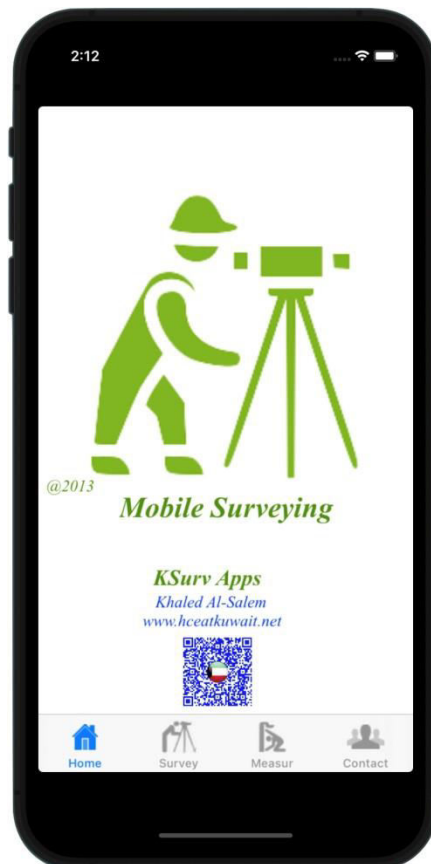




## Technical Report

### *Mobile Total Station Surveying apps*



***KSurv Apps***  
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2013

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## Introduction

Surveying or land surveying is the technique and science of accurately determining the terrestrial or three-dimensional position of points and the distances and angles between them. These points are usually on the surface of the Earth, and they are often used to establish boundaries for ownership or governmental, line altitude profile. To accomplish their objective, surveyors use elements of geometry, engineering, trigonometry, mathematics. A modern instrument is a total station, which is a theodolite with an electronic distance measurement device (EDM). A total station can also be used for leveling when set to the horizontal plane. Since their introduction, total stations have made the technological shift from being optical-mechanical devices to being fully electronic with computer and software.

Introducing A new application for mobile survey system which create 3 dimension measurements as (Longitude, Latitude and Altitude), and can even e-mail point data to the office computer and connect to satellite positioning systems, such as a Global Positioning System (GPS). Though real-time kinematic GPS systems have increased the speed of surveying, *there are still disadvantage of horizontal accuracy and vertical accuracy are still questionable of the GPS system.*

## Objective

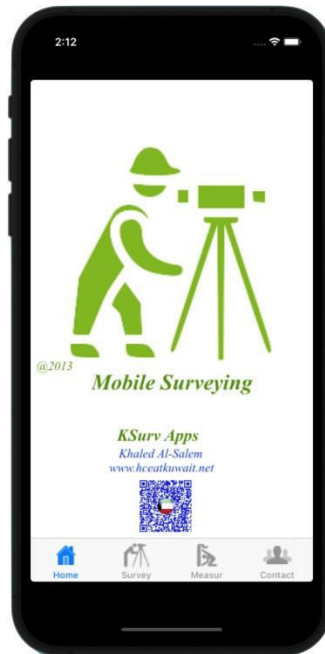
KSURV APPS, it is Land surveying apps to determining the positions of points on the surface of the earth and measuring the X/Y location, distances, bearing angles, and elevations between them by using Global Positioning System (GPS). This data helps to determine plot boundaries or total area and create altitude beach profile data for a number of engineering applications.

## Methodology

KSURV APPS allowed user to create land surveying through personal mobile device to the following options:




1. Surveying
  - To start new Surveying
  - Display data
  - Calculate [ Total area or Parameter line]
  - Create HTML file to display surveyed data on Google map
  - Email or send data by [ Email system Or Whatapps]
2. Measurements
  - Create interactive data from Google map by drop a pin on map
  - Calculate [ Total area or Parameter line]
  - Display / Draw a line through selected data on Google map
  - Start Navigation on Selected data
3. Email section
  - Email or send data by [ Email system Or Whatapps]

## KSURV SYSTEM DEMONSTRATION



**Figure 1. Main app page.**

Figure 1 display the main apps options as follows:

1. Survey [  ]
2. Measure [  ]
3. Contact [  ]

If user select Survey [  ] Figure 2A will display.  
Figure 2A display the following

- File name where data will be store.
- Zoom value for Google map display
- BM bench mark value

To start new project user must select Start [  ] from Figure 2A.

New Image will display as [  ] as in Figure 2B.

This button is for select the new Measurement of [Longitude, Latitude and Altitude] at mobile current location. To select new location just user move to new a location; then press on the Button a new location will recorded.

When all surveys data are done then just select Stop button [  ] as shown in Figure 2B to store surveyed data at select file name.

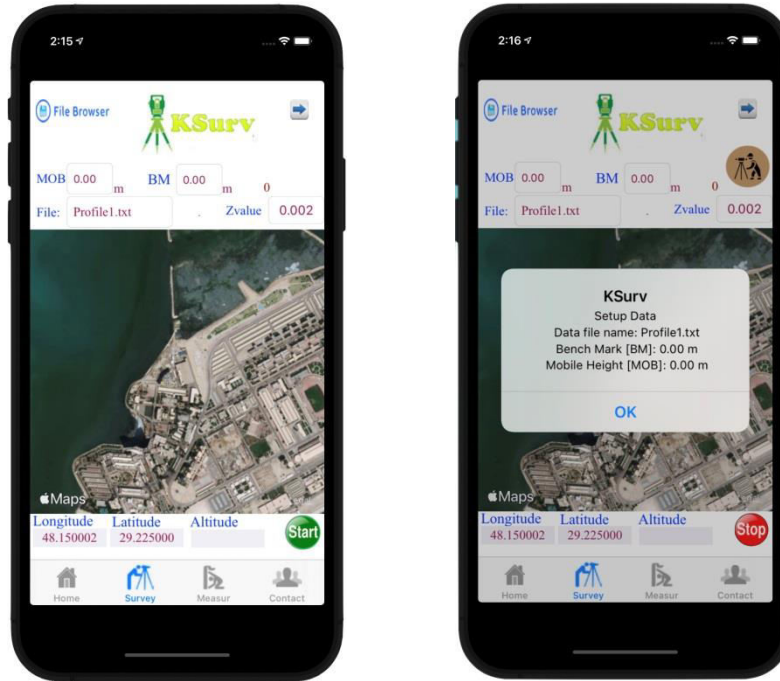


Figure 2. Survey page A and B



To display the surveyed data user must select [  ] in Figure 2

Figure 3 will display a summary report of the surveyed data file as

- MOB data
- BM data
- Date and Time of survey
- Total records
- Data collected and analyzed [Longitude, Latitude, Distance Bearing Angle and Altitude]

In Figure 3 a number of options for data display as follows:

- To calculate [area or parameter line] user must select [  ] as shown in Figure 4A.



- To Plot Altitude profile line [  ] as shown in Figure 4B
- To Create HTML file to display surveyed data on Google map user must select [  ] as shown in Figure 4C.



Figure 3. Display Surveyed Data

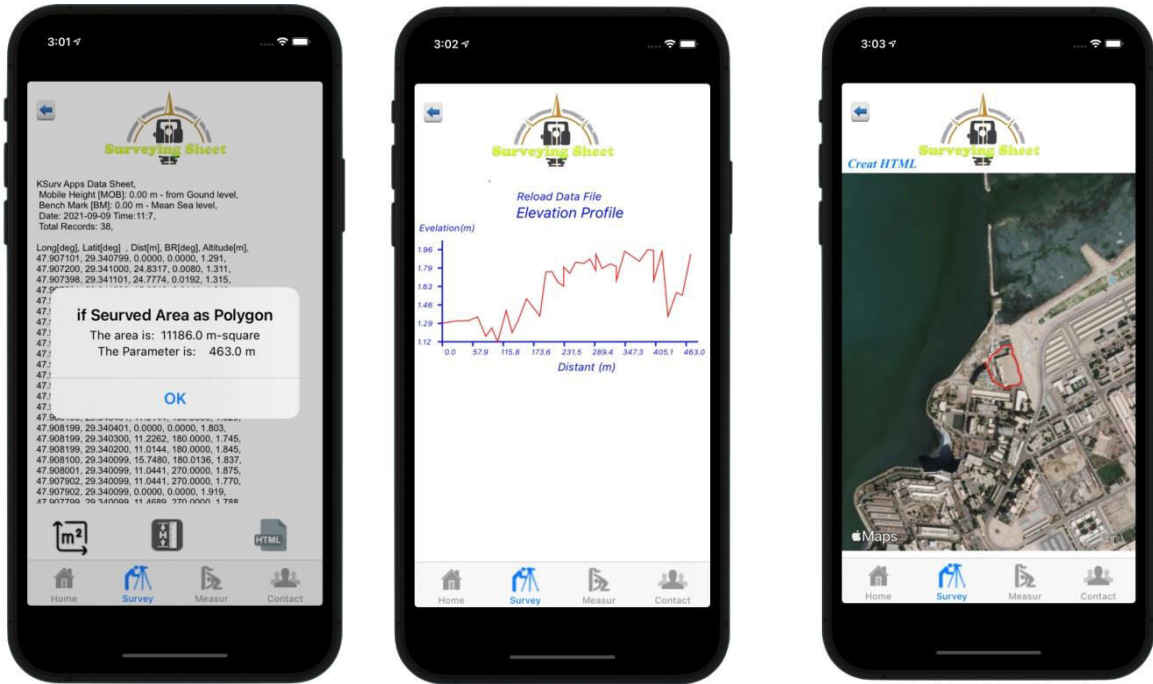







Figure 4. Surveyed Data analysis for [Calculate area -A, Plot Altitude Profile -B and Create HTML file -C

Option 2. Measurements [  ]

If user select [  ] from Figure 1 then Figure 5 will display a number of option for user to follows.

To select any point on Google map user use a long Touch on screen at selected location to drop a pin at location then the pin location will display on Longitude/latitude textbox as shown in Figure 5.

A number on Button selection in Figure 5 for as follows:

- To get user current location [  ]
- To delete a selected location [  ]
- To ADD a selected location [  ] as shown in Figure 6A
- To Clean all selected locations [  ]
- True North Compass display on Figure 5.

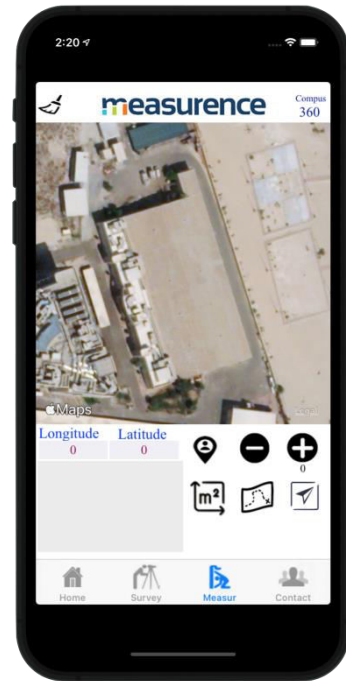



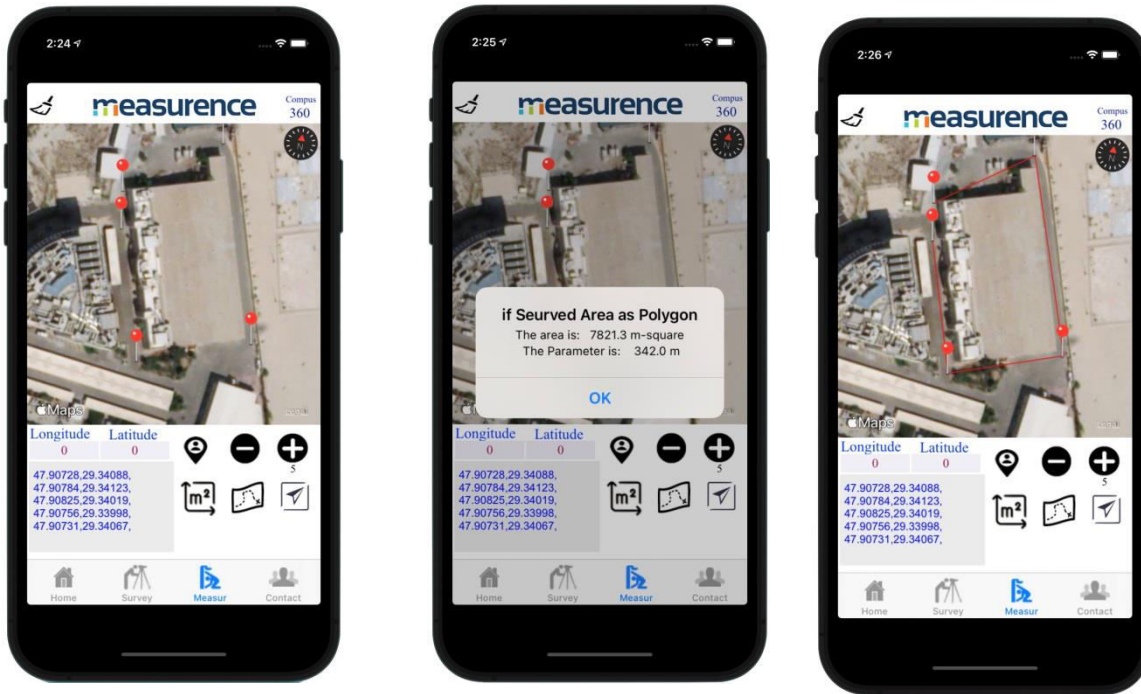


Figure 5. Measurements page

When all data are collected user do the following:

- To Calculate the total area and Parameter line [  ] as shown in Figure 6B
- To display the connected line of the selected location on Google map[  ] as shown in Figure 6C
- Display to navigation Line[  ]



**Figure 6. Measurements Data analysis for [Select Location-A, Calculate area -B and connected line of the selected location -C**

**Option 3. Data Transferee [Email/Whatapps by  ]**

User can send surveyed data file by two options

- Email [  ]
- Whatapps [  ]

By selection of [  ] from Figure 1.

Figure 7 will display for user to enter data file name to send as attachment select data file

User must enter the output file name to be transferred

To Check file name is by select [  File Browser ] as shown in Figure 7.

Figure 8 display the emailed file.

Figure 9 Display snapshot of output file create and email as attachment

Figure 10. Display snapshot of Created HTML file for Surveyed data display on Google map.

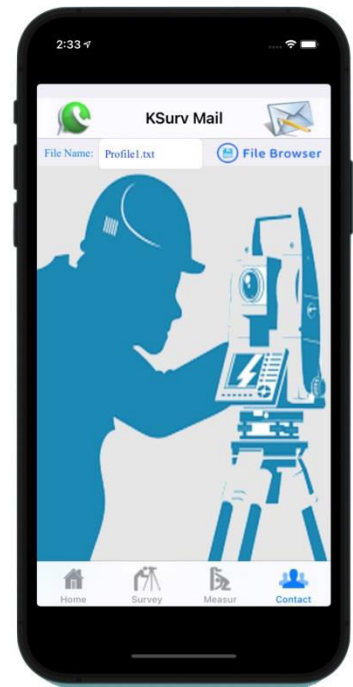


Figure 7. Email/Whatsapps page

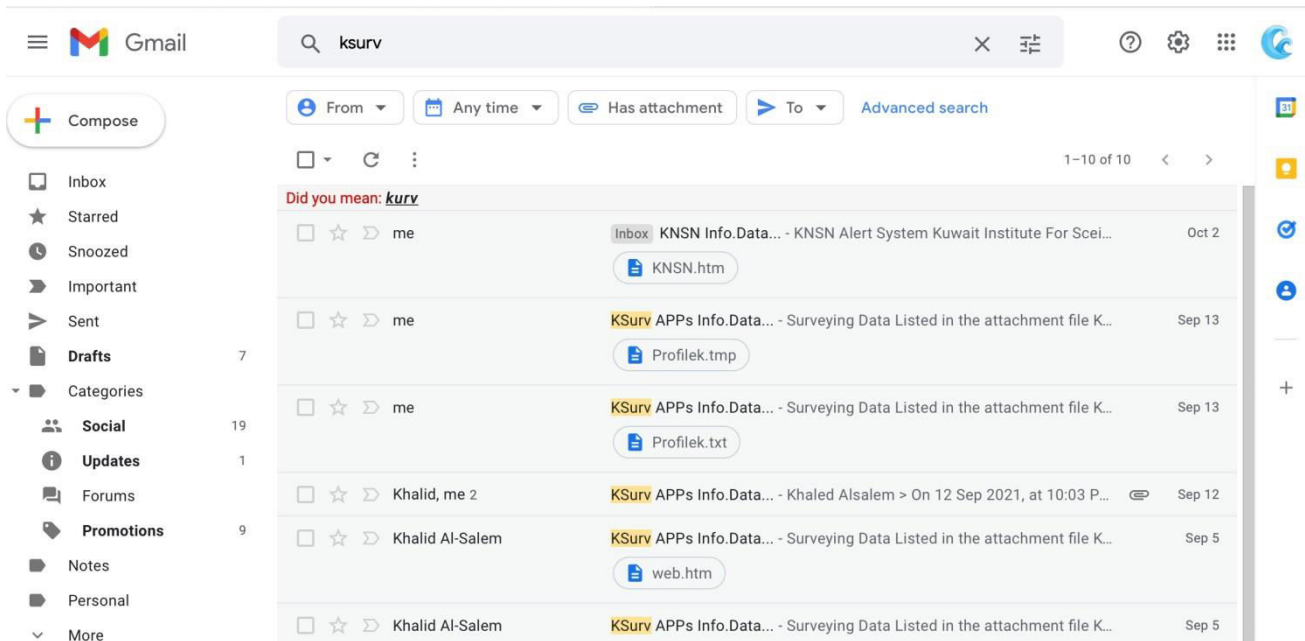


Figure 8. Snapshot of Emailed files

```
KSURV Apps Data Sheet,  
Mobile Height [MOB]: 0.00 m - from Gound level,  
Bench Mark [BM]: 0.00 m - Mean Sea level,  
Date: 2021-09-09 Time:11:7,  
Total Records: 38,  
  
Long[deg], Latit[deg] , Dist[m], BR[deg], Altitude[m],  
47.907101, 29.340799, 0.0000, 0.0000, 1.291,  
47.907200, 29.341000, 24.8317, 0.0080, 1.311,  
47.907398, 29.341101, 24.7774, 0.0192, 1.315,  
47.907501, 29.341200, 15.9013, 0.0141, 1.349,  
47.907600, 29.341299, 15.5977, 0.0137, 1.173,  
47.907700, 29.341299, 11.0441, 90.0000, 1.248,  
47.907799, 29.341299, 11.0441, 90.0000, 1.122,  
47.907902, 29.341200, 15.9013, 179.9859, 1.406,  
47.907902, 29.341101, 11.0144, 180.0000, 1.205,  
47.907902, 29.341000, 11.2262, 180.0000, 1.315,  
47.908001, 29.340900, 15.5977, 179.9863, 1.513,  
47.908100, 29.340700, 24.8317, 179.9920, 1.355,  
47.908100, 29.340599, 11.2262, 180.0000, 1.757,  
47.908100, 29.340500, 11.0144, 180.0000, 1.762,  
47.908199, 29.340500, 11.0441, 90.0000, 1.666,  
47.908199, 29.340401, 11.0144, 180.0000, 1.629,  
47.908199, 29.340401, 0.0000, 0.0000, 1.803,  
47.908199, 29.340300, 11.2262, 180.0000, 1.745,  
47.908199, 29.340200, 11.0144, 180.0000, 1.845,  
47.908100, 29.340099, 15.7480, 180.0136, 1.837,  
47.908001, 29.340099, 11.0441, 270.0000, 1.875,  
47.907902, 29.340099, 11.0441, 270.0000, 1.770,  
47.907902, 29.340099, 0.0000, 0.0000, 1.919,  
47.907799, 29.340099, 11.4689, 270.0000, 1.788,  
47.907700, 29.340000, 15.5977, 180.0137, 1.832,  
47.907600, 29.340000, 11.0441, 270.0000, 1.808,  
47.907600, 29.340000, 0.0000, 0.0000, 1.677,  
47.907501, 29.340099, 15.5977, 359.9863, 1.946,  
47.907398, 29.340099, 11.4689, 270.0000, 1.909,  
47.907299, 29.340200, 15.7480, 359.9865, 1.854,  
47.907200, 29.340300, 15.5977, 359.9863, 1.961,  
47.907200. 29.340401. 11.2262. 0.0000. 1.953.
```

**Figure 9. Snapshot of output email file created by KSURV apps**



```

<!DOCTYPE html>
<html>
<head>
<meta http-equiv='content-type' content='text/html; charset=utf-8' />
<meta http-equiv='X-UA-Compatible' content='IE=edge'>

<title>KSURV Apps</title>
<style>
#map { height: 100%;
}
html, body {
height: 100%;
margin: 0;
padding: 0;
}
</style>
</head>
<script>
function initMap() {
var map = new google.maps.Map(document.getElementById('map'), {
zoom: 15,
center: {lat: 29.340799 , lng: 47.907101 },
mapTypeId: 'satellite'
});

var flightPlanCoordinates = [
new google.maps.LatLng( 29.340799 , 47.907101 ),
new google.maps.LatLng( 29.341000 , 47.907200 ),
new google.maps.LatLng( 29.341101 , 47.907398 ),
new google.maps.LatLng( 29.341200 , 47.907501 ),
new google.maps.LatLng( 29.341299 , 47.907600 ),
new google.maps.LatLng( 29.341299 , 47.907700 ),
new google.maps.LatLng( 29.341299 , 47.907799 ),
new google.maps.LatLng( 29.341200 , 47.907902 ),
new google.maps.LatLng( 29.341101 , 47.907902 ),
new google.maps.LatLng( 29.341000 , 47.907902 ),
new google.maps.LatLng( 29.340900 , 47.908001 ),
new google.maps.LatLng( 29.340700 , 47.908100 ),
new google.maps.LatLng( 29.340599 , 47.908100 ),
new google.maps.LatLng( 29.340500 , 47.908100 ),
new google.maps.LatLng( 29.340500 , 47.908199 ),
new google.maps.LatLng( 29.340401 , 47.908199 ),
new google.maps.LatLng( 29.340401 , 47.908199 ),
new google.maps.LatLng( 29.340300 , 47.908199 ),
new google.maps.LatLng( 29.340200 , 47.908199 ),
new google.maps.LatLng( 29.340099 , 47.908100 ),
new google.maps.LatLng( 29.340099 , 47.908001 ),
new google.maps.LatLng( 29.340099 , 47.907902 ),
new google.maps.LatLng( 29.340099 , 47.907902 ),
new google.maps.LatLng( 29.340099 , 47.907799 ),
new google.maps.LatLng( 29.340000 , 47.907700 ),
new google.maps.LatLng( 29.340000 , 47.907600 ),
new google.maps.LatLng( 29.340000 , 47.907600 ),
new google.maps.LatLng( 29.340099 , 47.907501 ),
new google.maps.LatLng( 29.340099 , 47.907398 ),
new google.maps.LatLng( 29.340200 , 47.907299 ),
new google.maps.LatLng( 29.340300 , 47.907200 ),
new google.maps.LatLng( 29.340401 , 47.907200 ),
new google.maps.LatLng( 29.340401 , 47.907200 ),
new google.maps.LatLng( 29.340500 , 47.907101 ),
new google.maps.LatLng( 29.340599 , 47.907101 ),
new google.maps.LatLng( 29.340700 , 47.907001 ),
new google.maps.LatLng( 29.340799 , 47.907001 ),
new google.maps.LatLng( 29.340900 , 47.907101 )
];
var flightPath = new google.maps.Polyline({
path: flightPlanCoordinates,
geodesic: true,
strokeColor: '#FF0000'
});

```

Figure 10. Snapshot of HTML file create by KSURV apps