

"Vehicle Behavior Monitoring with Multi-GNSS Technology"

***AUTOMOTIVE
SUMMIT 2014***



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Introduction to Multi-GNSS

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Multi-GNSS



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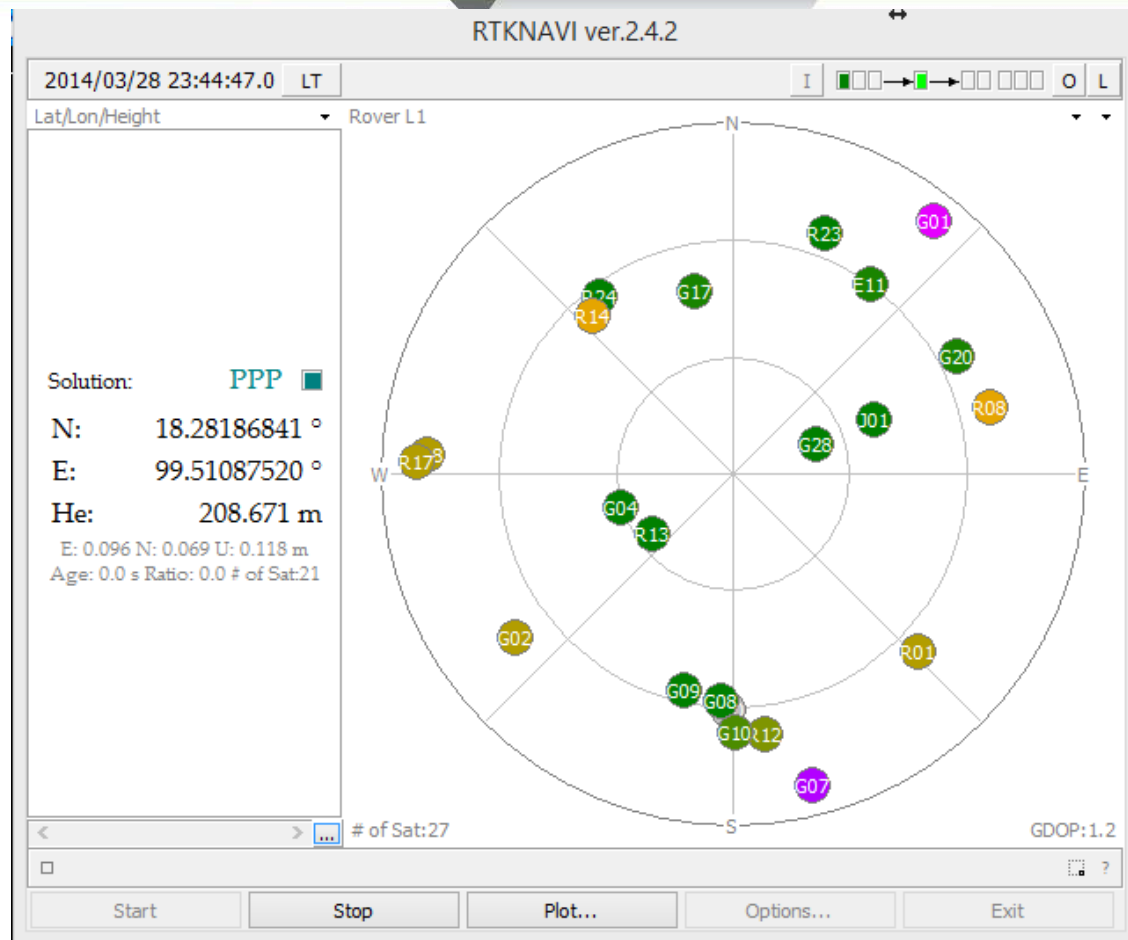
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Multi-GNSS in Thailand

GPS, GLONASS, GALILEO, SBAS, QZSS

HW, SW from JAXA



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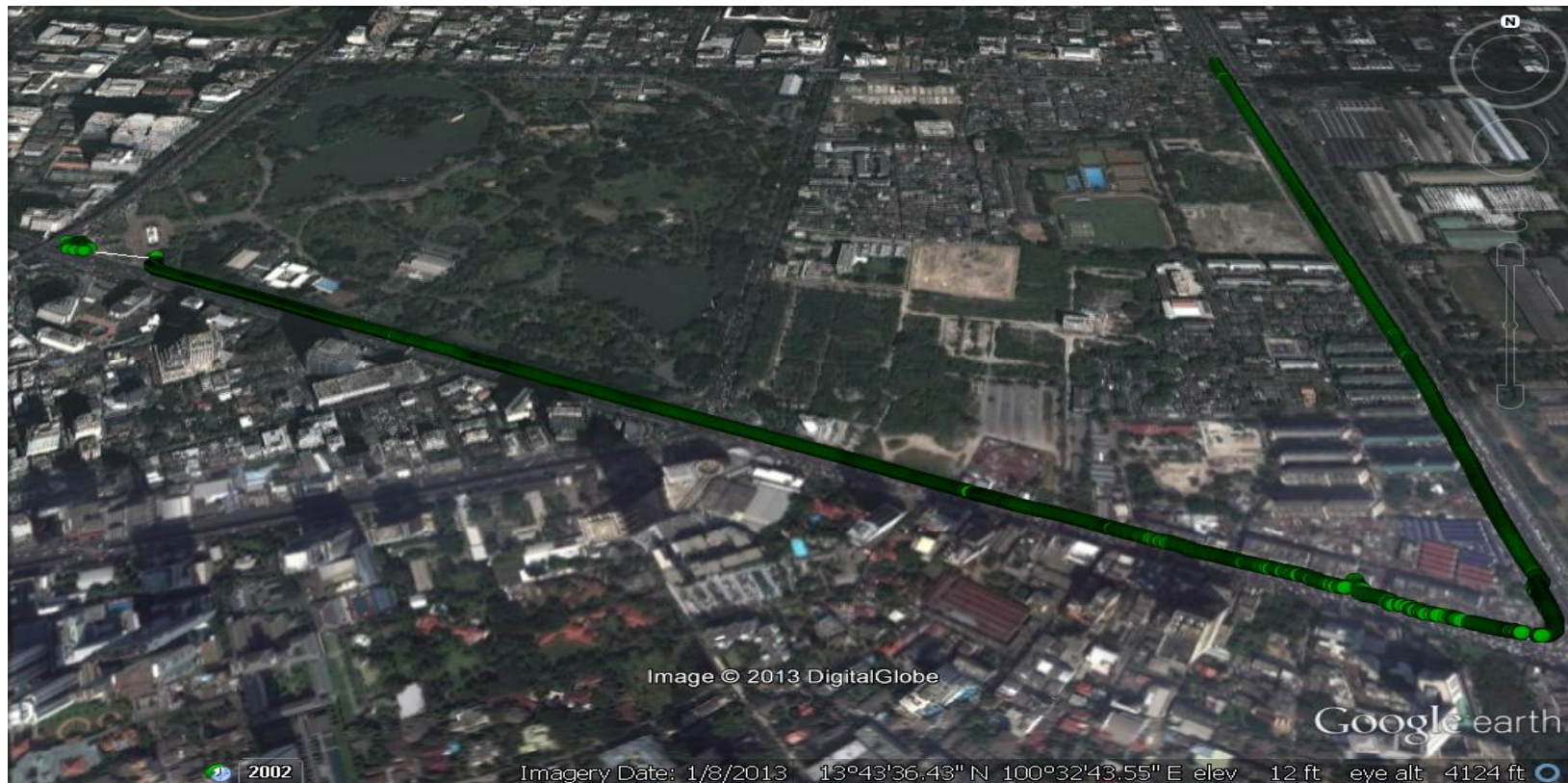


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Urban Multi-GNSS



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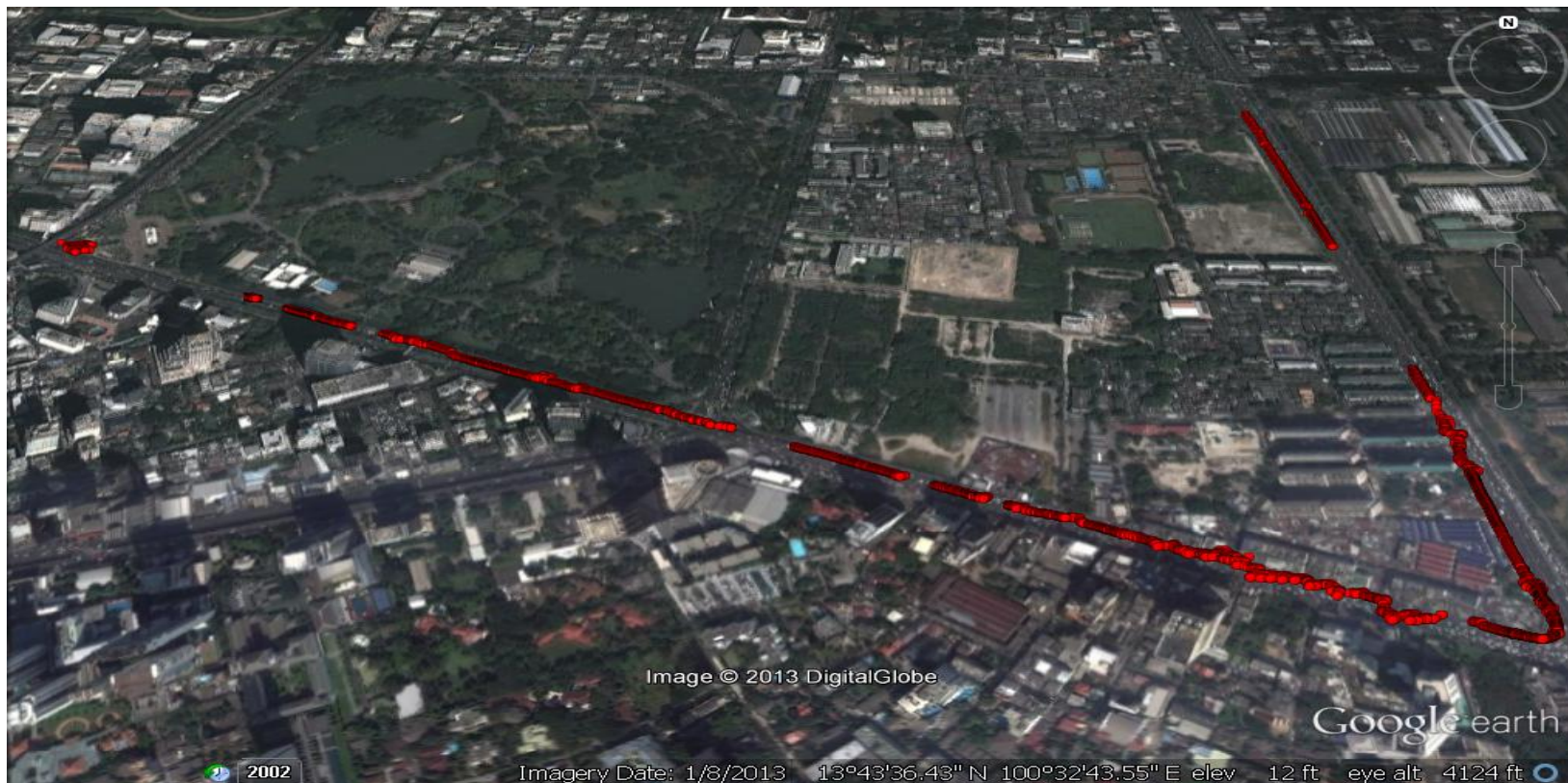


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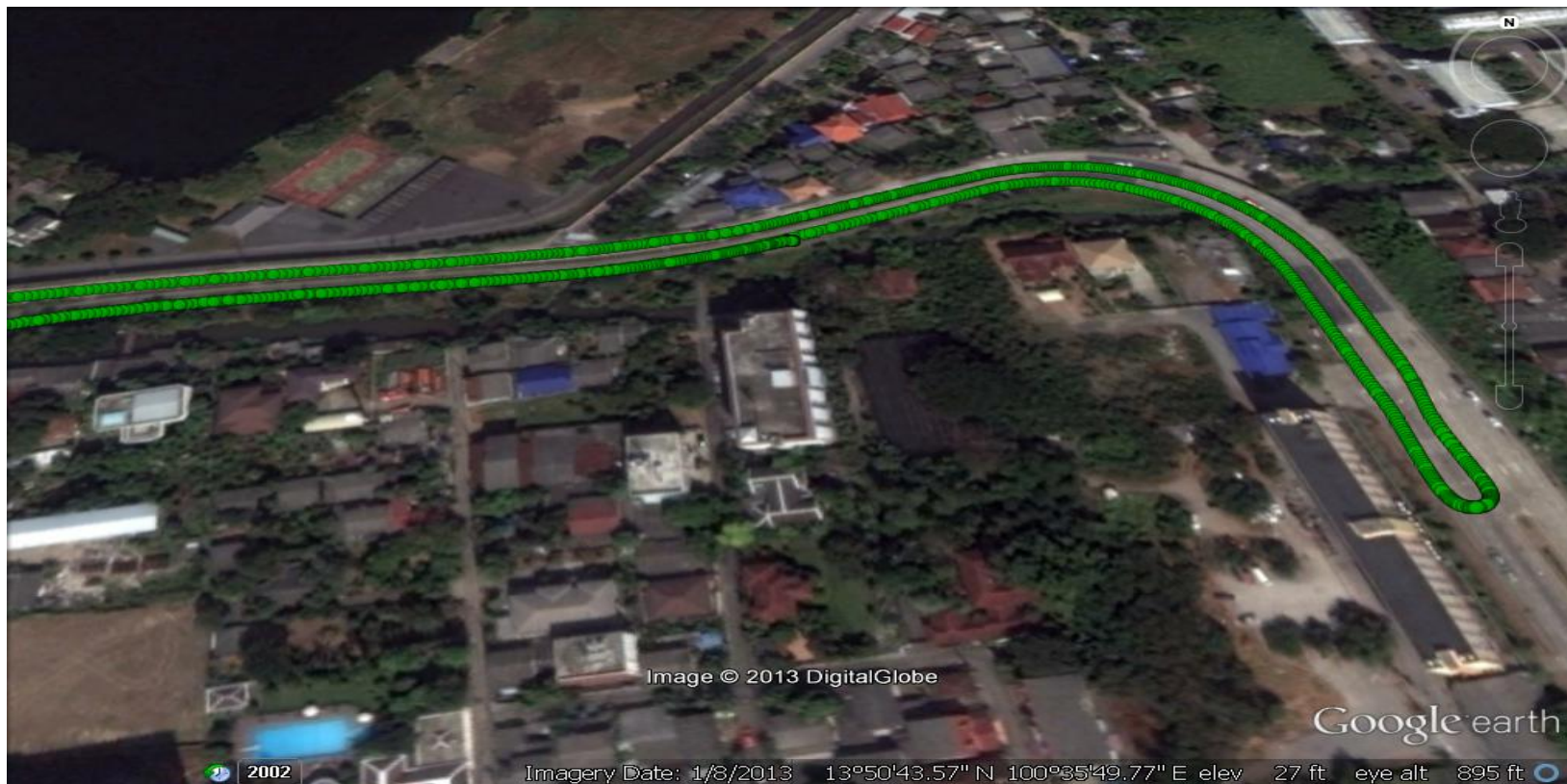


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Sub-Urban Multi-GNSS



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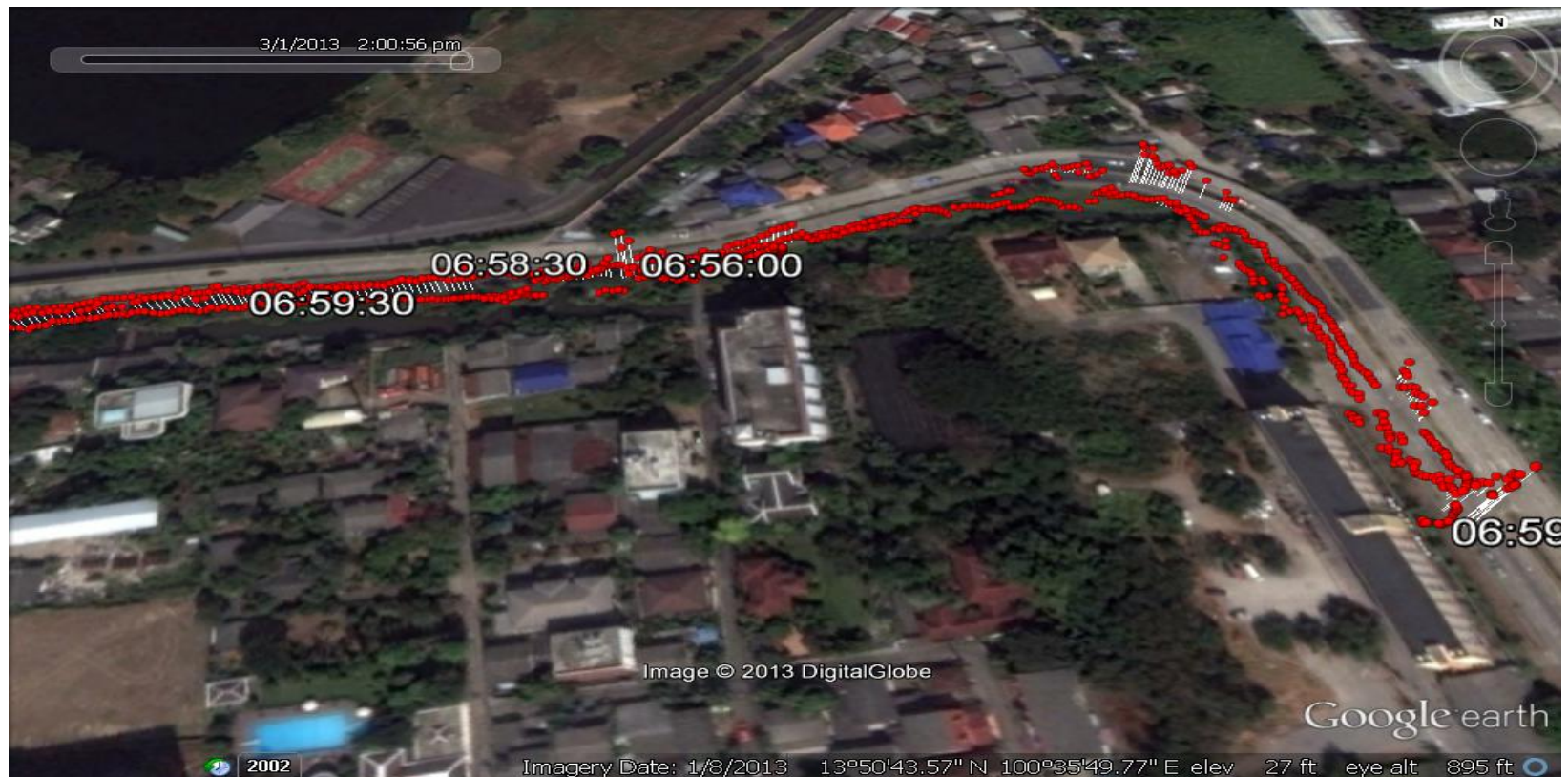


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NSTDA Multi-GNSS



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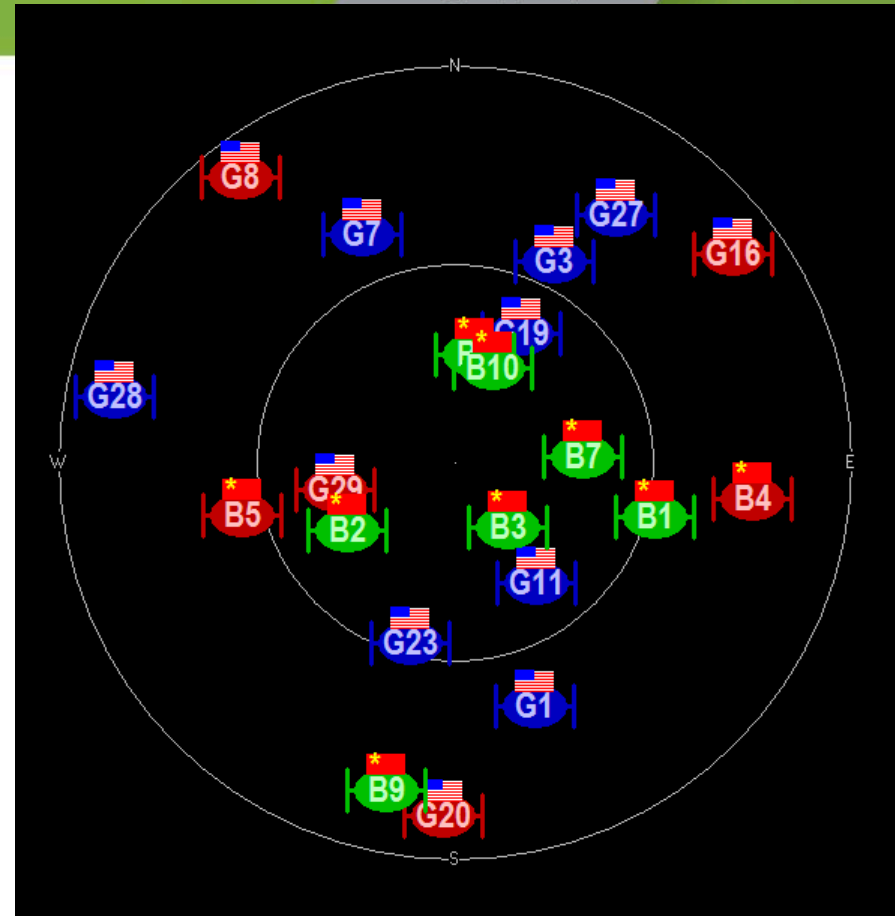
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Multi-GNSS in Thailand

GPS, Beidou

HW from TTET



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In 2013, Thailand is 3rd
rank road accident
fatalities by who.

The most important parts is driver.



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In-vehicle data-logger

Why? GNSS?

IMU is convenience in new or OEM.

For REM, It's not easy for develop,
vehicle models needs to calibrate.



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Driver's Behavior

Behavior	Physical Parameter
Accelerating	Longitudinal Acceleration
Braking	
Turning	Lateral Acceleration
Lane Changing	

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Limitation with GPS

	Current 1-Hz conventional GPS receiver
Longitudinal Acceleration	enough accuracy and update rate for estimate.
Lateral Acceleration	<p>For turning, applicable in cases with large displacement and duration.</p> <p>For lane change, cannot estimate, not enough accuracy and update rate.</p>

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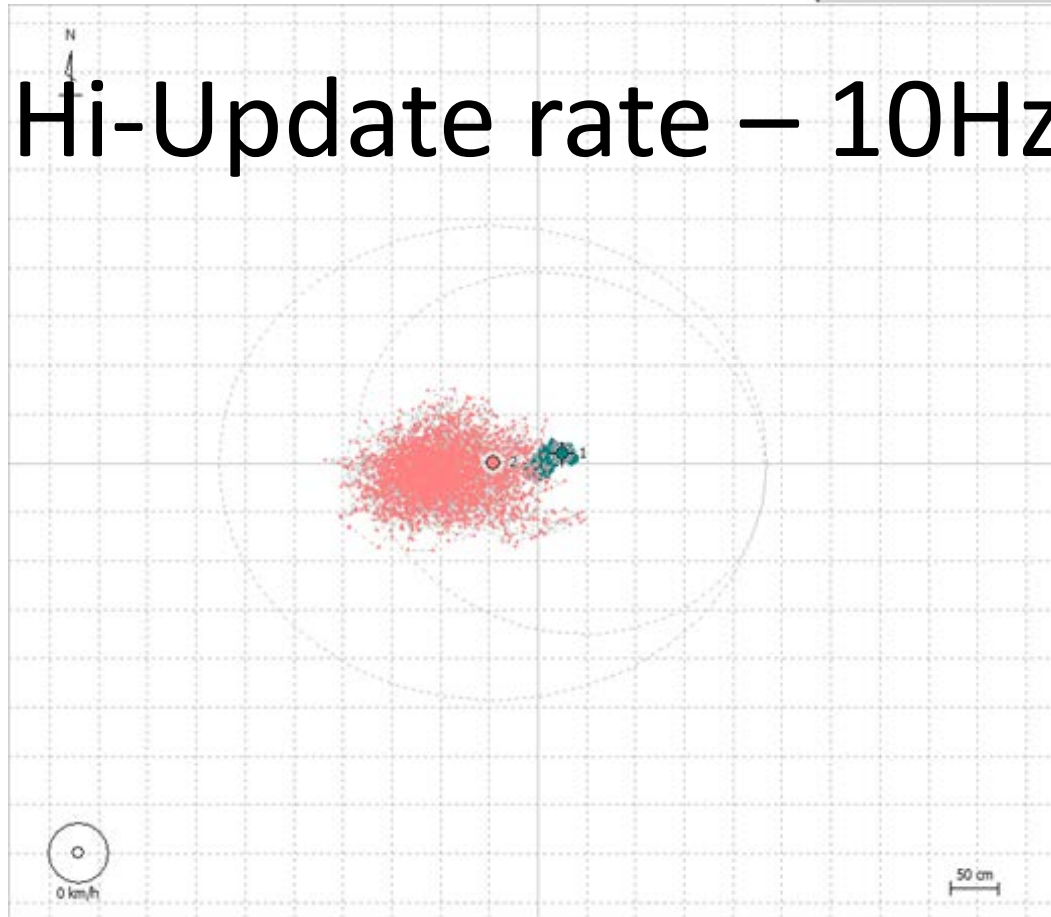


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Hi-Update rate – 10Hz



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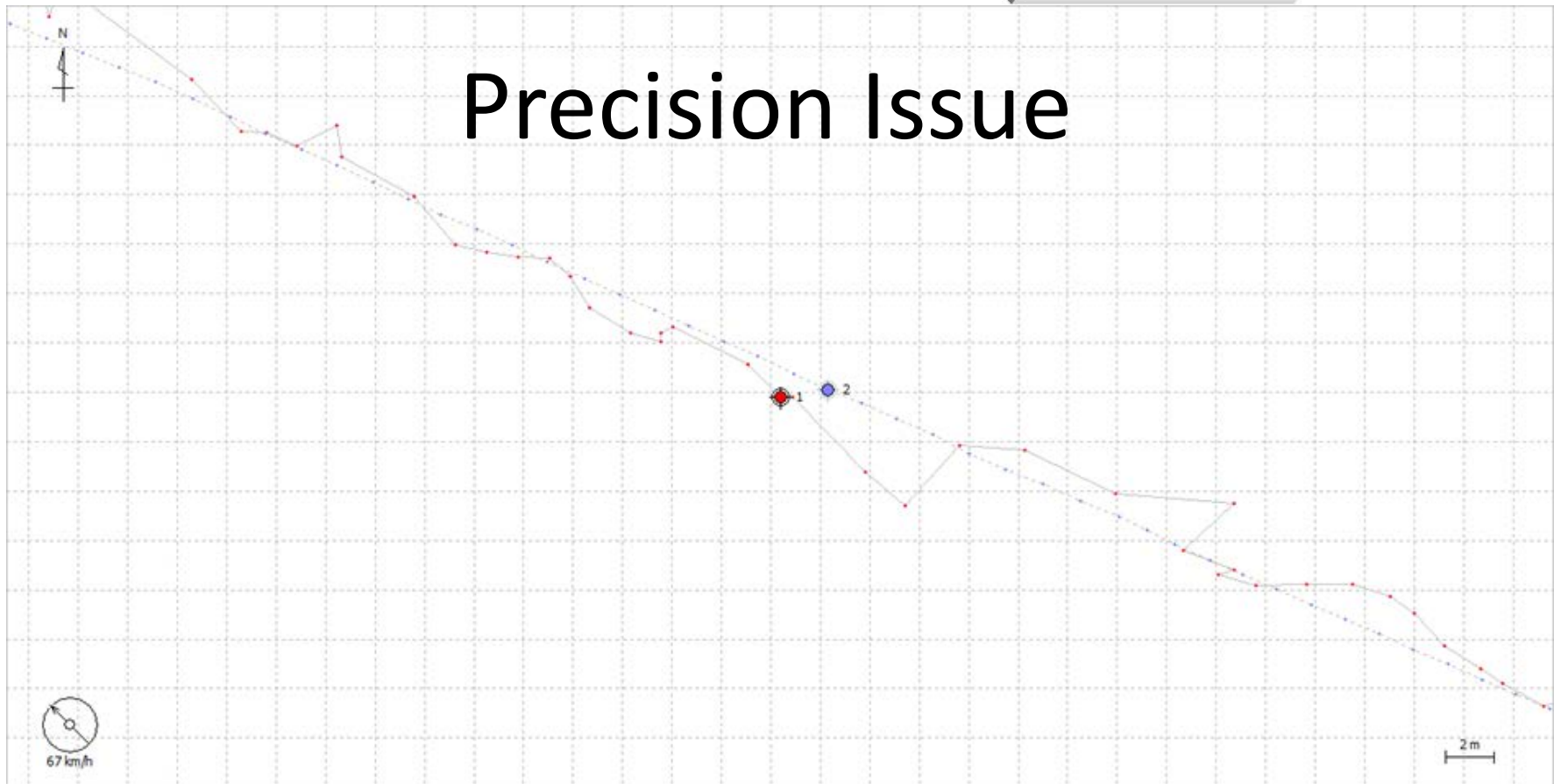


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Precision Issue



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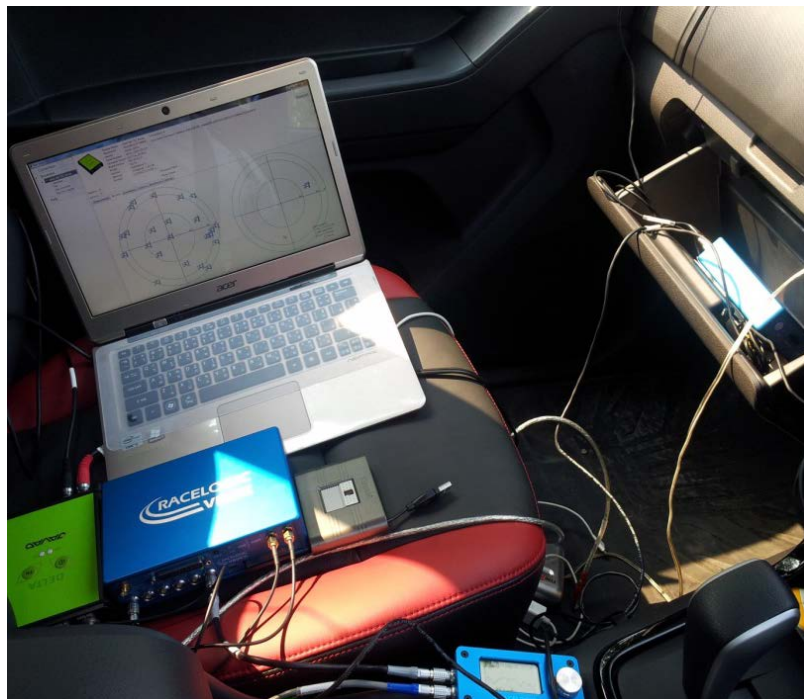


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2012 Test Equipment



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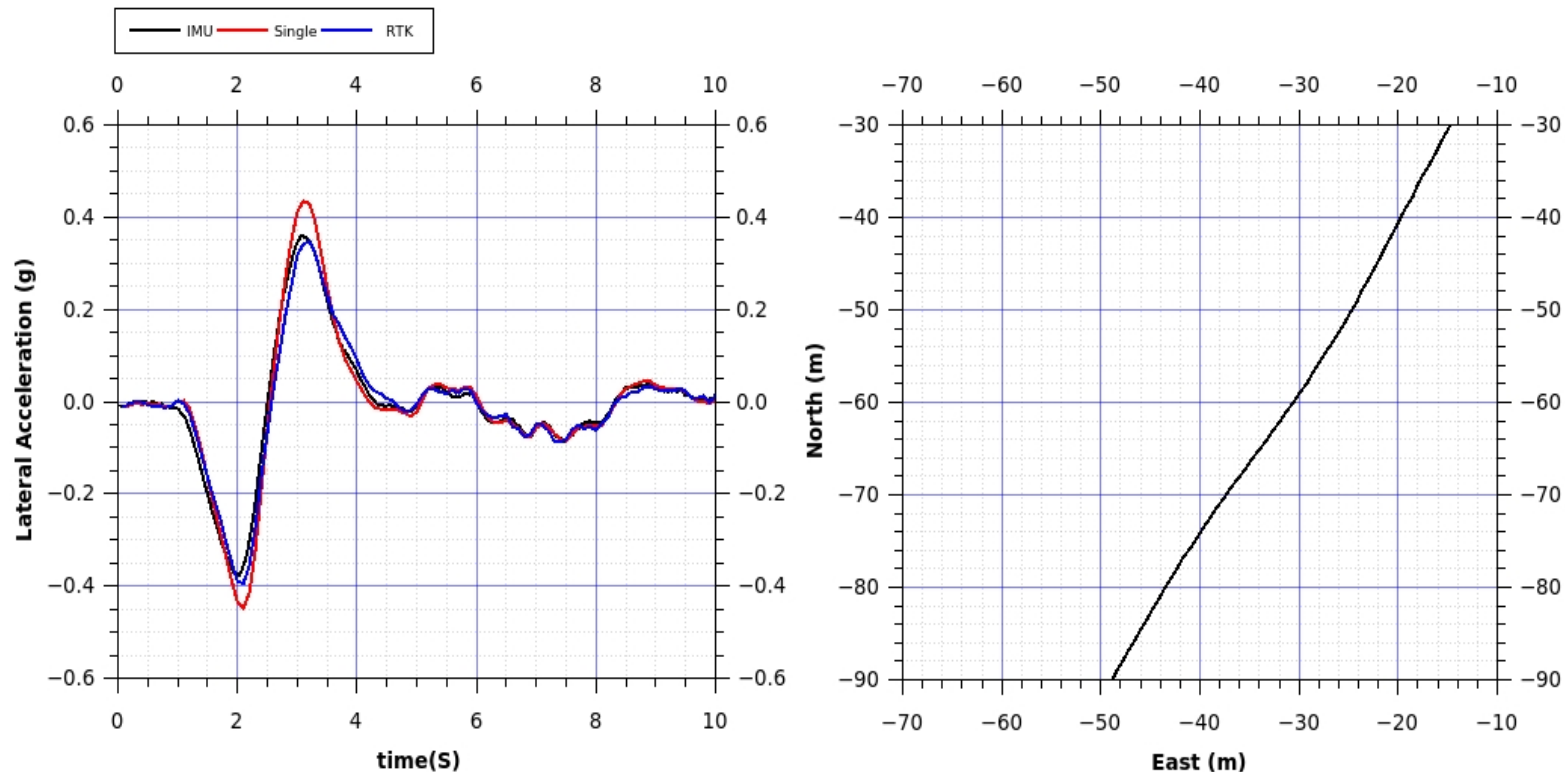


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Lane Changing Test



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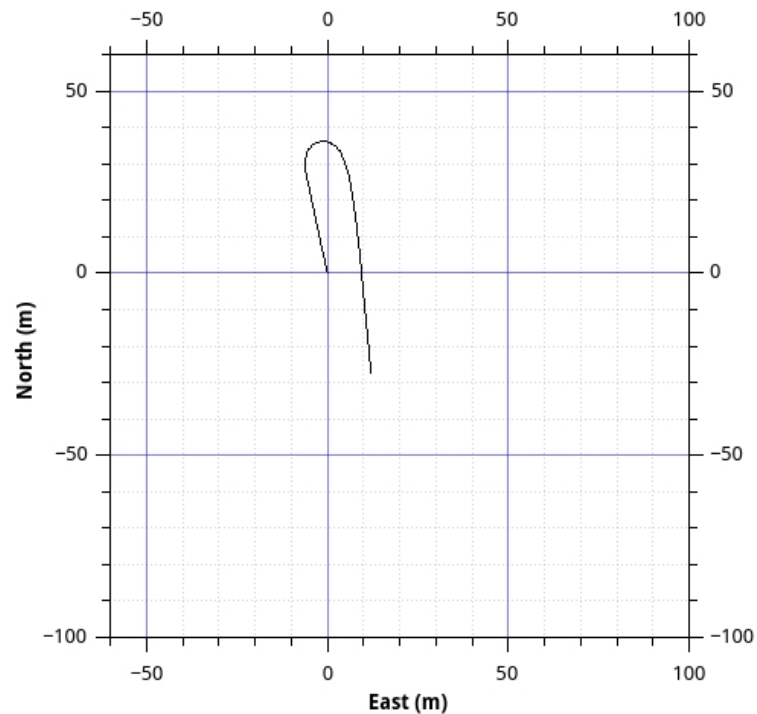
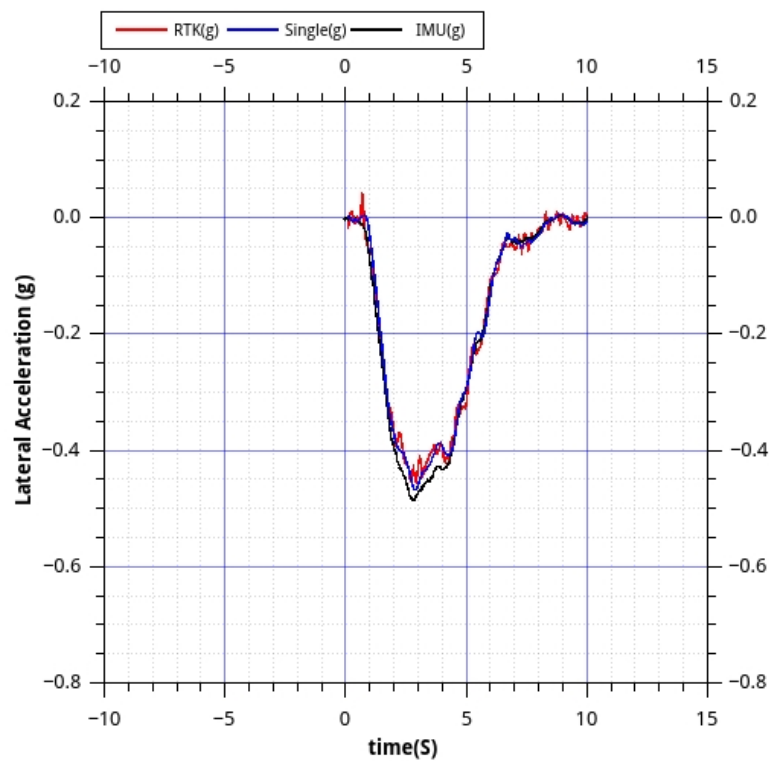


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Turning Test



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<http://youtu.be/kwXfIBxs69A>
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Survey Class GNSS – RTK system

- The precision from Multi-GNSS is the key to detect the risk incident in vehicle driver's behavior.
 - Single solution was enough for turning analysis.
 - RTK solution was required for lane changing analysis.
- Accuracy from RTK solution was less than actual lateral motion from lane changing.
 - Sub-meter class with high update rate capable for it.
 - PPP was considered

R. THITIPATANAPONG, S. KLONGNAIVAI, N. NOOMWONGS and S. CHATRANUWATHANA, "Study of Driver Behavior Detection on Vehicle with Satellite Navigation System (in Thai)," in GEOINFOTECH, GISTDA, Nonthaburi, Thailand, 2013.

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