# Consecutive FDIA For Autonomous Integrity Checking of Navigation Maps on Board Vehicles

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***Abstract*** *- Now a day's passenger uses navigation system while traveling. Passenger uses Google map for navigation which provide best and short distance to reach at their specific destination. This paper is completely in view of FDIA for Autonomous Identity checking of route maps on board vehicles that implies fault detection, isolation and adaption (FDIA) which is only a framework which base on discovering deficiency everywhere throughout the auto and gathers if select over dashboard exhibit in auto. The FDIA framework detailed in this work fills this gap by making use of repeated vehicle trips along the same roads as a source of redundancy. Results demonstrate that we utilize the property of Global Navigation Satellite System (GNSS) for secure and conveyed route framework of our venture. GSS maps are only predefined Google maps store which interfaces with the world over point's route procedure. The proposed framework was tested real sensor data and navigation map fault. Result was excellent in the open sky areas and promising in urban conditions. This procedure works through satellite so conjunction and furthermore utilizes cloud of information stockpiling so again no information lost issue.*

***Keywords*** - Global Positioning Services, Global Navigation Satellite System, Fault Detection, Isolation and Adaption , Intelligent Vehicle.

## I. INTRODUCTION

Today's passenger vehicles and navigation map are important components. Map is type of navigation system which provides guideline and context information to driver. The context information is provided by Advanced Driving Assistance System (ADASs) [1] .In automotive industry map is central component in autonomous vehicles that are currently under development. Integrity is an important feature when navigation functions relay on information technology. Integrity can be defined as ability of system to provide the user with accurate timely, complete an unambiguous information and warning when the system should not be used. Therefore new integrity monitoring function added to monitor integrity in real time. The main problem of Google map app or any other competitor is that it doesn't show clearly indication for turns it more focus on the map insist on indication for turn. The main information which is actually useful for the driver is limited to just 30% of the screen for the smartphone which results increase in distraction as the drivers needs to see the small indication and places closely instead of focusing on the road. It may confuse the user for taking correct turn. So Car Navigator we will show the correct turn and indication and more user friendly GUI.

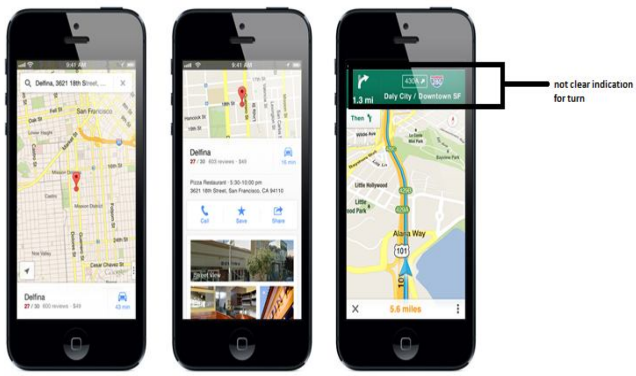


Fig: General Navigation View on Mobile Display

Navigation mapped to contain geometrical information which also essential for highly automated driving, path planning, decision making and control functions. Navigation system presents a new method of detecting, isolating and adapting geometrical errors in map to avoid functionality problems with client system [2]. This navigation system developed framework of overcoming ambiguity by making use of repeated vehicle trips. Using a model of effect on estimation faults isolation and adaption are performed by comparing past and current position estimates. The first step in FDIA consists in detecting fault by comparing two position estimates N and G(where, N is available observation position and G is current position).However, noise on estimates may cause non-faulty estimates to be different from each other and induce false alarms in the detection process. Once a fault has been detected a problem is known to isolate the faulty estimates and perform adaptation according to positions made previously. The detection and adaption is two concepts show how a set of faults can be isolated based on observation. Isolation capability improves as number of trips increases and that adaptation is possible when fault is isolated. The vehicle navigation system comes with confidence index associated with map-matched vehicle position It gives final score of optimization that employed in map-matching. However, this index not gives quality in navigation map for achieving high quality of map it provides high –confidence index.

The concept of user-level integrity was introduced[3] in GNSS.GNSS having problem with integrity monitoring for positioning vehicle. The authors presented new method for integrity monitoring of GNSS integrity with map complexity and map-matching solution integrity. By using map complexity and map –matching system providing only high-level data such as calculated vehicle position before and after map-matching. After map-matching integrity evaluation is dependent on choice of road conditions.[4][5] In this process Monte Carlo based approaches is used with particle filters. Particle filters are used when available resources allow them. Set of particles are spread over whole road network. Bayesian framework is used choose likely road. Bayesian network is easy way to handle conflict in data fusion [6].

Observation-based system monitoring comparing outputs based on given input.[7] Observation-based system there in system .If fault is there in system it shows in look-up table. Look-up table linking different faults and effects on the system would enable them to be identified unambiguously.[8] That unambiguously is isolated and corrected from the system. This process is known as Fault detection, Isolation and Adaption (FDIA). [9]

## II. MOTIVATION

To remove the fault detection in navigation map and corrected them. It means if any kind of problem is picked in the entire process regarding navigation, so in this case our goals is to pick them all & solve it in quick time. To avoid the noise two estimates from the use of standard vehicle sensors. It is very important to pick some very frequent bugs & error control management in the system. Creating touch screen for front of driver glass and display the navigation map also provided sound for show the direction, here we use some very good quality base gorilla glass display for better visibility. To improve the error free navigation map for detecting the fault detection, fault isolation and adaptation. This is our objective to put forward our demand on the floor using this type of concept which is very cheap & easily available in the market. To improve the FDIA framework to avoid utilizes repeated trips along the same roads as a source of redundancy. To improve sensor tracking and enables hazardous situations to be anticipated, by adapting the vehicle speed.

## III. LITERATURE

1. Sequential FDIA for Autonomous Integrity Monitoring of Navigation Maps on Board Vehicles[10] ,Clément Zinoune, Philippe Bonnifait, and Javier Ibañez-Guzmán,. In this paper the passenger vehicles navigation systems on board display fault detection, isolation, and adaptation (FDIA).The systems prevent advanced driving assistance systems and autonomous driving functions vehicle position continuously monitored and assessed data provided by the navigation system. In system method to use for detecting, isolating, and adapting geometrical errors in maps in orders to avoid dysfunctions in client systems. The fault detection comparing two estimates using a sequential statistical test to detect discrepancies despite the presence of noise and fault isolation and adaptation is introduced to identify faulty estimates and to provide a correction. The FDIA framework presented here utilizes repeated trips along the same roads as a source of redundancy. Relevant properties of this formalism and algorithm are given and verified vehicle in rural and urban conditions and with various map faults. The proposed approach estimate of vehicle position that is independent of the navigation system and based on data from standard vehicle sensors and to use the navigation map to display on car driver front glass through the mobile phone and also provided sound for left-right direction and this glass provided touch screen. Results show that sequential FDIA performed well, even in difficult GNSS conditions and display touch screen navigation map on front of car driver glass.
2. Behind the Glass: Driver Challenges and Opportunities for AR Automotive Applications By Joseph L. Gabbard, Gregory M. Fitch, and Hyungil Kim,The manufacturing company Corning has developed a product it calls Gorilla Glass. The company designed the glass for our electronic lifestyles. As we carry around computers, tablets,smartphones, MP3 players and other devices, we risk damaging them through everyday use. Corning's Gorilla Glass stands up to abuse with scratch- and impact-resistant qualities. And Corning's approach allows the glass to be incredibly thin, meaning it won't interfere with capacitance touch screens or add significant weight to a device.What's Corning's secret? What's so special about Gorilla Glass that sets it apart from other kinds of glass? The answer involves incredible temperatures, a special trough, robots and a molten salt bath. The finished product is a thin piece of glass that can withstand a lot of punishment. While you might think of glass in its manufactured form, the truth is it's a material we find in nature. Certain rocks and minerals become glass after coming into contact with high temperatures. This occurs

naturally along lava flows and places where lightning has hit the ground. Humans have been creating glass for millennia. Furnaces capable of generating incredible heat melt the right type of rocks down into what we call a glass melt. At this stage, you can shape the glass in many ways, including using a tube to push air into the mass. We call this technique glass blowing. Commercial glass tends to come from three main sources. The first is sand, which we refer to chemically as silicon dioxide. That's the type of material Corning uses in its manufacturing process. The other two types of materials in commercial glass include limestone and sodium carbonate.

3. Localization Confidence Domains via Set Inversion on Short-Term Trajectory, Vincent Drevelle and Philippe Bonnifait .This paper represents a booming estimation method that is able to quantify the localization confidence based on interval analysis and constraint propagation. Localization or positioning can be used for navigation in environment. this paper considers navigation of intelligent vehicles in urban areas without devoted beacons installed in infrastructure. This papers goal is to meet meter level accuracy with high availability and integrity for navigation. For achieving availability and integrity it uses dead-reckoning sensors, like odometers and gyros . odometers and gyros gives low latency pose prediction with buffer management. Sensor's take position from tightly coupled GPS map fusion. Because of frequent masking of the GPS satellites that can reduce drastically the number of position fixes, pseudoranges are directly exploited in a tightly coupled manner. Recent advances related to mapping make possible to use precise 3-D maps of the road network, surveyed in global coordinates with many details that allow the charting of the drivable space. If the vehicle always remains located in the drivable space of such a 3-D map, this information can be exploited in the localization process as a position constraint. GPS positioning is a time of arrival method, which involves pseudorange measurements from each visible satellite [1].Experimental validation was performed in very challenging GPS conditions, i.e., an urban canyon with at most two satellites in view half of the time. A CPF has been implemented for comparison purpose. Real-time processing tests showed the system's ability to provide full positioning availability, pose confidence domains that are consistent with ground truth, and positioning errors below 5.1 m for 95% of the time. Under the same conditions, the CPF yield comparable point-positioning results, but only half of the confidence domains were consistent with ground truth.
4. Map-Aided Integrity Monitoring of a Land Vehicle Navigation System, Nagendra R. Velaga, Mohammed A. Quddus, Abigail L. Bristow, and Yuheng Zheng, 2 june 2012. The concept of user-level integrity monitoring has been successfully applied to air transport navigation systems, where the main focus is on the errors associated with the Global Positioning System (GPS)-data-processing chain. Little research effort has been devoted to the study of integrity monitoring for the case of land vehicle navigation systems. The primary difference is that it is also necessary to consider errors associated with a spatial map and a map-matching (MM) process when monitoring the integrity of a land vehicle navigation system. Errors associated with a spatial road map are given special attention. Two knowledge-based fuzzy inference systems were developed to measure the integrity scale.

## IV.CONCLUSION

In this study, We have analyzed the map navigation. System has investigated realization of navigation guide over Android. The investigation covers basic functions of navigation guide there are functions such showing map, showing POIs on map, showing direction, showing user's location on map and so on. Moreover, during the investigation, I try to integrate current innovation technologies as many as possible. The FDIA framework detailed in this work fills this gap by making use of repeated vehicle trips. The proposed framework was tested using real sensor data and navigation map faults. Performance was excellent in open sky areas and promising in urban conditions. This highlights the interest of using this FDIA approach in intelligent vehicles.

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