

Activity Report of EASTS IRG (International Research Group)

IRG-04-2005

Date of Submission: 30/8/2007

1. Name of IRG:

Scale Free Characteristics of the Traffic Network (SCAFT)

2. List of research members:

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3. Purpose and Mission of IRG:

IRG SCAFT is a research group established in year 2005 by EASTS community to look into the problem of design of optimal integrated transportation systems. It currently operates under the leadership of Professor Ashok Kumar Gwal and has since succeeded to become a vibrant international research body, progressing in several fronts. The core feature of our proposed group is to study and measure the topological and dynamical properties of gradient induced flow entities within traffic and social networks using tools developed from superstatistics and GPS technology.

So far, we have developed and published, although much fundamental work has to be done and still needs to be taken care of with the upcoming technologies, new engineering tools and measures to extract the most dynamical stable path for proposed new global integrated transportation planning paradigm from existing social networks.

The focus of our second phase of our study is the application of GPS and related technologies for designing a feasible global feedback control mechanism for such system.

3.1 Vehicle tracking systems

As a very important application of GPS, vehicle tracking systems are usually used for managing a fleet of vehicles. The vehicles of a fleet are fitted with GPS, which usually transmit the positional data of the vehicles to a central station. The central station is a monitoring station, where the position of vehicles is displayed on a GIS map. Vehicle tracking systems will be useful for the police and emergency response services. The central station usually diverts the vehicle nearest to the site, where the vehicles are required. By using a wireless phone service or cellular phone network, real time corrections can be sent to the receivers fitted on the vehicles and better results can be obtained.

3.2 Vehicle navigation systems

Vehicle navigation systems are used for guiding vehicles to their destination. These systems usually use GPS or inertial navigation systems or a combination of both for positioning the vehicle. The advantage of using both inertial navigation systems and GPS is that navigation can be continued even when the GPS cannot receive the signals from the satellites due to obstruction. In countries like the US, vehicle navigation systems are used for guiding tourists to different tourist spots. The vehicle navigation systems use a computer, which determines the position of the vehicle, plans the route and gives the directions to the driver. The driver gives the location of his/her destination while starting his journey and the computer guides the driver by giving either audio or and visual instructions. The route the computer plans is usually optimized route; the route is the route optimized for distance or the route can be the most or the least used route. Following the principle study of vehicle tracking and vehicle

navigation system, this projects also aims at study movement of vehicles meticulously in certain defined regions of India as well as Australia.

3.3 Neural Network Studies

Another important implementation of the study comprises of Artificial Neural Networking systems (ANNs) that may be defined as a processing system comprising of a large number of highly interconnected processing elements (neurones) working in unison to solve specific problems through rigorous data analysis obtained from GPS. ANNs, like people, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological as well as physical systems involves adjustments to the synaptic connections that exist between the neurones. This is true of ANNs as well. Such method can be found useful for analysis of accidents using decision trees and neural network studies.

4. Past Achievements

4.1 Paper, Report or Book: (Title, Authors, Year, Name of journal etc.)

(You don't need to attach the files.)

Mojarrabi, B. (2006) Forms and function of gradient induced flows in transportation and social networks, Proceedings of Australasian Transport Research Forum, ATRF06, Gold coast, September 2006.

Ionospheric Total Electron Content measurements in Malaysian region during high solar activity using GPS receiver Activity Period Using GPS Receiver. Rashmi Wahi, Smita Dubey and A.K. Gwal. Indian Journal of Radio and Space Physics, 34, 399-401, 2005

Study of Amplitude And Phase Scintillation At GPS Frequency, Smita Dubey, Rashmi Wahi, Sub Lieutenant Ekkaphon Mingkhwan and A.K.Gwal, Indian Journal of Radio and Space Physics, 34, 402-407, 2005

Ionospheric effects on GPS monitoring, Smita Dubey, Rashmi Wahi and A.K.Gwal, Advances in Space Research, 38, 2478-2484, 2006.

A study of L band scintillations at equatorial latitudes, A.K.Gwal, Smita Dubey and Rashmi Wahi, Advances in Space Research, 34, 2092-2095, 2004

4.2 Seminar, Symposium or Special Session: (Title, Date, Venue & abstract)

4.3 Group meeting: (Date, Venue & abstract)

4.4 Result of Application to other research funds: (Name & result)

4.5 Promotional activities of your IRG: (Home page, Newsletter, Mailing list etc.)

Will you continue your IRG activity in next term (after September 2007) ? YES

→ If "YES", please answer the following questions.

5. Future research plan including time frame with the following items:

- Planned seminar, symposium etc. (Date & Venue) December 2007, India
- Possibility of Special Session at the next EASTS conference in 2009, yes
- Special considerations to young researchers

6. Application for ICRA Grant

Will you apply for ICRA Grant ? [NO]