Networks Research Lab (NetRL)

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VANETS

- Vehicular Ad-hoc Networks (VANETS) recently received great attention as a tool to disseminate information among vehicles with the dual purpose of increasing road safety and comfort in driving
  - Information Propagation Probability in VANETS is an important metric to design such a system
    - initially focus on Intersections where there is no build in infrastructure, later expand to network
    - from the quantity representation of the probability we can estimate the minimum appropriate conditions under of which information propagation is most likely to occur
    - derived probability and compared with VISSIM simulator results

Vehicular Ad Hoc Networks

- Current Work – Our Contribution
  - Simulation validation of our theoretical analysis using real data of major Highways around Los Angeles with VISSIM
    - Estimate information propagation probability between two areas in a given time

- Future Plan
  - Study the improvement of information speed and message delivery probability by inserting road side units
  - Relax assumptions used (e.g. Random and Independent vehicle mobility, single lane roads)
  - Information Hovering in VANETs- Information hovers from one vehicle to another remaining in the vicinity of its anchoring geographical location
Information Propagation Probability on Intersections

- Based on our paper “Information Propagation Probability on Intersections in VANETS” published on June 2007 in the 3rd International Workshop On Vehicle-to-Vehicle Communications

- Problem Formulation
  - Intersection: $I_j$,
  - Roads: $h_{ij}$ and $h_{jk}$,
  - Points: R, M
  - Head of Inform.: veh$_1$
  - Angle: $\phi$,
Information Propagation Probability on Intersections

- Ways to Propagate information on an Intersection
  - By transmitting

\[ p_{h_{ij}h_{jk}} = p_{tr} h_{ij} h_{jk} + (1 - p_{tr} h_{ij} h_{jk}) \times p_{dr} h_{ij} h_{jk} \]
Results

- Conclusions: Information propagation probability increases:
  - When we increase time
  - When we increase the arrival rate of the road we want the information to be transmitted
Simulation

- Validation of Theoretical Analysis
- VISSIM – a powerful microscopic simulator
  - Developed by PTV, German company which provides software, consulting and research for travel, traffic and transportation planning
  - Licensed by UCY
  - Highly Parameterized, Easy to use
  - Creates an output file with the coordinates of vehicles at every simulation step
Simulation

• **Processing the output file of VISSIM**
  
  – We develop an application using C++ which reads the output file of VISSIM
  
  – Process multiple output files
  
  – The application is highly parameterized
  
  – User can define among others:
    
    • Vehicle Transmission range
    
    • Source and Target Area and/or Vehicle
    
    • Exact time of information creation
    
    • Inserting Road Site Units with different transmission range
    
    • Percentage of equipped vehicles