1. Project title, abstract, Participant names

Title: A Self – Organizing and Message-Type Oriented Reputation Scheme for Vehicular Ad Hoc Networks (VANET)

Abstract: We propose a self-organizing trust model that uses a message based approach to formulate opinions about an event. Our model uses role, experienced based trust, split message trust, and the reliability of previous messages. Our model uses a threshold value and a confidence value to evaluate messages. Furthermore, our model takes into account the ever changing nature of roads by not relying on RSUs, which a fair amount of other models assume are always present. Our model evaluates what percentages of malicious nodes have an impact on messages, or go undetected. We also evaluate the performance of our model based ontime efficiency (the time it takes to perform a trust opinion and aggregation); and route avoidance (the ability of a node to avoid a particular route based on trust messages). Additionally we propose a solution to the storage and recollection of experience based trust in a decentralized environment that uses rapidly expiring keys. For added confidence in message transmission a threshold value for consideration ensures that only reliable nodes will contribute into the synthesis of a message.

Participants: Neha Gupta and Greg Johnson

2. Papers, status of papers, products

The poster, which does not contain information from the performance metrics, will be shown at MSU’s Mid-SURE presentation.

A draft of the paper is complete. Before the paper is submitted it still needs work. It needs to be edited and perhaps needs more accurate data before submitting.

3. Findings

1. Through computer simulations, we verified the feasibility of using
randomized multi-path routing for network-layer secret key extraction.

2. We found mobility helps to enhance the security of the
network-layer key extraction. Based on this finding, we have developed
two secret-share transmission interval control mechanisms, a
determinstic one and an adaptive one, to exploit node's mobility to
increase security.

4. Contributions:

a. within discipline: This project explored a new method of how to best determinetrust in VANETs. The findings increased our understanding of the relationship between security and privacy, as we were able to propose a self-organizing, direct model; rather than using a centralized approach to trust storage. Initial
data has been obtained after creating a grid, a car, and messages, through class composition in code we wrote in C++. This data aims to demonstrate the efficiency of our proposed model, and preliminary graphs have been placed in the paper draft.

b. to other disciplines: The outcome of this project will create a new method of determining trust values, which may have an impact on privacy and security. This privacy and security measures could extend to data confidentiality and the measure of information that is acceptable to release.

c. to human resource development: Two undergraduate students were
engaged in this project and have received training in
programming, network simulation, and network security
under the guidance of Dr. Fu and Jared Oluoch. The result of the training helps
to create a future in research careers, graduate applications, and the pursuit of higher education.

d. Beyond science and engineering: The final presentation of this project was open to the general public and presented at MSU for the Mid-Sure event. Such activities were promoted and this can promote the education of computer science and network security knowledge among the general public and may potentially attract more people to pursue computer science and Information Technology as their future career.

5. Training and Development for the students:

Students working on the project of "Vehicular Ad Hoc Networks" were trained
on skills related to cryptography, network modeling, security, network simulation, and privacy. The specific skills they have acquired through this project include writing mathematical equations, algorithms relating to trust (updating, decay, and establishing), and coding simulators to test their work. It is expected that such experience will enable them to gain solid backgrounds on emerging technologies in VANETs and at the same time foster their interests in
pursuing more advanced studies after their undergraduate program.