Anshuman Chhabra

Junior Undergraduate   **B-405**
Dept. of Electronics and Communication Engineering   BH-II
Netaji Subhas Institute of Technology   NSIT, Delhi
Dwarka, New Delhi   anshuman.lalakers@gmail.com

Research Interests

Machine Learning, Communication and Information theory, Wireless and Mobile Networks, Signal Processing, Electromagnetic Field Theory Applications

Education

Netaji Subhas Institute of Technology
B.E. in Electronics and Communication Engineering
Aggregate percentage 71.77 (**First Division**)

Completed/ Published research work

A. Chhabra, V. Vashishth, D. K. Sharma, **'An integrated approach using fuzzy logic and game theory for securing Opportunistic Networks',** currently being peer-reviewed by the journal *Ad Hoc Networks (Elsevier)*, 2016.
The project dealt with creation of a novel defense mechanism to secure the interactions between benign nodes and malicious nodes in an Opportunistic Network called the FuzzyPT. Fuzzy logic was used to make the defence mechanism more adaptive. The evolutionary stable strategy was then computed to prove the efficiency of the defence mechanism in fighting varied kinds of attacks.

S. K. Dhurandher, D. K. Sharma ,**A. Chhabra**, V. Vashishth, **'POPRON: Post Office Protocol for Routing in Infrastructure based Opportunistic Networks',** *has been completed and submitted to college faculty (guides) for publishing.*
The aim of this project was to create a novel infrastructure based routing protocol which modells an infostation heirarchy and combines its benefits with that of message ferries. The protocol was seen to outperform the Global Ferry scheme used to route messages in infrastructure based Opportunistic Networks.

A. Chhabra, V. Vashishth, D. K. Sharma, **'A game theoretic approach to securing Opportunistic Networks against Black Hole Attacks',** accepted for presentation and publication in IEEEXplore by the *IEEE Annual Conference on Information Sciences and Systems*, Johns Hopkins University, Baltimore, MD, USA, 2017.
This research project dealt with using our previously invented FuzzyPT protocol and modifying it to suit very specic attacks, such as the Black Hole attacks in OppNets. The protocol was further modified to charcterize nodes based on their interactions and behaviour with other nodes and it was seen that modelling was able to successfully detect messages being routed to malicious nodes. The Potential Threat (PT) protocol was also subjected to a game theoretic evaluation where malicious nodes were shown to never opt for malicious activities when given the option.

A. Chhabra, V. Vashishth, D. K. Sharma, **'SEIR: A Stackelberg Game based approach for energy-aware and incentivized routing in Selfish Opportunistic Networks',** accepted for presentation and publication in IEEEXplore by the *IEEE Annual Conference on Information Sciences and Systems*, Johns Hopkins University, Baltimore, MD, USA, 2017.
The Stackelberg game for duopolies was used as a basis to incorporate into routing OppNets. We devise the routing protocol to also incentivize nodes to transmit messages instead of being selsh. Moreover, the SEIR protocol also aims to maximize energy conservation. The mathematical basis for the Stackelberg game are applied to different characteristics of the Opportunistic Network and suitable results are then obtained. It

is found that the SEIR protocol is able to reduce energy consumption of nodes as well as increase message transmission in the network.

V. Vashishth, **A. Chhabra**, A. Sood, **'A predictive approach to task scheduling for Big Data in Cloud environments using classification algorithms'**, accepted for presentation and publication in IEEEXplore by the *Confluence - IEEE International Conference on Cloud, Data Science and Engineering*, Noida, India, 2017. The idea behind this project was to optimize task allocation in cloud enviornment especially when dealing with Big Data. Time of computation was reduced by choosing to predict clouldlet allocation to an appropriate Virtual Machine instead of computation. This was done with the help of various classifiers which were made to imitate a task allocation algorithm (Particle Swarm Optimization). The accuracy of prediction was compared for three sets of classifiers - Naive Bayes, Random Forest and KNN. Other performance charecteristics were also computed and were proven to perform better than the conventional PSO algorithm.

A. Chhabra, 'An Elliptic Curve Cryptography based Encryption Scheme for securing the Cloud against Eavesdropping Attacks', submitted to the series - *Advances in Intelligent Systems and Computing (Springer)*, decisions will be out by 15th March 2017.
In this paper, a security scheme for preventing eavesdropping attacks in Cloud environments is proposed. The encryption scheme is based on Elliptic Curve Cryptography and is specially tailored for securing Cloud services providing storage facilities. Subsequent results obtained show that the security scheme reduces the computational overhead incurred in the encryption of data. It is observed that the proposed scheme outperforms the other schemes in terms of the chosen performance characteristics.

Undergoing Research

Introduction of Stochastic properties to dielectric constant and relative permittivity of the wall medium in through wall sensing of humans using the FDTD method
- Working under Dr. Shobha Sundar Ram, ECE Dept., IIIT-Delhi.
- The project aims to allow for more realistic modelling of the FDTD method in applications of human tracking through walls.
- Work is still undergoing but simulation results so far have come out to be quite well. Experimental setting up of a radar system and further testing remain.

Using Gaussian Mixture Models for copy and paste forgery detection in Images
- Working with Dr. Jyotsna Singh, ECE Dept, NSIT.
- GMMs with other algorithms such as MAP and EM are being used to devise efficient strategies for Image denoising as well as forgery detection.
- Work is undergoing but is still in the nascent stages.

Other Projects

Smart Car: Collision Detection and Fuel Management Facilities
A project undertaken as part of the Microprocessors Lab in the sixth semester under Prof. Dhananjay V. Gadre (NSIT)
- Intel's 8085 microprocessor is being used to develop utilities for Smart Car.
- A number of insurance claims are made due to lack of witnesses and sometimes car crash victims are not given expedient medical attention. For this a collision detection system inside the car is necessary. Despite the archaic architecture of the 8085, we are developing such a facility for the car.
- Most often car users have no idea of how their fuel is being spent in the vehicle, creating a need for fuel management. A self calculating feature is being built

which allows for the user to input a date and the day's fuel consumption will be broken down and displayed.

Internships	**Machine Learning Intern at Be U Salons (Gingerpan Swapcart Pvt Ltd.)**

- Working as the sole Machine learning intern at the startup.
- Working to build:
  a. Chatbot for the companies' website.
  b. A facial recognition feature for continuous streaming video camera input.
- Out of these, the chatbot is ready and will soon be made live. Python and its ML modules and Geolocation APIs were used to develop the chatbot.

Courses Taken

- Machine Learning (Stanford University) **[View]**
- Ruby on Rails: An introduction (Johns Hopkins University) **[View]**
- Rails with Active Record and Action Pack (Johns Hopkins University) **[View]**
- Ruby on Rails Web Services and Integration with MongoDB (Johns Hopkins University) **[View]**
- HTML, CSS and JavaScript for Web Developers(Johns Hopkins University) **[View]**
- Javascript for Experienced Developers from Microsoft Virtual Academy

Skill Set

Languages and frameworks: MATLAB, C, C++, Python, Java, Javascript, Ruby, VHDL, Rails, OpenStack, HTML, CSS

Skilled In: Machine Learning, Networking, Wireless and Mobile Networks, Opportunistic Networks, Wireless Sensor Networks, Soft Computing, Web Development, Cloud Computing, Network Security, Natural Language Processing, Computer Vision, Electromagnetic Theory, Cosmology, General Relativity, Analog Electronics, Digital Electronics, Microprocessors and Microcontrollers