

FINAL REPORT

PROFESSIONAL DEVELOPMENT ASSIGNMENT (PDA)

Academic Year 2018-19

Dr. Dipankar Dasgupta

Professor of Computer Science

Director, Center for Information Assurance

July 20, 2019

I was on Professional Development Assignment (PDA) during the Academic year 2018=19. I have been actively involved in scholarly research and professional activities during the period. Particularly, I spent most of my time in visiting several countries, gave ACM distinguished lectures, experiencing their research and exchange ideas. I also managed 5 federally-funded projects, and supervised and mentored graduate (Ph.D) and undergraduate students in campus. I was also active in three university committees and research clusters. As per the plan, I did research in the field of *nature-inspired computing and its applications* -- design and development of intelligent software solutions inspired by biological and natural systems. These investigations resulted in following publications and a few others are in preparation.

Specific Professional Activities during FALL 2018

- August 31, 2018: Gave an invited talk on An Adaptive Multi-Factor Authentication (A-MFA) System at Oslo University, Norway's security seminar series AFSecurity (Academic Forum on Security, details at <https://wiki.uio.no/mn/ifi/AFSecurity/>) and participants from several IT companies attended along with university faculty and students.
- ☐☐September 3-7, 2018: Visited University of Jyväskylä, Finland and gave several lectures (as part of a short course) on Computational Intelligence in Cybersecurity, participated in research discussion and explored collaboration. <http://users.jyu.fi/~veijalai/TJTSS71/>
- ☐☐September 12, 2018: Gave an invited talk on "Advances in User Authentication" at Memphis chapter of The Information Systems Audit and Control Association (ISACA), Crescent Club, Memphis. ISACA is an international organization (www.isaca.org) comprised of more than 175 local chapters located in over 70 countries worldwide. Each chapter is dedicated to providing members with diverse education opportunities, resource sharing, advocacy, and professional networking; the event participants were IT audit and consulting professionals working for various companies, hospitals, and banks in greater Memphis area.
- September 14, 2018: The Center for Information Assurance hosted Raymond James and engaged in day-long activities/meetings to explore collaboration; Prof. Dasgupta led the discussion where cybersecurity faculty and students participated and gave brief presentation of their research works at the FedEx Institute of Technology (FIT).
- October 1-10: Poland Give a series of lectures on different research topics and also give ACM Distinguished Speaker talk on Immunological Computation.
- October 20: December 22nd: worked at the Indian Institute of Technology Kharagpur (<http://cse.iitkgp.ac.in/>) for two months as an International Visiting

Professor and offered a micro-credit course on Computational Intelligence in Cyber Security. The course received a lot of attention among students.

- Gave several lectures online to the Indian Institute of Technology, Bhubaneswar, India.
- October 26: ACM Distinguished lecture on Social Media security and Privacy issues at Bhopal, India
- October 27: ACM Distinguished Speaker talk on Social Media security and Privacy issues at Indore, India.
- November 18-21: Organized IEEE Symposium on Computational Intelligence in Cybersecurity at SSCI, offered a tutorial and served as a session chair at the event, Bangalore, India.
- November 27: Gave an invited talk on Adaptive Strategy in User Identity Management at the Indian Institute of Technology, Kharagpur, India.
<http://cse.iitkgp.ac.in/vtalks.php?yr=2018>

Peer-Reviewed Publications (currently working on 3 other research papers)

1. Debanjan Sadhya, Zahid Akhtar, **Dipankar Dasgupta**. A Locality Sensitive Hashing Based Approach for Generating Cancelable Fingerprints. IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS), pp. 1-8, Tampa, USA, September 2019.
2. **Dipankar Dasgupta**, Zahid Akhtar, Sajib Sen, Anoop Singhal, "Machine Learning in Cybersecurity: A Comprehensive Survey", The Journal of Defense Modeling and Simulation, SAGE, 2019 (Submitted).
3. Zahid Akhtar and **Dipankar Dasgupta**, "Malware Detection and Analysis: Challenges and Research Opportunities", IEEE Security and Privacy, 2019 (Submitted).
4. Zahid Akhtar and **Dipankar Dasgupta**, "A Comparative Evaluation of Local Feature Descriptors for Face Authenticity Detection", IEEE International Symposium on Technologies for Homeland Security, pp. 1-8, Woburn, USA, November 5-6, 2019.
5. Shiba Kuanar, Vassilis Athitsos, Dwarikanath Mahapatra, Zahid Akhtar, **Dipankar Dasgupta**, K.R. Rao, "Low Dose Abdominal CT Image Reconstruction: An Unsupervised Learning Based Approach", IEEE International Conference on Image Processing (ICIP), pp. 1-5, Taipei, Taiwan, September 22-25, 2019.
6. Z Akhtar, **D Dasgupta**, B Banerjee. Face Authenticity: An Overview of Face Manipulation Generation, Detection and Recognition, In Proceedings of International Conference on Communication and Information Processing (ICCIP), Elsevier-SSRN, pp. 1-8, Pune, India, May 17-18, 2019.
7. **D. Dasgupta**, J. Shrein and K. Duttagupta *A Survey of Blockchain from Security Perspective*. In Journal of Banking and Financial Technology, Springer (DOI: 10.1007/s42786-018-00002-6).
8. Kishore Duttagupta, Sajib Sen and **Dipankar Dasgupta**. *Smart Crowd sourcing-based Content Review System (SCCRS): An approach to improve trustworthiness of online contents*. In the conference proceedings of International Conference on Computational Data and Social Networks (CSoNet 2018) held on December 18-20 in Shanghai, China.
9. Subash Poudyal, Kul Prasad Subedi, **Dipankar Dasgupta**. *A Framework for Analyzing Ransomware using Machine Learning* In *Proceedings of IEEE Symposia Series on Computational Intelligence (SSCI)* November 18-21, 2018, Bangalore, India.
10. C Cabrera, G Hernández, LF Niño, **D Dasgupta**. *Thermal Vein Signatures, DNA and EEG Brainprint in Biometric User Authentication* In International Workshop on Experimental and Efficient Algorithms, Pages 30-41, October 2018

11. S Ghosh, MH Ali, **D Dasgupta**. *Effects of Cyber-Attacks on the Energy Storage in a Hybrid Power System*. In Proceedings of the IEEE PES General Meeting, 978-1-5386-7703-2/18, Portland, OR, USA, August 2018
12. D R Budhathoki, **D Dasgupta**, P Jain. *Analysis of Multi-Market Stock data to find Exchange Dominance*. In 8th Annual International Conference on Accounting and Finance (AF), Singapore, July 2018
13. **Dipankar Dasgupta**. *Biometrics and its use: Viewpoint*. In *Biostatistics and Biometrics--Open Access Journal* (ISSN: 2573-2633) 7 (3), pp 1-3, July 2018
14. **Dipankar Dasgupta**, John Shrein, McKittrick Swindle and Abhijit Kumar Nag. *Design and Implementation of Adaptive Multi-Factor Authentication (A-MFA) System*. Submitted to the EURASIP Journal on Information Security, 2018
15. **Dipankar Dasgupta**. *Biometrics and its use: Viewpoint*. *Biostatistics and Biometrics--Open Access Journal* (ISSN: 2573-2633) 7 (3), 1-3, July 2018.
16. **Dipankar Dasgupta**, Arunava Roy and Debashis Ghosh, *Multi-user Permission Strategy to Access Sensitive Information*, Published in journal of Information Sciences, Elsevier, Volume 423, Pages 24-49 January 2018.

Awards & Achievements:

- Received College of Arts & Sciences (CAS) Designation of [William Hill Professor in Cybersecurity, August 22, 2018](#)
- **Patent (#9,912,657) on Adaptive Multi-Factor Authentication** has been approved by United States Patent and Trademark Office on 6th of March, 2018. [US patent information at USPTO website.](#)
 - The A-MFA patent information is published in Federal agencies monthly magazine (FedTech) for circulation and adoption, August 2019.
- **[Submitted another patent application on Multi-user Permission Strategy to Access Sensitive Information](#)**
- Administered 5 federally funded projects, and planning to submit 3 new proposals
- Negotiating with 3 Companies (Raymond James, Discover Card and Intel) on Corporate engagements on our research
- Leading to form university-wide team to propose NSF ERC Center of Excellence
- Working on a Multi-University DHS proposal with MIT.
- Involved in hosting two Professional workshops in August and another in October
- Helped to host Cyber Summit in October

Community Outreach

As the Director of the Center for Information Assurance (CfIA), Prof. Dasgupta established formal agreements have been made with several schools for shared curriculums, lectures, and teaching materials. We hope that this is the first step of many towards significantly greater exposure and recognition for the Information Technology capabilities of the participating schools and surrounding businesses. We hope that continued interest will be maintained by the Mid-South area and our efforts can encourage the growth

of not only the students but also the private sector as a result of supply of cyber qualified graduates entering the job market. As my sabbatical Year started, I have been involved in following activities in campus:

2018 [Cyber Ambassadors Tech Camp](#) High School students were introduced to the concepts of Cybersecurity, Ethical Hacking, Coding and more in this weeklong camp.

2018 [Professional Development Series](#)

A series of professional development workshops were conducted that focused on Cybersecurity, Secure Coding, and More.

2018 [Online Cybersecurity Courses](#)

Online courses we developed focused on various aspects of Cybersecurity. These FEMA funded courses are free for all users. Our most recent course, [Cyber Identity and Authentication](#) will be available soon.

2018 Cybersecurity Radio Program:

Initiated monthly broadcast on Cyber Safety and best Practices from the University's radio channel. Here are the links for two radio broadcasts:

[Cybersecurity Radio Show 1](#)

[Cybersecurity Radio Show 2](#)

2019 Cyber Ambassadors Tech Camp

PDA Report Spring 2019

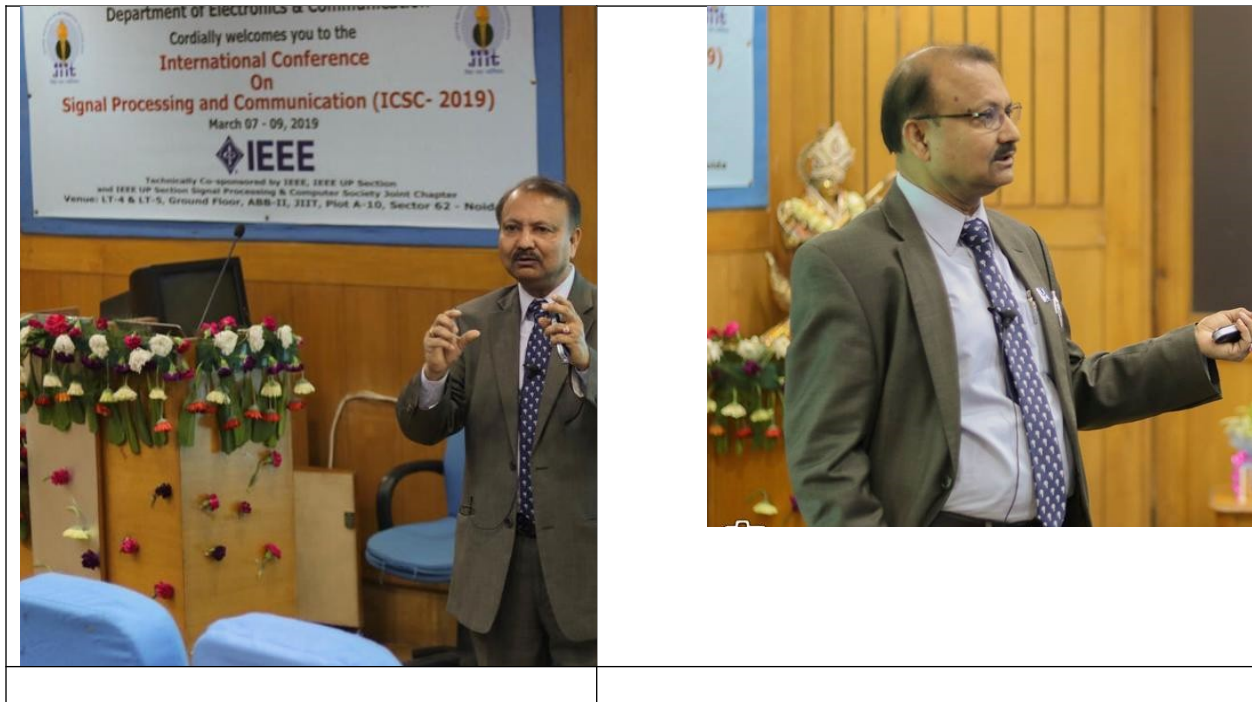
- Gave an ACM-DSP Keynote Speech on Puzzle-based learning in Cyber Security Education at Second International Conference on Advanced Computational and Communication Paradigms (ICACCP 2019) (<http://www.icaccpa.in/>) at Sikkim Manipal Institute of Technology (SMIT), February 25 - 28, 2019, Sikkim, India.



- On March 8th gave ACM Distinguish Speaker Program (DSP) lecture on "Genetic and Evolutionary Computation in Defense, Security and Risk Management" at ABES Engineering College, Ghaziabad, India. Website: <https://www.facebook.com/1493589300958116/posts/2224133807903658/>



- On March 9th gave Keynote Speech at ICSC-2019 at Jaypee Institute of Information Technology, Noida (INDIA) <http://www.jiit.ac.in/jiit/icsc/>



- Visited **IIT Bhubaneshwar, India** on **March 10th-15th, 2019** and offered a short course on cyber security.
- Gave **NEDTalk** on “**Hashtag & emoji in social media**” at **University of Memphis McWherter Library** on **April 18, 2019**.
- Delivered a talk on “**Data Privacy in Research**” at **Research & Networking Breakfast Series at FedEx Institute of Technology** on **April 24, 2019**.
- Gave **CAST Training on Cyber security** at **FedEx Institute of Technology** on **May 2, 2019**.
- Delivered an **invited talk** on his **Cyber Security Research** at **City--University of London** on **June 5, 2019**.
- Gave an **invited talk** on his patented research (**A-MFA**) at **University of Oxford, England** (<http://www.cs.ox.ac.uk/seminars/2225.html>) on **June 7, 2019**.
- Delivered an **invited talks** on **Online Social Networks and Privacy Issues** and engaged in discussion on research collaboration, and student visits, etc. The talk took place on **11 June 2019** in **Infolab21, Lancaster University, England** and was well received, attended by faculty and students in the hall and remotely. The talk covered a wide range of issues starting from blogging, twitting and social networking which become an important part of our daily life. at **Lancaster University, England** (<https://www.lancaster.ac.uk/events/acm-distinguished-talk-on-online-social-networks-and-privacy-issues>) on **June 11, 2019**.

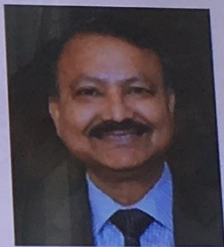
Lancaster Intelligent,
 Robotic & Autonomous
 Systems Centre

Lancaster
 University

**ACM Distinguished Talk on
 Online Social Networks and Privacy issues**

Professor Dipankar Dasgupta, FIEEE
 Director, Centre for Information Assurance
 Department of Computer Science
 University of Memphis

D55, InfoLab21
Tuesday, 11th June 1.30 – 2.30pm





- Facilitated in hosting 2019 Cyber Ambassadors Tech Camp High School students, where the concepts of Cybersecurity, Ethical Hacking, and Secure Coding were introduced, June 19-20, 2019.
- Hosted visiting Professor Jayanta Mukhopadhyay from Indian Institute of Technology (IIT), Kharagpu, who gave talk on *Information Processing for Neonatal Health Care* on June 17th at 12:30 pm, Methodist Presentation Theatre (FIT 103). Hi visit initiated collaboration with UTHS and six faculty from the University of Memphis.
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- Online courses we developed focused on various aspects of Cybersecurity. These FEMA funded courses are free for all users. Our most recent course, Cyber Identity and Authentication will be available soon.
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Other Services / Creative Activities

- ❖ Hosted two Cybersecurity Professional workshops on August 3rd and another on October 12, 2018
- ❖ Helped (in finding the speakers and some logistics) hosting the Cyber Summit in October 5, 2018.
- ❖ Negotiating with 3 Companies (Raymond James, Discover Card and Intel) on corporate engagements on research and organized Raymond James visit to Campus.
- ❖ Helped to form university-wide team to propose NSF ERC Center of Excellence
- ❖ Engaged in TWO university-level Committees: UM Corporate Strategy Council and University Research Council.