To Whom It May Concern,

I am writing to apply for the US National Science Foundation (NSF) travel grant opportunity for US-based students (Type B) for INFOCOM 2014. I have the paper *DAWN: Defending Against Wormhole Attacks in Wireless Network Coding Systems* accepted by INFOCOM 2014.

I am a second year PhD candidate at Oklahoma State University, working on incentive issues, data privacy and cyber security of crowdsourcing and wireless networks.

I have been working on the incentive mechanisms of crowdsourcing. I have investigated the problems on crowdsourcing such as *Sensing Uncertainty* and *Finite Sensing Precisions*. I have proposed different mechanisms that can achieve equilibria for various scenarios. I have also studied the privacy preserving mechanisms in crowdsourcing that can achieve k-anonymity and differential privacy. For the cyber security in wireless networks, I have researched the wormhole attack in network coding systems, and participated in designing the algorithms to defend against wormhole attacks.

I have authored/coauthored 4 papers. 3 have been published or accepted by prestigious conferences and journals like INFOCOM, ICC and Journal of Electronic Imaging.

By attending the prestigious conferences like INFOCOM, I can gain abundant advanced knowledge from the face-to-face discussions with the active contributors in my research field. Getting to know the people in the same field can definitely help me prepare the academic career in the future.

Thank you.

Shiyu Ji, PhD Candidate,
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February 4, 2014

SHIYU JI

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RESEARCH INTERESTS

My current research interests include incentive mechanisms, data privacy and cyber security of crowdsourcing and wireless networks.

EDUCATION

- **Ph.D. Candidate** (2012-Present), Computer Science, Oklahoma State University.
  Advisor: Dr. Tingting Chen.
- **B.E.** (2008-2012), Information Security, Harbin Institute of Technology. GPA: 3.7/4.0.

PUBLICATIONS

1. Shiyu Ji, Tingting Chen, Sheng Zhong, Subhash Kak. DAWN: Defending Against Wormhole Attacks in Wireless Network Coding Systems, accepted by *IEEE International Conference on Computer Communications (INFOCOM)*, Toronto, Canada, April, 2014.
2. Shiyu Ji, Tingting Chen. Crowdsensing Incentive Mechanisms for Mobile Systems with Finite Precisions, accepted by *IEEE ICC 2014 - Mobile and Wireless Networking Symposium (ICC'14 MWN)*, Sydney, Australia, June, 2014.
3. Shiyu Ji, Xiaojun Tong, Miao Zhang. Image encryption schemes for joint photographic experts group and graphics interchange format formats based on three-dimensional baker with compound chaotic sequence generator. *Journal of Electronic Imaging*, vol. 22, no. 1 (2013): 013017-013017.

EXPERIENCE

- **Research Assistant** (06/2013-08/2013) at Oklahoma State University.
  Advisor: Dr. Tingting Chen.
  I worked on the wormhole attacks and incentive issues of crowdsourcing.

  For the research of wormhole attacks, I quatified the negative impacts of wormhole attacks on network coding systems and proposed the Expected Transmission Count (ETX) based algorithms to defend against wormhole attacks for network coding systems. Extensive simulations have verified the validness and efficiency of the proposed algorithms.

  For incentive issues of crowdsourcing, I researched two problems:

  - *Sensing Uncertainty*: I investigated the negative impacts of uncertainty on crowdsourcing, and proposed the incentive mechanism that can achieve Trembling-Hand Perfect Equilibrium for the crowdsourcing game with uncertain perturbations. I also designed extensive simulations to successfully verify the correctness and efficiency of the proposed incentive mechanism.
  - *Finite Sensing Precisions*: I investigated the harmful influences of finite precisions on crowdsensing, and proposed the incentive mechanism that can achieve Bayesian Nash Equilibrium for the crowdsensing game with finite sensing precisions. Extensive simulations have verified the proposed mechanism is valid and efficient.

- **Teaching Assistant** (08/2012-Present) at Oklahoma State University.
  I graded for *Data Structures and Algorithms*, *Formal Languages*, *Numerical Analysis* and *Wireless Networks*. I also prepared the introductory slides of ns3 at the graduate level course.

- **Research Assistant** (11/2011-05/2012) at Harbin Institute of Technology.
  Advisor: Prof. Xiaojun Tong.
  I worked on the algorithms of chaotic image encryption on various graphic formats, such as JPEG, GIF, etc. I proposed an image encryption algorithm that leverages three-dimensional baker map and compound chaotic sequence generator. Extensive experiments have verified that the proposed encryption algorithm achieves high security as NIST SP 800-22 standard requires.

HONORS AND AWARDS

- Honorable Mention, Mathematical Contest in Modeling (MCM) (top 25%), 2011.
- First Class Scholarships of Harbin Institute of Technology (top 5%), 2008-2011.
- Excellent Graduate of Harbin Institute of Technology (top 10%), 2012.
- Excellent Student of Harbin Institute of Technology (top 5%), 2011.
- First Prize, Chinese High School Physics Competition (top 5%), 2007.

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February 4, 2014

Dear Travel Grants Committee Chairs,

I am writing to support Shiyu Ji's application for the US National Science Foundation (NSF) travel grant for US-based students (Type B) to attend INFOCOM 2014. Shiyu has been working with me in the areas of wireless networks since Fall 2012. As his advisor, I know his research qualifications very well.

Shiyu is the best PhD student in our department, with 4.0/4.0 GPA and three finished first-author papers. As a second year student, he already has two papers accepted, one by INFOCOM 2014 and the other by ICC 2014.

Shiyu has demonstrated his outstanding research capability. He has impressive strength in theoretical analysis and he is a quick-learner as well in terms of hands-on programming. For example, one of his finished papers was dedicated to address the incentive issues in mobile crowdsensing. He leveraged the game theoretical approach to solve the problems of Finite Sensing Precisions. The obtained results can achieve equilibria in various scenarios. He contributed to the papers with his remarkable analytical and experimental skills.

As a researcher, Shiyu has just started. He has great potential to accomplish more in his bright future. At this stage, if he can directly communicate with active researchers in prestigious conferences like INFOCOM, I believe it will expand his horizon and thus benefit his career a lot.

I support him without reservation in this application. I will be glad to offer further information about him if needed.

Sincerely,

Chen Tingting

Tingting Chen
Assistant Professor
Department of Computer Science
Oklahoma State University

Travel Cost Estimate

Items	Airfare	Hotel	Conference Registration	Total
Cost	$500	$350	$550	$1400

Table 1: Travel Cost Estimate