




# I'm From the Government and I'm Here to Help.

How to get your research in front of the right people  
at NSA.

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The nine most terrifying words in the English language are, 'I'm from the government and I'm here to help.'

President Ronald Reagan

# Outline

- Background
- Examples of research needs
- What NSA can offer to the researcher and university
- Wrap-up

# National Security Agency

- Established under Executive Order in 1952 from President Truman
- Prior to 1987 two main missions
  - Signals Intelligence
  - Communication Security
- After 1987 Computer Security was added
  - Technical advice role with NIST for national
  - Still senior advocate for DoD
- Today 3 main missions
  - SIGINT
  - Information Assurance
  - Computer Network Operations

# Areas of Research

- Computer Science/Computer Engineering
  - Vulnerability Discovery
  - Malware Analysis
  - Real-time Embedded Computing
  - Parallel and Distributed Computing
- Engineering
  - Network Engineering
  - Systems Engineering
  - Microelectronics
  - RF Engineering
- Mathematics
  - Algorithm Development
  - Crypto

# NSA SEAL Program

- NSA assigns a Senior Education Academic Liaison (SEAL) representative to colleges and universities
  - SID SEALs are assigned due to affiliation or interest of individual Senior. There are also Associate SEALs (read younger employees for some schools) who work with the SID SEALs.
  - IAD SEALs (S is for Security here) are assigned to each of the National Centers of Academic Excellence in IA Education (CAE/IAE) and National Centers of Academic Excellence in Research (CAE-R).
  - To best of my knowledge, all major schools in Texas have at least one SEAL.
- If you do not know who is your SEAL, email me. They are your institutions entry point into NSA.

# Selected Research Problems

- Selected from a set of 25 unclassified problems from Feb 2011
- Good examples of NSA operational challenges that can be helped with your research
- Ask your SEAL for a more complete listing

# Open Source Verification

- Background

- The internet is full of information of uncertain pedigree, resulting in a mixture in which misinformation may appear to have equal value to legitimate information.

- Key Research Questions

- Develop techniques that can be used to rate the validity (prove or disprove) information found on the internet
- Assess the performance of the techniques developed by rating randomly selected articles found in Wikipedia or similar sources

# Watson versus the Unknown

- Background

- Watson is IBM's DeepQA system that successfully out-competed humans on Jeopardy. In its now famous human-machine challenge Watson was asked to give the question to an answer whose associated question was already known.

- Key Research Questions

- Can the techniques implemented in Watson be used as a powerful knowledge discovery tool to find the questions to answers associated with questions that are not known?
- Turning this around, can these techniques be applied to find the answers to questions whose answers are unknown?

# Machine Translation in less commonly taught languages

- Background

- 2004 Tsunami/2010 Haiti Earthquake translators were needed to support humanitarian efforts. Modern statistical machine translation systems by training the system using line by line translation of parallel texts. Bad news is that LCTL ALT reliance on religious texts is not the daily language. One promising approach uses Wikipedia, news, and Linux manuals.

- Key Research Question

- For each several LCTL, develop a technique for the assembly, from openly available internet sources, of a collection of parallel sentences with more than 1 million words in English and the parallel translation in the LCTL

# Network Modeling

- Background

- When TCP/IP was created, the foundation of the Internet was very different from what it is today. The impact of advances in network components may impact how TCP/IP operates. Additionally the issue of Net Neutrality will have some impacts on network services as delivered by carriers.

- Key Research Questions

- How can QOS be provided in the face of net neutrality to support real-time services? (VOIP, VTC etc.)
- Develop a model of the internet to study the impact of Buffer Bloat.
- Can Buffer Bloat introduce a network wide DOS problem?
- Develop techniques to expose what is routinely communicating with “my computer”.

# Hosting Sensitive Information in the Commercial Cloud

- Background

- As commercial capabilities continue to expand in the arena of cloud offerings such as Infrastructure as a Service (IaaS) and Platform as a Service (PaaS), organizations, including the Federal Government, are beginning to push their data out into the cloud due to cost efficiencies and flexibility. Two criteria that need to be considered when contemplating the hosting of sensitive information in the commercial cloud are:
  - Providing security services (CIAN)
  - Leveraging the availability and scalability of the cloud.

- Key Research Questions:

- How can sensitive data be secured in a commercial cloud while at rest, in transit, during computation and at endpoint access?
- How can the risk to sensitive data be minimized while utilizing un-trusted infrastructure?
- How can the computing power inherent in processing the data on an external cloud be leveraged without putting the data at risk?

# System of Systems

- Background

- Mobile devices, especially smart phones, can be considered as a system of systems. On a smart phone various different stakeholders control different interfacing systems (e.g. the user, the cellular network, the app, etc....)

- Key Research Questions

- What are the connections among those systems? What are the security concerns? In particular, what is the connection between security in the phone and the app system on a smart phone?
- Cyber defense (red team/blue team) activities have been conducted for enterprise networks and components. How could one design a “smart phone” based Cyber defensive exercise? How would this exercise differ from a mobile device Cyber defensive exercise?

# What NSA can do for You

- One Grant program
  - Mathematical Sciences Program
    - Specific areas
    - 4 levels of grants up to \$15K
    - Deadline 15 October for conferences and special situations
    - See [www.nsa.gov](http://www.nsa.gov) under Research for more info
- Academic Research
  - Answer Broad Area Announcements (BAA)
    - Often from IAPRA or DARPA
  - Unsolicited Proposals
    - Talk to your SEAL (SID or IAD) as to what you are investigating
    - SEAL will contact RD for interest
- That is it.
  - We are not NSF.

# Some Additional Notes

- NSA is looking for your best and brightest
  - (US Citizens)
- As Interns
  - CS/CE, Engineering, and Math
    - Do not forget the Stokes Scholarship program for outstanding Sophomore Math majors
  - See [www.nsa.gov](http://www.nsa.gov) for deadlines
- As Employees
  - FY12 Hiring Goal = 1500 new hires
    - FYI NSA met last years' goal of over 1500 new hires
  - Just finished three careers fairs in Texas
    - Texas A&M
    - UTSA
    - UT

# Closing

- Your research might be able to help NSA with some of our hard problems.
- We are not NSF.
- We have internal opportunities for your researchers.
- NSA is working to get some researchers assigned to our San Antonio office.
  - Your best may not have to leave the state.

# Contact information

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