

**Call for Proposals**  
**MSIP-AFOSR Korea Cyber Security Basic Research**  
**iC2S2 (intelligent Convergence Cyber Security Systems) 2017-2020**

The Korean Ministry of Science, ICT, and Future Planning (MSIP) and the US Air Force Asian Office of Aerospace Research & Development (AOARD) with Office of Naval Research Global (ONRG) and the U.S. Army International Technology Center - Pacific (ITC-PAC) announce the solicitation for a three-year Program which is co-funded by the Korean Ministry of Science, ICT, and Future Planning (MSIP).

**History:**

MSIP has had a long 10-year relationship with the USAF and sister services for supporting basic scientific research efforts. In order to continue to provide opportunities for scientists and engineers in both countries to collaborate in these emerging technology areas and to leverage their intellectual resources, MSIP and AFOSR are collaborating on a new cyber-security basic-research program.

**Eligibility:**

This is an open call with open competition, so welcome all applications. Each application must consist of a team with a PI at a US institution and a PI at a Korean institution which are eligible to receive grants from AFOSR and IITP respectively. Only one application per PI please.

**Collaborative Funding Opportunity:**

Teams consisting of a principal investigator (PI) from Korea with his/her counterpart from the US are invited to submit a joint proposals indicating what could be uniquely accomplished with a collaboration with sustained funding for three years.

Within the realm of Basic Research for Information Assurance and Cyber-Security, proposals are sought to address the following scientific challenges:

- (1) Making practical Homomorphic Encryption, Program Obfuscation, and Secure Multiparty Computation, Post Quantum Cryptographic Protocols: The practical realization of these fundamental science challenges will enable an entirely new paradigm for trusted computing. Significant efficiencies must be gained before the concept can be turned into reality.
- (2) Provably Security. Current cyber systems are expanding to the Internet of Things (IoT) and virtualized cloud systems. To accomplish cyber-security in the short-term will likely be done with many small patches. We are seeking proposals for longer-term low-overhead provable security for

these systems. The long-term security of both systems could be enabled by identifying low-overhead (about 10%) provably-secure protocols or VMs or hypervisors.

(a) For the IoT, the small size and limited processing power of many connected devices could inhibit encryption and other robust security measures. If a vulnerability is discovered on that type of device, it may be difficult to update the software or apply a patch. Secure IoT devices would best be secured by design and impervious from the start.

(b) For Cloud systems the potential to compromise the virtualization software, or hypervisor can cause the whole datacenter to go down or be reconfigured to an attacker's liking. Cloud security should ensure that infrastructure is secure and data and applications are protected. Can this be accomplished with provably-secure VMs or hypervisors?

(3) Nanoscale and Quantum-Enabled Security: Nanoscale material properties and quantum effects should offer new security capabilities for future hardware devices. They potentially enable physical construction of cryptographic primitives that are traditionally described by algorithms and typically implemented by software.

(4) Formal Modeling, Automation and verification of IoT/Cloud security.

(a) for the Cloud security : Formal verifier of VM/Hypervisor security(A full code-coverage sandbox for verifying the security of VM/Hypervisor), “behavior-based” malware detection (detection of “invariant behaviors” with respect to classes of malware)

( b) for the IoT security : model checking and formal verification to ensure protection against zero day attacks.

Selection will be based upon the (1) the scientific merit of the proposal (2) the unique synergy enabled by the US-Korean team, and (3) the potential for eventual transition of the basic research investment towards societal applications. Based on the joint evaluation of these proposals, the winning teams will be funded by their respective country's funding agency.

It is expected that efforts funded under this program will complement existing basic research efforts and would foster greater scientific collaboration between the US and Korea. Specific areas of interest for AFOSR can be also found in the AFOSR Broad Agency Announcement (BAA-AFOSR-2016-0007) at <http://www.grants.gov/search/search.do>

### **Funding Level:**

All funding is estimated and based on budget availability of both the US and Korean governments. We anticipate Three Years of funding - AFOSR will fund about five US PI's

up to US \$100,000 per year and IITP will fund their corresponding Korean PI's up to 120,000,000 KRW per year for each grant.

The US and Korea grant funding is expected to occur in three periods which are approximately

Jul 2017 – Jun 2018: \$100,000, each

Jul 2018 – Jun 2019: \$100,000, each

Jul 2019 – Jun 2020: \$100,000, each

### **Application Process, Timeline, and Submission Information**

The proposal submission process is in two stages. Prospective awardees are encouraged to submit an optional white papers to minimize the labor and cost associated with the production of detailed full proposals that have very little chance of being selected for funding. Any offeror may still submit a full proposal even if its white paper was not identified as being of “particular value” or if no white paper was submitted.

Approximately 12 white papers will be invited to submit full proposals.

Optional White Paper Phase: Each team consisting of Korean PI and US PI is asked to submit a white paper with a narrative of no more than 4 pages. The white papers should include research highlights (problem, method of investigation, uniqueness of approach, synergy value of the specific Korean/US team, and potential applications), and the following two items as appendices: biographic information on both the Korean and the US research team members, and a short budget summary from each side. White papers should be submitted via email to the POCs of IITP and AFOSR **by 2 Mar 2017**.

Full Proposal Phase: Each application must be from a team consisting of a Korean PI and a US. Any offeror may still submit a full proposal even if its white paper was not specifically requested to submit a full proposal or if no white paper was submitted. Full proposal will include a narrative of no more than 8 pages to compete for the final selection. The proposals should include research highlights (problem, method of investigation, uniqueness of approach, synergy value of the specific Korean/US team, and potential applications), and the following items as appendices: CV's for both PIs, a joint budget summary. In addition, each team member may need to submit supplemental documents, forms, and budget justification required by the US/Korea funding agency for which the team member will be seeking funding. Identical Joint Proposal narratives and appendices with all funding-agency specific associated supplemental documents should be

submitted to both the following websites of IITP and AFOSR by 28 April 2017 at 18:00 Seoul, Korea Time.

Korean PIs: Submit white papers to jilee@iitp.kr, sun1016@iitp.kr, gazetier@iitp.kr  
Submit full proposals to [ezone.iitp.kr](http://ezone.iitp.kr)

US PIs: Please request a template package from [Mario.serna@us.af.mil](mailto:Mario.serna@us.af.mil). Submit white papers to [mario.serna@us.af.mil](mailto:mario.serna@us.af.mil) and full proposals through the funding opportunity BAA-AFOSR-2016-0007 (<http://www.grants.gov/web/grants/view-opportunity.html?oppId=285269> ) Please use the AOARD international package. In box 4b of the SF424 enter “Serna, Mario A” to direct it to the correct office. Once submitted, please e-mail both the full grant application package and the Grants.gov ID number to [mario.serna@us.af.mil](mailto:mario.serna@us.af.mil).

The evaluation of full proposals will be made by US government and IITP representatives. The announcement for the awardee will be made in May 2017. Applicants funded by the U.S. Air Force Office of Scientific Research (AFOSR), are subject to the terms and conditions described in the current AFOSR Broad Agency Announcement. Evaluation criteria and review are subject to the terms and conditions described in the current AFOSR Broad Agency Announcement

The following items should be discussed between the Korean PI's institution and the US PI's institution:

1. Intellectual property issues
2. Personnel exchanges (faculty and students) to promote collaborative research.

Addressing these issues well in advance will expedite the grant process and minimize delays in starting the research collaboration.

Joint Reporting: When awarded, the Korean and US PI's shall submit joint annual and joint final reports to MSIP, IITP and AFOSR as required in the grant paperwork. In addition, mandatory annual program reviews will be held, and both PI's are expected to attend the review and to make a joint oral presentations. Korean travel to program reviews in the United States will be provided by a separate grant from US Navy. The US PIs should allocate in their grant budget travel funds to attend the reviews which will alternate between Korea and the United States. The first 2018 review, will be in the United States.