

**TARGETED CALL: INTERNATIONAL JOINT PROJECTS WITHIN THE ICT 2023
PROGRAMME: WiFiUS, WIRELESS COMMUNICATIONS AND NETWORKING**

Introduction

In 2011, NSF and the Academy of Finland, along with Tekes, embarked on a joint research program, i.e., Wireless Innovation between Finland and US (WiFiUS), which aimed to enlarge the scope of the US-Finland collaboration by including additional topics related to wireless networking.

Based on the success of past and ongoing collaborative projects, NSF and the Academy of Finland are continuing this joint program. WiFiUS seeks to fund innovative collaborative research that has the potential to make significant contributions in the area of wireless communications and networking, especially in light of the emerging Internet of Things.

Program description

Proposals are solicited for joint US-Finland foundational and transformative research in the area of wireless networking.

Reflecting the funding priorities of each participating NSF division as well as those of the Academy of Finland, this program seeks research projects on novel frameworks, architectures, protocols, methodologies, and tools for the design and analysis of robust and highly dependable wireless communication systems and networks, especially as they support and enable the Internet of Things (IoT).

Driven by global digitalization and the emerging IoT paradigms, the number of connected devices is increasing at an exponential rate. Hundreds of billions and even trillions of IoT-connected devices are expected in the next five years. The abundant exploitation of wireless sensors, gadgets, multimedia services, autonomous robots, cognitive Internet, augmented reality, and other similar applications will require unparalleled access rates with high reliability and low latency. To achieve the anticipated capacity, reliability, latency, security, sustainable power efficiency, and cost-efficient realization of networks for wide-scale deployment, a complete paradigm shift in wireless communication technologies as well as their operation in wireless networks is required. The richness and variety of devices and connections in heterogeneous IoT systems is expected to generate a broad class of new and innovative communication technologies, protocols, network architectures, and applications.

This program seeks joint US-Finland research projects that leverage each nation's expertise and address these challenges via work in three areas:

1. IoT architectures and protocols: The IoT enables the exchange of information in a variety of application scenarios requiring unique performance guarantees including throughput, latency, and energy efficiency. This area addresses the design, modeling, performance analysis, and optimization challenges associated with increasingly diverse and heterogeneous IoT systems and applications at scale.
2. Cognitive IoT systems: In many emerging IoT systems, wireless networks are playing a central role. These networks are not just a bit-pipe to transport information. Rather, they are an intelligent fabric that combines network functions with communication, computation, and storage within the wireless network. A large

volume of information available in an IoT system can be used to improve the overall communication and network performance. This area addresses collecting, processing, analyzing, and storing spatial-temporal information available through a variety of devices and protocols in an IoT context, and the use of these data in improving network performance and addressing quality of experience (QoE).

3. Security and privacy in IoT: Emerging IoT systems involve a large number of devices and highly diverse device/application types. Traditional security solutions that rely on cryptography become inadequate due to the difficulty in providing physical protection of devices and initializing and securing key materials in the lifetime of an IoT system. This area seeks novel techniques leveraging fundamental physical properties in the context of their use to increase security, protect privacy, ensure resiliency, improve usability, and support scalability with extreme heterogeneity and mobility.

Applications will be submitted by a Finnish party and an American party. The parties apply for funding separately from the Academy and the NSF.

Academy of Finland and NSF strongly encourage new collaborations pursuant to this solicitation.

Joint research projects that receive funding will be included into the activities of the WiFiUS virtual institute (www.wifi.us).

Review of applications

The Academy of Finland and the NSF will conduct independent and parallel review processes and discuss the review results before making the funding decisions. During this discussion, Academy and NSF officials may share unattributed reviews (i.e. reviews will not include reviewer identities) with one another.

In addition to the Academy's normal review principles and criteria, WiFiUS applications will also be evaluated by the extent to which the proposed work supports the WiFiUS call theme, and by the extent to which the work and collaboration plans describe a unified project between Finnish and US researchers.

Special instructions for this call

Joint research plan

The Finnish PIs taking part in the joint project are expected to coordinate their Academy applications with their US counterparts' submissions to the NSF.

The applications addressed to the Academy and the NSF must include identical project abstracts, project descriptions, lists of publications, curricula vitae, collaboration and management plans, and lists of personnel (See appendix 1 B). The lists of publications must include references relevant to this project by the Finnish PIs and their US partners. *In addition*, append to the applications to the Academy the curricula vitae for the PIs and co-PIs applying for funding from the Academy and the curricula vitae for the PIs and co-PIs applying for funding from the NSF.

Annual researcher meetings

The researchers to be funded will be expected to attend – and should budget for – annual grantee review meetings for the purpose of sharing research progress with representatives of other projects funded under this call, as well as Academy and NSF representatives (and any other persons designated by these agencies). The first such meeting will be held some nine months after the funding is granted, and the succeeding meeting twelve months thereafter. For budgetary purposes, applicants should assume that one of these meetings will be held in Finland and one in the US.

Funding period

The Academy of Finland's Research Council for Natural Sciences and Engineering is prepared to fund 7–9 projects with a total of 2,000,000 euros. As a rule, the funding period for the two-year projects will start on 1 April 2017.

Appendices to application

The required appendices are listed in Appendix 1 B of the April 2016 call text.

How to apply

Please note the nonstandard call schedule. The non-negotiable deadline for applications is **17 October 2016** at 16.15. Draft the application in the Academy's online services. Select *Open calls* > **ICT 2023/WiFiUS, wireless networking (Academy of Finland and NSF)**.

Enter the application title (*on the application form: topic*) as follows: "WiFiUS:" followed by the project-specific text, for example: WiFiUS: Project title.

Draft the application so that the Academy's contribution to funding comes to no more than 70% of the estimated total project costs. Read more under Full cost model.

If the applicant is a consortium, see detailed guidelines on our website under Guidelines for consortium application. Consortium compositions cannot be changed after the deadline has expired. The consortium guidelines for the September 2016 call will be updated before the call opens.

Contacts

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APPENDICES TO APPLICATION IN WIFUIUS CALL

Append only the requested appendices to the application and make sure to draft them in line with the Academy's guidelines, see Appendices required on our website. Make sure not to exceed the maximum length of appendices. Draft the appendices in English and append them to the application in the online services under *Appendices*. The only exception is the Finnish PI's curriculum vitae, which is appended under *Personal data/CV*.

1. Appendices to application

Obligatory appendices:

- **research plan** (no more than 15 pages; also provide a bibliography), including:
 - a clear description of the proposed research and research collaboration (distribution of work and methods of implementation) and the added value to be expected from the collaboration
 - an account of the broader impact of the proposed research (indicated with a **separate heading**)
 - a joint budget, including separate budgets for both parties
 - a justification for the funding applied for
 - a description of any researcher training to be carried out within the project
 - a mobility plan detailing the project's national and international mobility plans during the funding period; describing the involvement of foreign researchers in the project; and explaining other ways in which the project transcends international, national, institutional and public/private sector boundaries
- **curricula vitae for the Finnish applicant and the foreign partner**; the CV for the Finnish applicant is appended under *Personal data/CV*; the CVs appended to applications to be submitted to the Academy of Finland must be drafted following the template of the Finnish Advisory Board on Research Integrity.
- **lists of publications by the Finnish applicant and the foreign partner**; in both lists, clearly indicate the ten most important publications for the research plan
- **collaboration and management plan** (no more than three pages):
 - Describe the collaboration and management included in the project.
 - Designate the principal investigator of the project; that person will be responsible for project coordination and management and will act as the project's contact person.
 - Describe the management and research duties within the project.
 - Define each PI's required input to the project, and justify why each research team's joint contribution outweighs their individual efforts put together.
 - Describe the mechanisms by which the project will integrate all participating organisations and individual researchers and bring together students or early-career researchers with their colleagues in Finland and the US.
 - Present the project's schedule and indicate the parties responsible for each main task.
 - Make sure that the collaboration and management plan's length and details are proportional to the size of the project. The plan should be extensive enough to ensure that the project's Finnish and American parties will work together as one whole.
- **list of personnel and organisations involved**
 - Provide a list of the participating Finnish and American PIs, vice PIs, senior scientists, partners, consultants and researchers with a doctorate.
 - Number the list and include the following details in the following order:

person's name, organisation and task in the project. Separate each item with a semicolon and put each person on a separate, numbered line:

1. *Mary Smith; XYZ University; PI*
2. *John Jones; University of PQR; Senior Personnel*
3. *Jane Brown; XYZ University; Postdoc*

Case-specific appendices:

- invitation by foreign university or research institute, if the research or part of it will be conducted abroad
- statement by an ethics committee or the Committee on Animal Experimentation; the ethical aspects must always be specified in the research plan
- progress report on all Academy-funded research projects headed by the applicant that have not submitted final reports

2. Application by a US research team and a consortium of two or several Finnish research teams

In international calls for joint projects, applicants can consider submitting a consortium application only if their research team working in Finland, **in addition** to a foreign partner, has close collaboration with at least one other team working in Finland.

For detailed guidelines, see Guidelines for consortium application on our website. The appendices are appended only to the consortium PI's application. The consortium guidelines for the September 2016 call will be updated before the call opens.

In addition, the following guidelines are applied to consortium applications in international calls:

Consortium PIs also append to their application **the curriculum vitae for and the list of publications by the foreign applicant**. Foreign applicants must clearly indicate the ten most important publications for the research plan.

The research plan must include both a **joint cost estimate for the project** and **separate cost estimates for all parties**.