Joint Call for Proposals between

JST (Japan) and NSTC (Taiwan) in the field of

"Nanoelectronics and System Integration for AI"

Call for Proposals

Closing Date:

1st August 2023 (1:00 Japan Time) / 31st July 2023 (24:00 Taiwan Time)

I. General Description

1. New Scheme for Joint Funding of Japan-Taiwan Research Cooperation

Japan Science and Technology Agency (JST) and the National Science and Technology Council (NSTC) have initiated a program for joint funding of Japan-Taiwan cooperative research projects. After consultation between JST and NSTC, "Nanoelectronics and System Integration for AI" was selected as the field of research to which the joint funding scheme is applied.

2. Aim of Program

The aim of the program is to strengthen collaboration between Japan and Taiwan within the field of "Nanoelectronics and System Integration for AI" to achieve world-class scientific results, leading towards new innovative science and technology.

Since Japan and Taiwan have different strengths in nanoelectronics, development of innovative nanoelectronics for AI applications is expected by conducting research while making use of the strengths of both Japan and Taiwan. In consideration of the above, JST and NSTC co-organized joint workshops (https://www.jst.go.jp/inter/program/kiban/gather/taiwan.html) in Kyoto (June 2019) and in Tainan (December 2022) to investigate cooperative research areas which are thought to have potential for collaboration between Japan and Taiwan researchers. Based on the outcome of the workshop, " Nanoelectronics and System Integration for AI" was jointly agreed upon as the field of the joint call in 2019 and 2021, and three teams were selected for each joint call. This year, the third joint call is announced under the same scheme.

3. Research Field

AI technologies quickly become a world leading research area for modern smart living technologies. Currently, the most application systems are based on graphics processing units (GPU) under the control of computers, which could involve heavy loading of memory access and computation kernel. For low power, fast, and versatile AI systems, researchers start to design the AI processors with concept of computation in memory (CIM) and near memory computing. In the future, neuromorphic computing or brain-inspired computing should be also deeply investigated. The possible cooperated topics were discussed in the last workshop (December 2022) to finalized the 3th Joint Call for Proposals, including new memory technologies for AI system, hardware and software platform design for AI systems, medical and health care applications with AI systems.

The priority research area / topics are listed below. In each of the last two calls, three projects were selected based on competition among more than ten applicants, and all of them are dealing with new materials for logic/memory devices. This year, we welcome proposals complementary to the ongoing subjects, such as novel design for AI computing systems and IoT technologies enabling new AI applications, although possible proposals are not limited to these subjects and those on material/device are still appreciated.

The priority research area / topics are:

1) Innovative AI computing technologies
   AI learning and inference systems with newly-invented enhanced modules require a large computing power and consume energy as well. Disruptive proposals are requested that enable efficient data processing for AI with minimum power consumption. Examples are near memory or in-memory computers using novel processing unit or memory device composed of new materials. Another example is neuromorphic computing based on new operation principles particularly those using analogue devices and circuits.

2) Innovative memory technology for AI computing
   The present scope includes proposals for design and fabrication methods to construct memory cells in an innovative manner. Possible organization of

memory cells and their supporting circuits, and programmable AI systems using reconfigurable circuits or tunable materials with novel architectures.

3) Innovative design of AI accelerator for gigapixel images

The scope also includes the applications of AI computing technologies in use of the accelerator that may enable processing, compression, and classification for high quality video/audio data. The segmentation and classification of the gigapixel images, for example pathology and hyperspectral images, could be a visible and high potential applications.

4) Innovative AioT technologies for health care services

Most health care services and medical inspections could be greatly enhanced with AI-based Internet on Thing (AioT) technologies. In collection of health data with sensing devices and subsequent analyses of big data model on cloud, the innovative AI systems are needed that could highly improve precision judgement and instant classification while keeping personal security.

4. Prospective Applicants and Eligibility Criteria

JST and NSTC invite Japan-based and Taiwan-based researchers to submit joint proposals for cooperative research projects in the research area of focus described above. An important criterion of the proposed collaboration is that it should build on and reinforce already on-going research activities in each research group and contribute significant added value to these through Japan-Taiwan collaboration.

Please note that each applicant can only apply for one project within this call. Researchers from industry may take part in the joint collaboration according to the following conditions: Japan: as Principal Investigators or partners; Taiwan: as partners in teams headed by Principal Investigators from an academic institution or research institute.

4-1. Eligibility criteria in Japan (For Japan-based applicants only)

1) Any independent researcher personally affiliated with and actively conducting research at a domestic Japanese research institution (or who would fulfil this requirement by the start of the research project), regardless of nationality, is eligible to apply.

Note: “Domestic Japanese research institution” in Japan refers to universities, independent administrative institutions, national/public testing and Research Institutions, specially authorized corporations, public-service corporations and enterprises, etc. that must satisfy predetermined requirements designated by MEXT. Please refer to the MEXT homepage for more information:
https://www.mext.go.jp/a_menu/kansa/houkoku/1324571.htm
(in Japanese only).

2) The Japan-based researchers who are currently financially supported as Principal Investigator under this JST(Japan)-NSTC(Taiwan) cooperative program are not eligible to apply.

The Japan-based applicant must complete a research ethics training program conducted by the research institute with which he or she is affiliated, and then declare the completion of the program to the JST call secretariat. If it would be difficult for the Japan applicant to undertake a research ethics training program provided by his or her own affiliated institute, he or she should please contact JST to register for a program provided by eAPRIN (previously known as CITI Japan) and should complete the program before the deadline of the call for proposals. Please be advised that unless the applicant completes a research ethics program, his or her application will be deemed ineligible and rejected. For more details, please refer to the Appendix (Japanese only).

5. Financial Support

JST and NSTC plan to support cooperative research projects including exchange of researchers to the counterpart research team.
JST supports expenses for Japan-based researchers, and NSTC supports expenses for Taiwan-based researchers.

It is envisioned to fund up to about 3 joint projects for this call depending on the number of proposals.

II. Details of Support

1. Budget for a Cooperative Research Project

Support by JST:

JST will support for the Japan-based research team for a full research period (i.e., approx. 36 months) totalling no more than 18 million yen including direct and indirect costs.

Indirect cost amounting to 10% or less of the total research expenses (direct expenses) will be allowed. Please refer Annex. 1 for further details.

Support by NSTC:

Please refer to the document from NSTC.

2. Cooperative Research Period

The cooperative research period shall be approx. 3 years in total, counting from the following start dates.

Support by JST:

The starting date of the projects: 1st April 2024.

The support by JST will be 36 months and will be completed by 31 March 2027.

Support by NSTC:

The starting date of the projects: 1st April 2024.

The support by NSTC will be 36 months and will be completed by 31 March 2027.

III. Contract between Researchers

A contract for cooperative research MUST be entered into among institutions with which collaborating researchers are affiliated for implementing actual research collaboration. The contract for cooperative research shall include conclusions of discussions among the institutions which are entitled to intellectual property arising as a result of research collaboration, and the institutions concerned on issues regarding treatment of research information

brought by researchers involved for the implementation of research collaboration, of research achievements as a result of research collaboration and of intellectual properties among the concerned institutions. Before conclusion of the contract, the Japan-based principal investigator must submit the check-list in specified form to JST and then undergo a check by JST. When concluded, JST needs to be promptly notified of the contract.

IV. Application

The Japan-based and Taiwan-based applicants shall write a common application that shall be handed in both to JST and NSTC in parallel. The application shall be written in English. For the Japan-based applicants, some part of the application should be also submitted in Japanese.

The application shall include:
A project description including how collaboration will be carried out, with clear statements of what roles Japan-based and Taiwan-based researchers will respectively play in the project;

a) Description of the expected outcome of the proposed project, scientifically as well as in terms of its relevance for the industry and society;
b) Description of the ongoing activities and specific advantages of the Japanese and Taiwanese research groups respectively have, which form the basis for the proposed joint project;
c) Description of the expected added value by the proposed joint project, including how the competence, technology and other resources of one party would complement the other's;
d) Description of how the project is expected to strengthen research cooperation between Japan and Taiwan over the longer term;
e) Description of the added value expected from the multidisciplinary approach in the proposed joint project; and
f) Description of the possible comparative advantages of the proposed joint project in comparison with other comparable activities worldwide.

1. Application Forms

Part Ⅰ	General Information
Part Ⅱ	Abstract
Part Ⅲ	Research Topic and Plan of Work
Part Ⅳ	Budget Description (for Japan-based Team)
Part Ⅴ	Budget Description (for Taiwan-based Team)
Part Ⅵ	Key Professional Personnel
Part Ⅶ	Personal Background Information
Part Ⅷ	Japanese Abstract (Japan-based applicants only)
Part Ⅸ	Compliance Checklist for Research Regulations (Japan-based applicants only)
Part Ⅹ	Declaration Letter (Japan-based applicants only)

2. Preparation of Application Forms

Applicants should fill in the particulars in all the application forms listed in above 1.

3. Submittal of Application Forms for Japan-based Applicants

Japan-based applicants should electronically submit their application forms to JST by the deadline, through online application system, e-Rad (https://www.e-rad.go.jp).

V. Evaluation of Project Proposals

1. Evaluation Procedure

Committees consisting of experts selected by JST and NSTC respectively will evaluate all proposals. Based on the results of the evaluation, JST and NSTC will make a common decision regarding funding of selected proposals.

2. Evaluation Criteria

The following general evaluation criteria will apply to each proposed project:

1) Conformity with Program Aims and Designated Research Fields

The proposed activity shall conform to the aims of the program and the

research fields that the program designates. In addition, the applicants shall already have good research foundation for their proposed activity.

2) Capability of Research Leaders

The research leaders in Japan and Taiwan shall have the insight or experience (or potential in case of younger researchers) necessary for pursuing the activity and the ability to manage the cooperation and reach the project goals during this program's period of support.

3) Effectiveness and synergy of the joint research project

The proposed research activity shall be eminent, creative and at an internationally high level in an attempt to produce a significant impact on the development of future science and technology or to solve global and regional common issues or to create innovative technological seeds that can contribute to the creation of new industries in the future.

Moreover, the proposed research activity that is expected to create synergy through collaborative research with the counterpart institution will be preferred. Such synergy could be attained through, for example, the acquisition and/or application of knowledge, skill and/or know-how of the counterpart researcher.

4) Validity of research plan

The sharing of research activities with the counterpart research institute and the planning of research expenses shall be adequate to realize the proposed research activity.

5) Effectiveness and continuity of exchange activities characterized by the following examples shall be involved to enhance sustainable research exchange and networking.

○ Nurturing of researchers through human resource exchange for several weeks

○ Sustainable development of research exchange with Taiwan initiated by this activity.

○ Enhancing the research network between Japan and Taiwan including researchers other than the research leader and members of this activity.

○ Improving the presence of science and technology in Japan and Taiwan.

*In order to nurture and encourage Japan-based early career researchers to get involved in international collaborative activities, it is recommended to assign a co-Principal Investigator who has not passed 10 years since completing their PhD., in the Japan-based research team.

6) Validity of exchange plan

The planning of exchange activities and their expenses with the counterpart research institute shall be adequate to realize the proposed research activity.

3. Announcement of Decision

The final decision regarding supported projects is planned to be notified to the applicants not less than four weeks before the starting dates of the projects.

VI. Responsibilities of Research Leader after Proposal is Approved

After the proposal is approved, the research leaders and their affiliated institutions shall observe the following when carrying out the cooperative research and utilizing supported expenses.

1. Annual Progress Report (Only for Japan-based Researchers)

At the end of each Japanese fiscal year, the research leader shall promptly submit a progress report on the status of research exchange, and the institution with which the research leader is affiliated shall promptly submit a financial report on supported expenses.

2. Final Report

After completion of the period of collaborative research project, the research leaders shall promptly submit to JST a final report, in addition to a financial report, on the research exchange activities. The report shall include a general summary (maximum ten A4 pages) compiled jointly by both Japan-based and Taiwan-based research groups, and Taiwan-based researchers are also requested to submit the report to NSTC.

If papers describing results of research exchange are published to academic journals, societies and so on, copies of such papers should be attached to the final report.

VII. Additional Information and Requirements for Japan based Researchers

Please see Appendix (available only in Japanese) for such requirements.

Japan-based applicants should contact the following for further information:

Japan Science and Technology Agency
Department of International Affairs
Ms. Junko Shiraishi, Mr. Norihito Matsumoto
E-mail: kokusatw@jst.go.jp
TEL: +81(0)3-5214-7375 Fax: +81(0)3-5214-7379

Taiwan-based applicants should contact the following for further information:

National Science and Technology Council
Department of International Cooperation and Science Education
Ms. Szu-Ying WU
E-mail: sywu@nstc.gov.tw
TEL: +886-2-2737-7431

Annex 1

Research Contract and Funding Modality (Japan side)

A.1 Contract between Applicant and JST

Support will be implemented according to a contract for commissioned research entered between JST and a university or research institute, etc. (hereafter referred to as “institution”) to which the Japan based Principal Investigator belongs.

The contract for commissioned research will be renewed each year over the cooperative research period.

Since the contract is agreed on condition that all administrative procedures related to this project shall be handled within the institution, the research leader should consult with the department in charge at his/her institution.

The contract stipulates the Article 19 of the Industrial Technology Enhancement Act (Japanese version of the Bayh-Dole Act) and the Article 25 of the Act on Promotion of the Creation, Protection and Exploitation of Content (tentative translation) be applied to all intellectual property rights generated as results of this project, and that these can be the properties of the institution with which the research leader is affiliated.

A.2 Funded expenses

Funded expenses include costs for implementation of research exchanges and performing research activities.

Funding provided within this Call is intended to enhance the capacity of the applicants to collaborate with each other. Funding will therefore be provided in support of collaborative activities and may include some of the local research that is necessary for the collaboration.

These may include:

(1) Expenses for research exchanges

1) Travel expenses

In principle, travel expenses should be based on the rules of the institution to which the research leader belongs. When budgeting visits between the Taiwan-based and Japan-based partners, all related expenses are to be covered by the visiting side according to

national rules and restrictions.

2) Expenses for holding symposiums, seminars and meetings

(2) Expenses for research activities

1)Expenses for facilities, equipment and consumables

2)Expenses for personnel

Stipend for a PhD student, or stipend or salary for a post-doctoral fellow

3)Others

Expenses for creating software, renting or leasing equipment, transporting equipment, etc.

(3) Overhead expenses

Overhead expenses amounting to 10% or less of the total research expenses (direct expenses) will be allowed. Overhead expenses should be provided for within the total budget.

Note: Please refer to the following link for the provisions regarding indirect costs:
https://www8.cao.go.jp/cstp/compefund/shishin2.pdf (in Japanese only).

(4) Expenses not covered/funded in the program

No expenses stated below shall be covered under this program:

1) Expenses related to acquiring real estate or constructing buildings or other facilities
2) Expenses related to procurement of major equipment
3) Expenses related to dealing with accidents or disasters occurring during cooperative research periods
4) Other expenses unrelated to implementation of this cooperative research project

Please refer to the guidance documents available at the following link for further details of eligible costs:
https://www.jst.go.jp/contract/index2.html (in Japanese only).