

附件：2024-2027 臺日 (JST) 共同研究計畫合作領域英文說明

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.