MEMORANDUM OF UNDERSTANDING

FOR

INSTITUTIONAL COLLABORATION

BETWEEN

INDIAN INSTITUTE OF TECHNOLOGY (IIT(ISM)) DHANBAD

AND

CSIR–CENTRAL ELECTRONICS ENGINEERING RESEARCH INSTITUTE (CSIR-CEERI)

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This **Memorandum of Understanding** (hereinafter referred to as "**MoU**") entered into on this 10th **day of March 2021** by and between:

Indian Institute of Technology (earlier Indian School of Mines) (hereinafter referred to as "**IIT-ISM**") is an Institute of National Importance established in 1926 and later on converted to IIT (under Institute of Technology Act, 1961) in 2016, is located at Main Campus IIT (ISM), Dhanbad Jharkhand - 826 004.

AND

CSIR-Central Electronics Engineering Research Institute, (hereinafter referred to as "**CSIR-CEERI**") established in 1953, is a constituent establishment of the **Council of Scientific and Industrial Research (CSIR), New Delhi**, having its campus and administrative office in Pilani – 333 031, Rajasthan, India.It is devoted to R&D activities in the following areas:(1) Advanced Electronic Systems: Image processing and DSP, Internet of Things (IoT), Embedded System Design, Electronic Instrumentation, Industrial Control & Automation, Power Electronics, Robotics, VLSI Design (Digital, Analog, Mixed Signal), etc.; (2) Advanced Semiconductor Electronics: MEMS, Micro-sensors, Opto-electronic Technologies, Photonic Devices and Sub-systems, Nano-electronics, LTCC and Advanced Packaging technologies, etc.; (3) Microwave Tubes: Klystron, Magnetron, Travelling Wave Tubes, Gyrotron, Plasma Tubes, Tera Hertz devices etc. CSIR-CEERI also has Centres at Chennai, Delhi and Jaipur.

Collectively hereinafter referred to as "institutions"

This MoU is based on the principal of reciprocity and expresses the interest of both institutions in exchanging scholars, students, academics information and materials in the belief that the research and educational process at both institutions will be enhanced and that mutual understanding between their respective scholars and students will be increased by the establishment of such exchange programs as per CSIR Guidelines .

1. The institutions agree to encourage the development of the following exchange programs based on their respective academic and educational needs :
   - Submission of joint research project proposals to funding agencies
   - Joint collaboration with international institutes/Universities
   - Exchange of scientific staff
   - Exchange of students (undergraduate and / or graduate)
   - Joint supervision of B. Tech, M.Tech., M.S. and Ph.D. students
   - Exchange of academic information and materials
   - Organization of joint research courses
   - Organization of joint conferences
   - Organization of other academic exchanges agreeable to both institutions
   - Use of laboratory facilities on mutually agreed terms and conditions

   Areas to start this collaboration are listed in Annexure 1. Both the institutions can revisit this list after mutual consultation. The above activities shall be undertaken as per CSIR guidelines.

2. The parties recognize that the implementation of any exchange program will depend upon the academic interests and expertise of individual staff members and upon the availability of financial resources. Accordingly, the implementation of each exchange program based on this agreement shall be separately examined and determined by both institutions. The institutions shall enter into separate agreements regarding the individual exchange programs.

3. Faculty/ Scientists of either of the institute initiating collaborative work will take care of the usage of their institute resources and conduction of activities as per institute norms. Prof. Rajeev Kumar Ranjan, Assistant Professor, Department of Electronics Engineering, IIT-ISM shall be the Coordinator of the CSIR-CEERI & IIT-ISM Collaboration and will coordinate with a scientist from CSIR-CEERI for the implementation of this initiative.

4. Each institution will adhere to the intellectual laws of India. Intellectual property developed during the visit of an exchange student/researcher/faculty/staff will be governed by the rules of the host institute unless otherwise specified. The two institutions shall jointly own results of clearly defined collaborative projects and exchange programs. This joint ownership also entitles each party to explore commercialization. However, transfer of jointly developed technology and associated sharing of revenue shall be governed by a separate agreement. This cost of IP filing will be equally shared by both Institutions.

   Furthermore, if one institution receives any information from the partner under a clearly defined non-disclosure agreement, necessary and reasonable care will be taken to protect the intellectual property received.

5. This MoU is not intended to be a legally binding document. It is meant to describe the nature and to suggest the guidelines of the cooperation described above. Nothing therefore shall diminish the full autonomy of either institution, nor will any constraints be imposed by either upon the other in carrying out the agreement. Any disputes shall be resolved through mutual discussion between the highest officials of the respective institutions.

6. Any addition, deletion and /or alteration to this MoU may be effected by writing. A document containing the additions, deletions and /or alterations, and signed by all Parties hereto, shall from an annexure to and be deemed to be a part of this MoU.

7. The agreement shall become effective on the day representatives of both institutions affix their signatures and seals, will be in force for a period of 5 years, and is subject to revision or modification by mutual agreement. It is also understood that either institution may terminate the agreement at any time, although it is assumed that such action would only be taken after mutual consultation at least six months in advance in order to avoid any possible inconvenience to the other institution.

IN WITNESS WHEREOF, the institutions hereto have offered signatures :

For: **Indian Institute of Technology (IIT (ISM)), Dhanbad**

Signature :

Name: Shaeivahan

Date: 10.03.2021

Seal: Dean (Research & Development)
Indian Institute of Technology
(Indian School of Mines)
Dhanbad - 826004 (INDIA)

Witness :

Signature:

Name: Prof. R. K. Ranjan

Designation-: A.P.

Signature:

Name: Prof. J. KUMAR

Designation: Professor

For: **CSIR-Central Electronics Engineering Research Institute, Pilani**

Signature :

Name: Dr. Ajay Agarwal

Date : 01 April 2021

Seal:

डॉ. अजय अग्रवाल / Dr. Ajay Agarwal
वरिष्ठ प्रधान वैज्ञानिक / Sr. Principal Scientist
प्रमुख, प्रौद्योगिकी व्यवसाय विकास यूनिट
Head, Technology Business Development Unit
सीएसआईआर-सीरी / CSIR-CEERI,
पिलानी (राज.) भारत / Pilani (Raj.)333031 INDIA

Witness :

Signature:

Name: Dr. Suchandan Pal

Designation: Sr. Prin. Sci. & Head, PME

Signature:

Name: PRAMOD KR. TANWAR

Designation: PR. SCIENTIST

Annexure 1

MoU between Indian Institute of Technology, Dhanbad and CSIR-CEERI

Areas from IIT-ISM (but not *limited to)*	Areas from CSIR-CEERI (*but not limited to)*
1. Semiconductors & MEMS Design & fabrication 2. VLSI Design and CAD 3. Machine Learning 4. Sensor Design 5. Imaging and Multimedia 6. IoT and Smart Embedded systems 7. Energy Harvesting Systems 8. Photonic Devices 9. Wireless Communication	1. ASIC Design, Post silicon validation, Embedded Systems and Real Time Embedded and IoT Applications 2. MEMS and Microfluidics based Sensors design, fabrication and characterization 3. Nano-sensors, Nano–devices and Advanced Packaging 4. GaN-based Optoelectronic Devices and Photonics Crystal based Structures and Devices 5. RF MEMS based Switches, Filters and Devices 6. Computer Vision, Machine Learning and Artificial Intelligence Algorithms 7. Signal Processing 8. Instrumentation & Optimization Techniques 9. IoT Technology and systems 10. Cyber Physical Systems 11. Power Electronics 12. Microwave Devices

CSIR-CEERI has expertise in Semiconductor Processes, Device design and fabrication with state-of-the-art facilities and is planning to offer short duration training on same under **SHILP initiative**. In UG/ PG/ PhD programs IIT-ISM offers Electronics courses with semiconductor, CMOS, VLSI Design and related fields as their constituents. Students from IIT-ISM shall visit CSIR-CEERI to get a practical understanding of Semiconductor Design & Fabrication processes. This may be included, as part of their curriculum where students from each affiliated college shall get an opportunity to visit and execute semiconductor labs related training at CSIR-CEERI, as per CSIR Guidelines ***on chargeable basis***. CSIR-CEERI shall demonstrate following to the students:

- Demonstration of Semiconductor Unit processes
- Unit process integration, to realize a devices/ device structures
- Unit Process Characterizations and
- Device characterization

CSIR-CEERI would offer a bouquet of programs with duration varying from one week to one month for UG and PG students of affiliated/ constituent institutes of IIT-ISM. A calendar of the courses and programs would be made available to the institutes. IIT-ISM will proliferate it and motivate the target students to take maximum advantage of these facilities.

UG, PG and PhD students enrolled at IIT-ISM would be exposed to the facilities at CSIR-CEERI, in order to take suitable topics of their curriculum/ research where they can harness the facilities of CSIR-CEERI.

Under various schemes, IIT-ISM and CSIR-CEERI would coordinate joint Faculty Development Programs for the engineering teachers.