

# India's No:1 Ranked Institute IIT Madras partners with ISRO to develop a 'Made In India' SHAKTI-based Semiconductor Chip

*Aerospace Quality Chip a major step in achieving indigenisation in addressing computing needs for Space & other sectors*

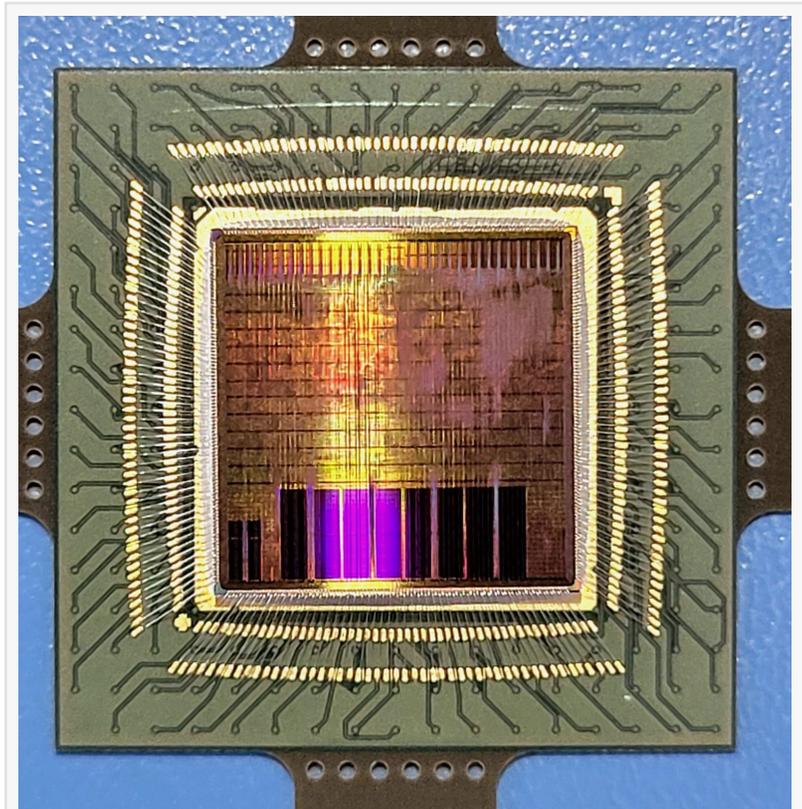
CHENNAI, TAMIL NADU, INDIA, April 7, 2025 /EINPresswire.com/ -- India's No: 1 Ranked Institute, the Indian Institute of Technology Madras ([IIT Madras](#)) partnered with Indian Space Research Organisation ([ISRO](#)), the National Space Agency, to develop and successfully boot a 'Made in India' aerospace quality SHAKTI-based [Semiconductor Chip](#).

IIT Madras Director Prof. V. Kamakoti leads the SHAKTI Project, which is India's First Indigenous Microprocessor.

The SHAKTI class of systems are based on RISC-V, an open-source Instruction Set Architecture (ISA), for designing custom processors. 'SHAKTI' is backed by Union Ministry of Electronics and Information Technology under its 'Digital India RISC-V' initiative (DIRV).

The 'IRIS' (Indigenous RISC-V Controller for Space Applications) Chip was developed from 'SHAKTI' processor baseline. It can be used in diverse domains from IoT and compute systems for strategic needs. This development was part of the effort to indigenize semiconductors used by ISRO for its applications, Command and Control Systems and other critical functions aligning with its march towards 'Make in India' in Space Technologies.

The ISRO Inertial Systems Unit in Thiruvananthapuram proposed the idea of a 64bit RISC-V-based Controller and collaborated with IIT Madras in defining the specifications and designing of



The 'IRIS-LV 1.0' Semiconductor Chip developed by IIT Madras for ISRO

the semiconductor chip.

The chip configuration was arrived at addressing the common functional and computing requirements of existing sensors and systems used in ISRO missions. Fault-tolerant internal memories were interfaced to SHAKTI core, enhancing the reliability of the design.

The finalised design underwent software and hardware testing, targeting a high-reliability, high-performance product.

What makes this semiconductor effort important for the Nation is that it was done completely in India and is a great example of 'Atmanirbhar Bharat' - conceived by IISU

Thiruvananthapuram, designed and implemented by IIT Madras, manufactured by SCL, Chandigarh, packaged by Tata Advanced Systems, Ltd at Perjenahalli, Karnataka,

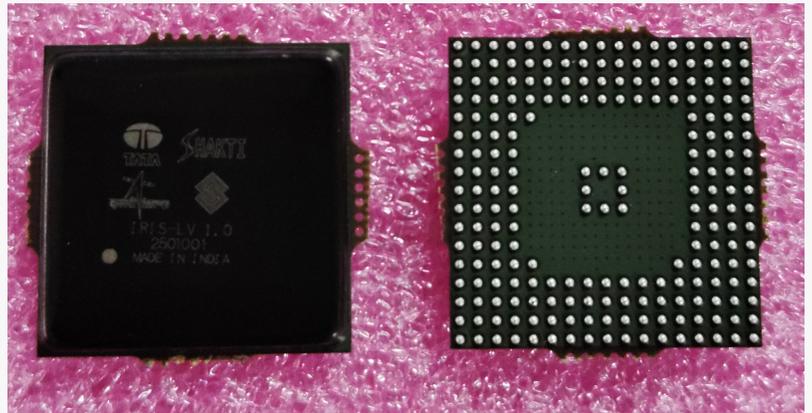
Motherboard PCB manufactured by PCB Power, Gujarat, motherboard assembled and mounted by Syrma SGS, Chennai and the software developed by IIT Madras and successfully booted at IIT Madras.

Highlighting the importance of this new microprocessor, Prof. V. Kamakoti, Director, IIT Madras, said, "After RIMO in 2018 and MOUSHIK in 2020, this is the third SHAKTI chip we have fabricated at SCL Chandigarh and successfully booted at IIT Madras. That the chip design, chip fabrication, chip packaging, motherboard design and fabrication, assembly, software and boot - all happened inside India, is yet another validation that the complete semiconductor ecosystem and expertise exists within our country."

Appreciating this joint effort Dr. V Narayanan, Chairman, ISRO, said, "We at ISRO are very happy that IRIS Controller conceived by IISU based on SHAKTI processor of IIT Madras could be successfully developed end-to-end with Indian resources. This marks truly a milestone in "Make in India" efforts in semiconductor design and fabrication. I congratulate all the teams involved, especially the IISU Team led by Sri Padmakumar ES and the IIT Madras team led by Prof. V. Kamakoti. I am sure that this high-performance controller, realized as per our requirements, will



The 'IRIS-LV 1.0' Semiconductor Chip developed by IIT Madras for ISRO



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contribute significantly to future embedded controllers for space mission-related applications.”

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## ABOUT IIT MADRAS

Indian Institute of Technology Madras (IITM) was established in 1959 by the Government of India as an ‘Institute of National Importance.’ The Institute has been ranked No.1 in the ‘Overall’ Category for the sixth consecutive year in India Ranking 2024 released by National Institutional Ranking Framework, Ministry of Education, Govt. of India & No.1 in the ‘Engineering Institutions’ category in the same Rankings for nine consecutive years – from 2016 to 2024. the same Rankings for nine consecutive years – from 2016 to 2024.

Bhavani Veeravalli

Footprint Global Communications

bhavani.giddu@footprintglobal.com

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