

Executive Summary



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1. Title of the Project: **Secure SHAKTI Microprocessor**
2. Date of Start of the Project: **01-02-2020**
3. Aims and Objectives: **To develop a secure-variant of SHAKTI class of microprocessors to meet the growing cyber security demand of our country.**
4. Significant achievements (not more than 500 words to include List of patents, publications, prototype, deployment etc)

With the advent of Digital India there is an ever increasing demand for microprocessors with different functionalities, power, performance and form-factor to suit the different needs. The needs come out of large scale cyber physical systems that are integral part of any digitization effort including smart cities and smart grids. Each of these domains have specific compute requirements and thus the need is to build a highly customizable domain specific processor ecosystem. Given the huge market and the implicit security implications, there is a need to develop an ecosystem comprising an indigenous family of compute systems. The objective of the project is to provide a family of open processor eco system model based on RISC-V open ISA (instruction set architecture) and built with Bluespec (an open source high-level functional hardware description programming language) for hardware, along with software based on Linux (a family of open-source Unix-like operating systems) and GNU tool chain (an extensive collection of free software, which can be used as an operating system or can be used in parts with other operating systems). This gives an unhindered liberty to create and

innovate in the field of open source Microprocessor development and applications. This creativity demonstrated, thus is a testimony to the ideals of open source. The program envisages to promote home grown companies with open source microprocessors at the heart of their business model. Security at compute level becomes paramount. The secure features need to be built at a lowest microarchitectural level to establish a perfect root of trust. This project envisages building a highly secure SHAKTI microarchitecture. More details are available at shakti.org.in

5. Concluding remarks: **The challenge is to mature the ecosystem to be quickly adoptable by the end users. Microarchitectural level Security will eventually be a big need and the effort taken through this project is aimed at addressing this particular gap and fill it effectively.**