
Enabling Computer Vision and AI on the edge with milliWatts

Venkat Rangan, Founder, tinyVision.ai Inc., venkat@tinyvision.ai

Various market projections for Embedded Computer Vision show large adoption rates over the next decade. However, it is not clear how these complex technologies can move quickly from the niche, expensive one-off deployments today to enable truly world-changing applications that are forecast.

Developing a Low power (sub 10mW average) Computer Vision/AI based product is hard. The typical integrator/developer is faced with not only the challenges and risks of new product introduction but also the steep learning technology curves of embedded HW, SW, CV algorithms and ML/AI. Driving a product from concept to production brings additional challenges and risks in terms of cost and TTM to R&D and prototype as well as the prototype to production supply chains due to the new technologies being introduced. The field of low power CV/AI is nascent and knowledge even among the practitioners in the field is fragmented and stratified by discipline. Successfully deploying a CV product requires deep expertise in various diverse fields. This leads to a high barrier to adoption, currently dominated by companies with deep pockets that can field large teams.

Similar problems have been faced as new technologies came online in the past such as connectivity (BLE, WiFi, WAN), compute and power systems. Each of these technologies is extremely complex and multi-disciplinary requiring deep expertise and extensive capital and personnel investments for a deployment limiting scalability. Wifi/BLE/WAN modules, compute SoM's (Raspberry Pi and Arduino are prime examples) as well as power supply modules, are ubiquitous today allowing a black-box approach to be used to abstract and bring down the barrier to adoption for these technologies. Each of these modules presents the user with a clean, well-defined, hardware, software and mechanical interface that simplifies integration and allows the user to focus on their differentiating features rather than the infrastructure.

The tinyVision.ai Inc. Vision FPGA SoM brings the modular and open approach to low power computer vision at the edge. The well documented SoM enables users to be up and running quickly (goal of 5 minutes!), potentially with an MVP within a day, while providing a path to mass production. The SoM integrates an ultra-low-power image sensor, microphone, and IMU with frame sync capability with a low power FPGA for compute along with 1 MB qSPI Flash and 8 MB qSPI SRAM for storage. An open SW API allows customization with Python/C++ based sample code running on a microcontroller and a developer kit to explore and prototype applications. A low power solution reference design with connectivity (BLE/WiFi) and energy harvesting is available with customizations for specific verticals. More technical details available at:

<https://github.com/tinyvision-ai-inc/Vision-FPGA-SoM>.