TECHNICAL REPORT

EC Lab with plugin board

An open-source Electronics HDL platform- Ekalavya

The breakdown of the electronics industry, which started about ten years ago and has shaped the electronics industry structure, favors the transition from a vertically integrated business model to a horizontally integrated business model. In the past, ESS companies maintained complete control over the production cycle, from product definition to final product manufacturing. Today, identifying a new market, defining detailed system specifications, developing the components, assembling those components, and manufacturing the final product are all tasks that are largely outsourced to different organizations. (1)

The world of Embedded Systems is relatively large and mainly revolves around the GPG (General Purpose) Processor and Microcontrollers. FPGA (Field-Programmable Gate Array) is commonly used in Processor-Based Embedded Systems to Glue logic or to offload the processor from workloads that require rapid updates. (2) The HDL for FPGA-based signal processing is a significant aspect of Hardware Abstraction Layer efforts. (3)

The Ekalavya HDL platform is a convenient and cost-effective pocket HDL platform for Embedded Electronic Design.

Ekalavya is an open-source electronics HDL platform that provides seamless implementation with compatible breakout boards and plugins using VHDL/Verilog.

Electronic Engineering students, with this Pocket Lab and in combination with various breakout boards, would have the opportunity to conduct a wide range of available experiments based on their current syllabus from the 1st to 8th semester; these students have an additional appetite for upskilling themselves with hands-on experiments can capabilities in areas of Edge computing for AI, ML, Mechatronics, Robotics and Industrial automation to name a few can choose the appropriate breakout board which in combination with the main EC lab unit will fuel their innovative spark, enable their project initiatives and overall empower them to be better industry prepared. Breakout boards can be considered as a gateway to building edge computing models.

From an SI or ML perspective, the Ekalavya architecture:

It is designed to integrate shortly into the TensorFlow and TensorFlow Lite framework providing superior ease of use over legacy and alternative platforms.

It is designed to serve as a Machine Learning development platform for deploying Convolutional Neural Networks (CNN) on FGGAs in the near future; it includes software scripts needed to convert TensorFlow files and accelerator FPGAIP.

Salient Features

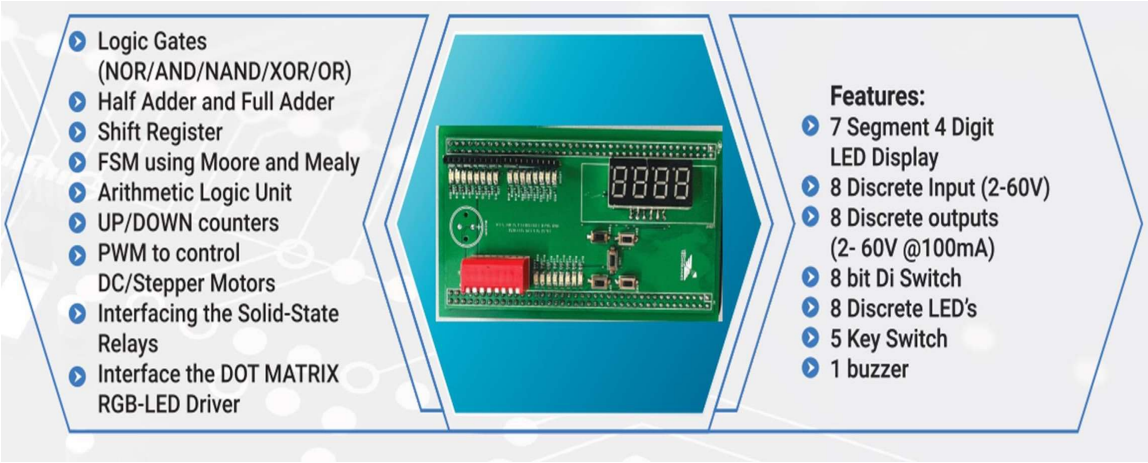
Built-in IP support for a wide range of Sensors for Quick development of Algorithms that can be implemented.

Robust IP Library for building Applications for AI or ML

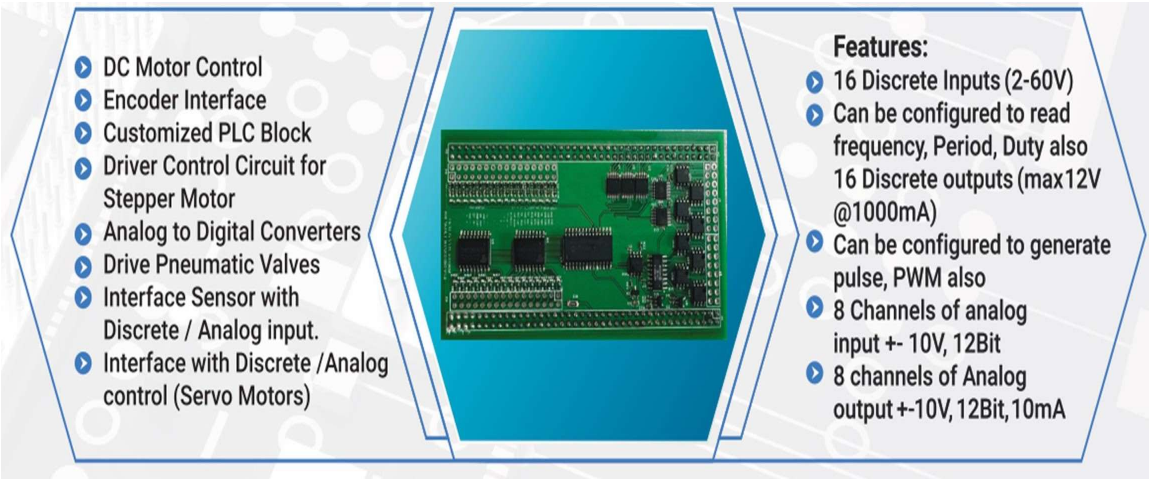
Designed to work with applications across verticals through specific breakout boards covering the utmost IO

User-friendly IDE that works on Windows and Linux.

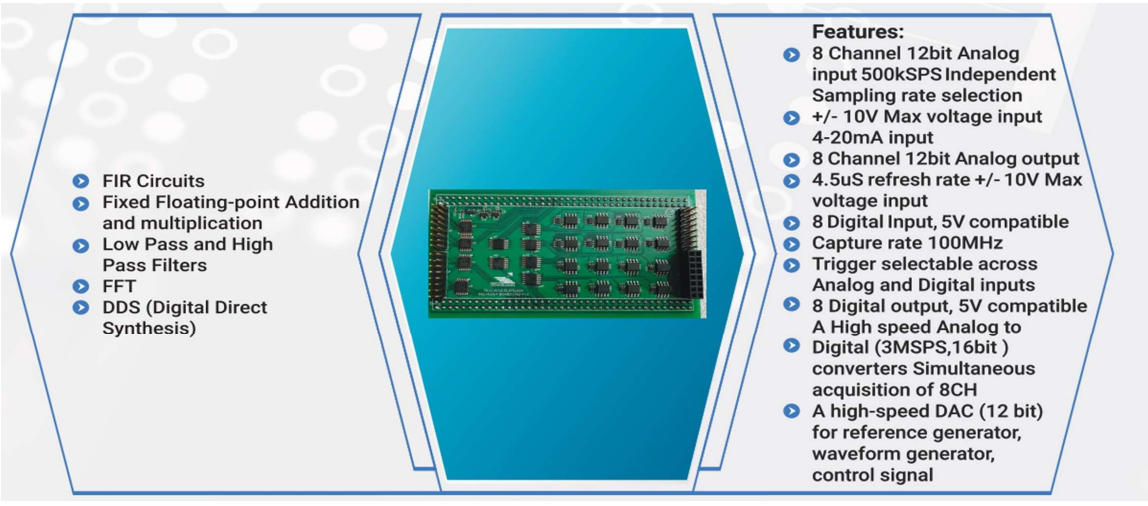
1. Generic Break-out Board



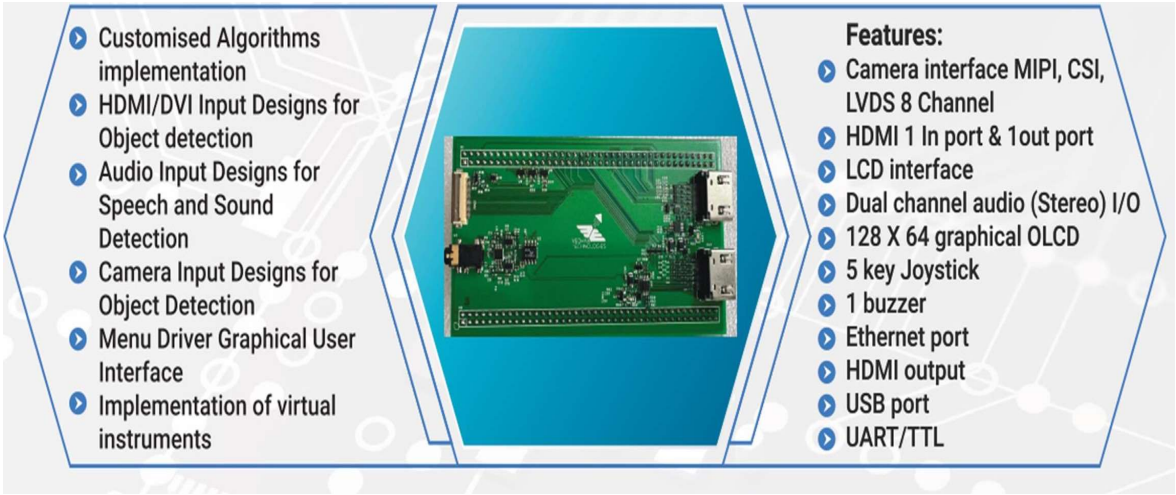
2. Discrete I/0 Break-out Board



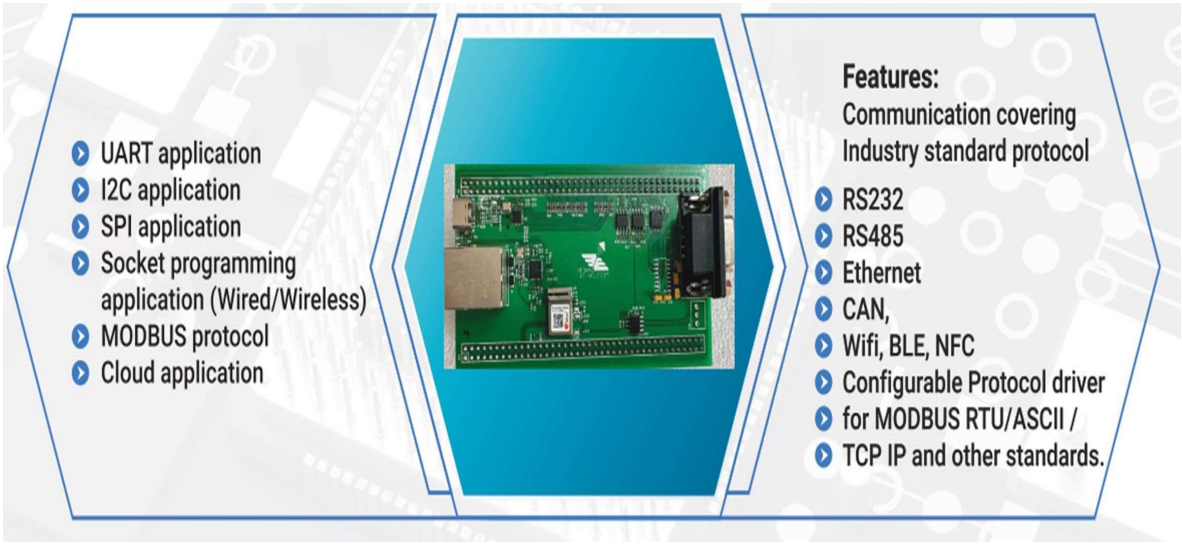
3. Data Acquisition Plug-in Board



4. Image Processing / Hmi Plug-in Board



5. Communication Plug-in Board



Benefits

Breaking down complex digital design

Scalable and affordable based on students' drive to learn

Simple and clear programming environment that supports creation of own microprocessors

Industry aspirants to get hands on working on various experiments/capability options using the VHDL/ verlilog environment

Online Community Support: (www.vedhyatech.com)

References

[1] Platform-Based Design for Embedded Systems Luca P. Carloni a Fernando De Bernardinis a,b Claudio Pinello a Alberto L. Sangiovanni-Vincentelli a Marco Sgroia. In: http://www.cs.columbia.edu/~luca/research/pbdes.pdf

[2] Rahul Dubey. (2009). Introduction to Embedded System Design Using Field Programmable Gate Arrays. © 2009 Springer-Verlag.

[3] Ain, M. F, Naghmash, M. S., Chye, Y. H. (2010). Synthesis of HDL code for FPGA design using system generator. *European Journal of Scientific Research*. 45 (1), 111-121.