LogicTronix

March 30, 2022

LogicTronix Technologies

FPGA Design and ML Acceleration Company

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LogicTronix - *Introduction, Solutions, IP Cores and Services*

1. Introduction to LogicTronix
2. LogicTronix ANPR and TVAS Solution
3. AI/ML in Cloud
4. LogicTronix IP Cores: Computer Vision, Crypto-Hashing Applications & HFT.
5. LogicTronix- Design Services
6. White-papers & Resources
7. Satisfied Clients: Design Services
8. LogicTronix-Collaborators
9. LogicTronix-Team details: FPGA and ML Acceleration

Introduction to LogicTronix

We are

✓**FPGA Design & Machine Learning Company**

Expertise (Design Service) & IP Cores:

❖FPGA based development for Computer Vision, Sensor Fusion, Embedded Solutions, etc.

❖Machine Learning Acceleration with FPGA for Surveillance/Security, Automotive (ADAS), Industrial, Medical & Financial Applications (HFT).

❖Offering IP Cores in Computer Vision, Cryptographic-hashing, HFT and Machine Learning.

Solutions:

❖Smart City and Smart Parking Solutions: TVAS and ANPR

❖High Frequency Trading (HFT) IP Cores-Pipeline

Mission and Vision

❖**Mission:**

- Accelerating real world solutions with AI and Machine Learning
- Providing optimized and user-friendly **Edge and Cloud based solutions**.

❖**Vision:**

- Being the top-notch “AI Acceleration Company”

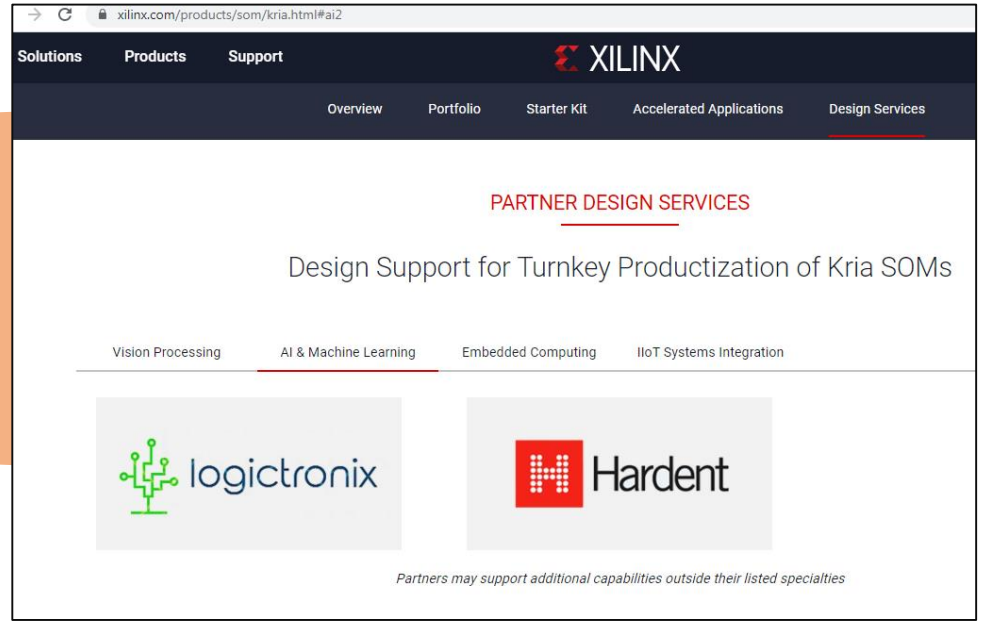
We are:

❖Xilinx Certified Partner

XILINX
Certified Partner

❖Design Service Partner for

Machine Learning for Xilinx Kria SoM FPGAs



Xilinx Partner Profile Link: https://www.xilinx.com/alliance/memberlocator/1-1dturdk.html

LogicTronix ANPR Solution : Features

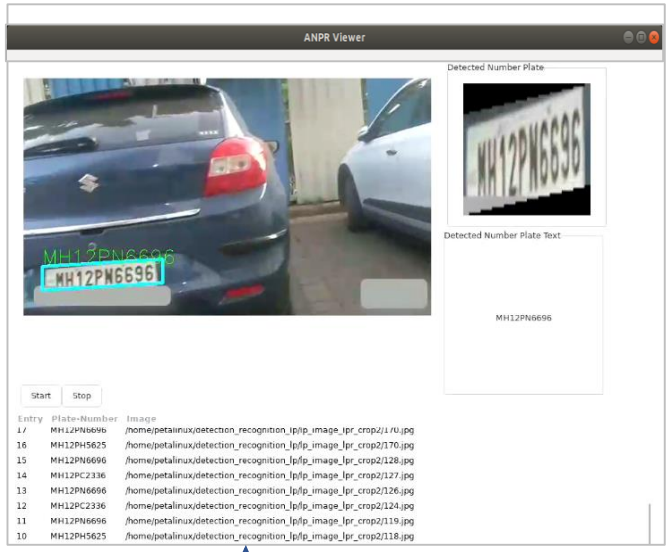
- AI as a Service (AIaaS) Solution.
- **Plug and Play solution (Embedded Linux based Solution) for Xilinx Kria SoM- KV260 and Xilinx MPSoC based platforms.**
- Edge based AI-Solution with GUI features.
- Can process 25+ FPS per stream on single camera and 2 camera streams at 15 FPS. Supports 4 streams on single Kria-KV260.
- Highly competitive **Cost per Stream (CPS) Solution** with compared to available solutions on market.
- Works with IP Camera or RTSP streams as well as USB and MIPI streams.
- **Offering solution for English-Character License Plates as well as Regional languages for Thailand and Japan.**
- Solution is deploying over Asia Pacific, North America and EU Countries.

LogicTronix ANPR Solution : Use Cases

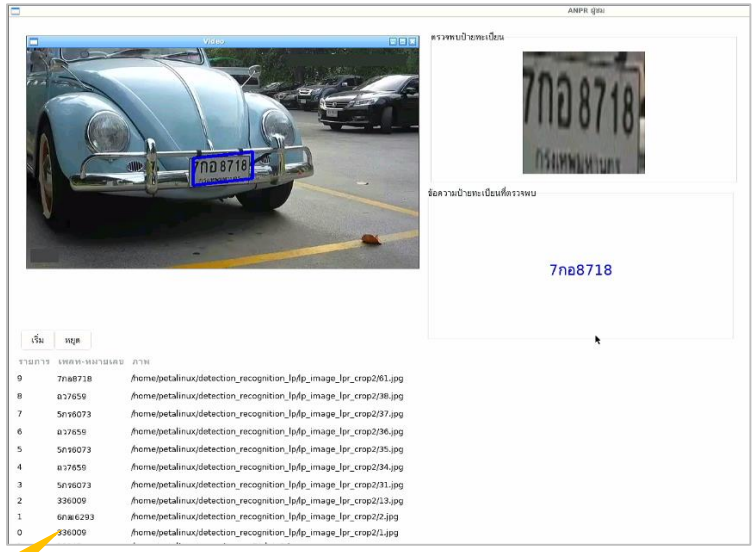
- Private Parking
- Public Parking
- Toll Booth Management

❖Traffic Video Analytics Solution (TVAS):

- ✓Larger Solution of ANPR,
- ✓Vehicle Counting, Vehicle type recognition
- ✓Traffic rules violation: Speed, lane etc.



ANPR- Parking Use Case-India



ANPR- Parking Field Test-Thailand

ANPR- Tool Booth Use Case- India

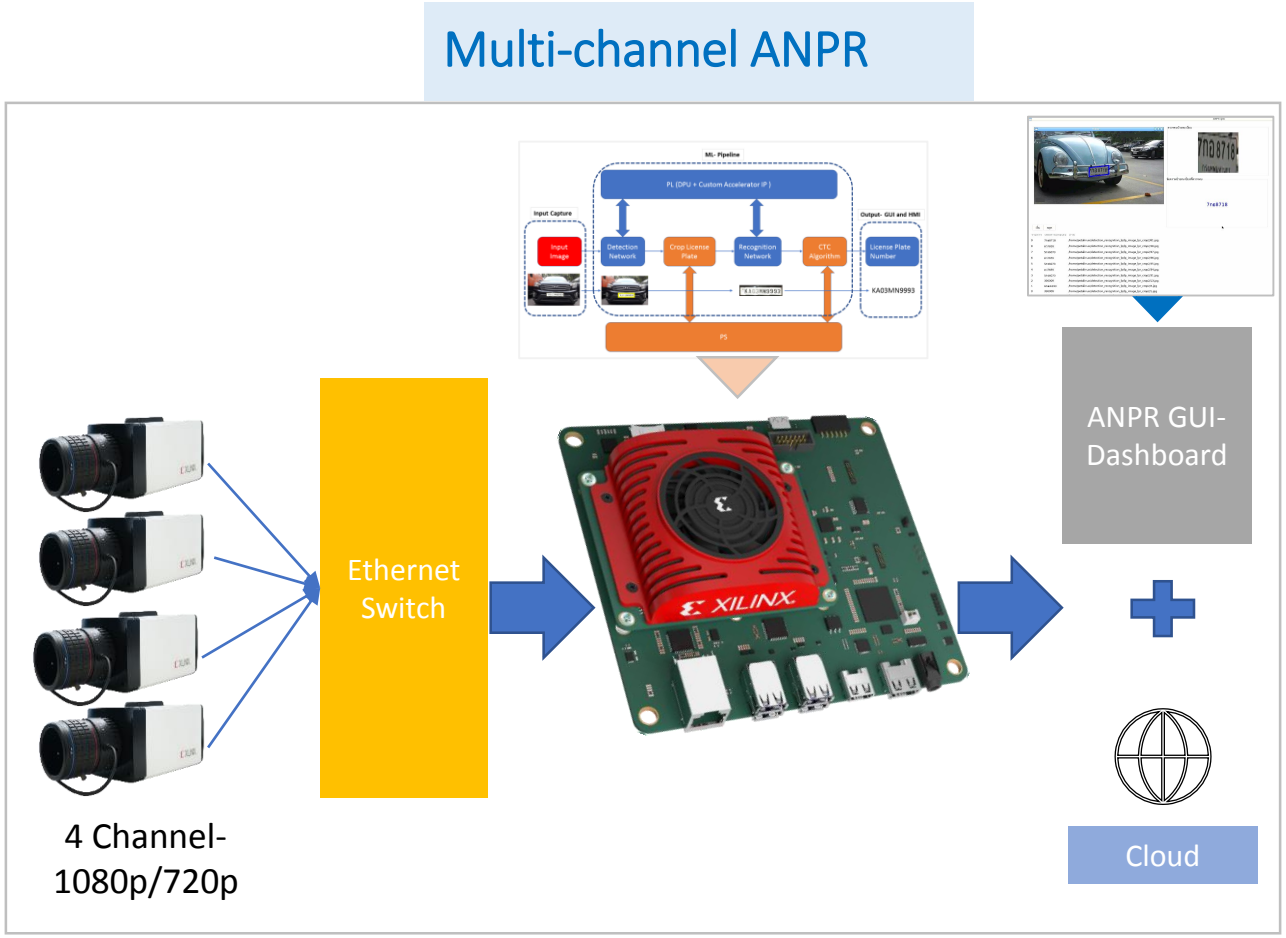
LogicTronix ANPR Solution : License Plates

Non Embossed License Plates

Yellow color License Plates – Public Vehicles

Embossed License Plates

Multichannel ANPR

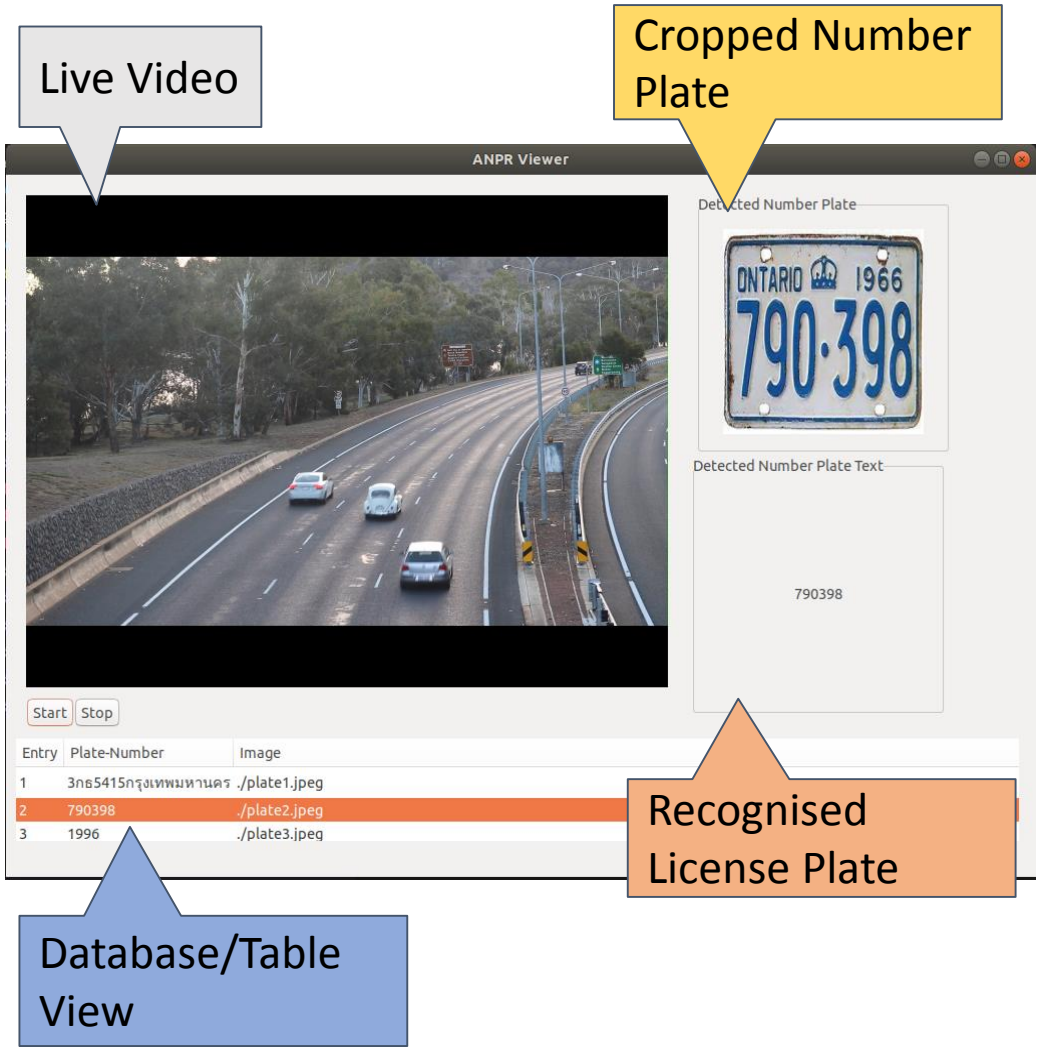


ANPR Solution: Supported Devices

- Input capture device can be of MIPI, USB3, GigE etc.
- Current Kria apps supports(USB webcams, Onboard OnSemi MIPI camera, video file).

ANPR Viewer- GUI features

- **Lightweight Edge based GUI**
- Standalone application developed with GTK+.
- Live Feed to camera with detected bounding box.
- Parse the MQTT payload.
- Show detected number plate image and string.
- Updates the dashboard table to view the list of detected Plate Number and image.



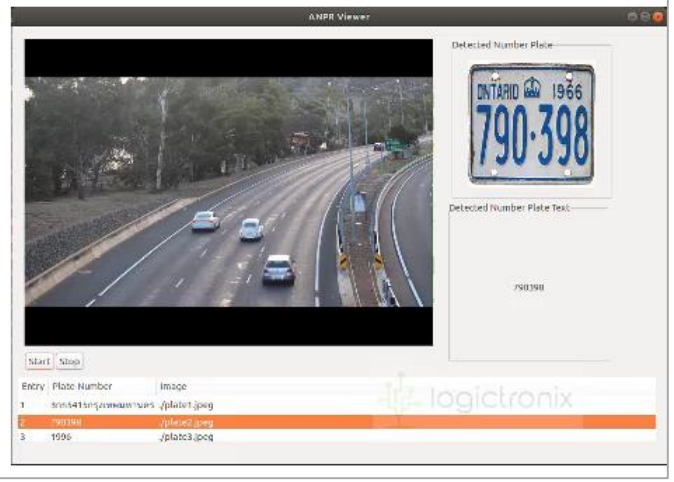
ANPR

Solution-Demo on

Xilinx Kria-KV260 / MPSoC FPGA

Solution by

LogicTronix



Video Demo of ANPR Solution:
[Link]

LogicTronix-Xilinx Webinar on Kria-AI/ML

pages.xilinx.com/EN-WB-2022-03-03-Logictronix_LP-Registration.html

AMD
XILINX

Kria SOM - KV260 Development and Machine Learning Acceleration

Webinar

Summary

Presented in collaboration with Xilinx Kria SOM partner Logictronix, this webinar will focus on the methodologies about Machine Learning Acceleration, developing ML based solution on Xilinx Kria KV260 Vision AI Starter Kit, creating custom Accelerated Applications for Kria SOMs. During the webinar, we will also discuss how to use Petalinux or Yocto layers for creating customization on real world solutions and creating Vitis Video Analytics SDK based pipelines for ML inference.

WATCH ON-DEMAND

bit.ly/KriaSoM_Webinar

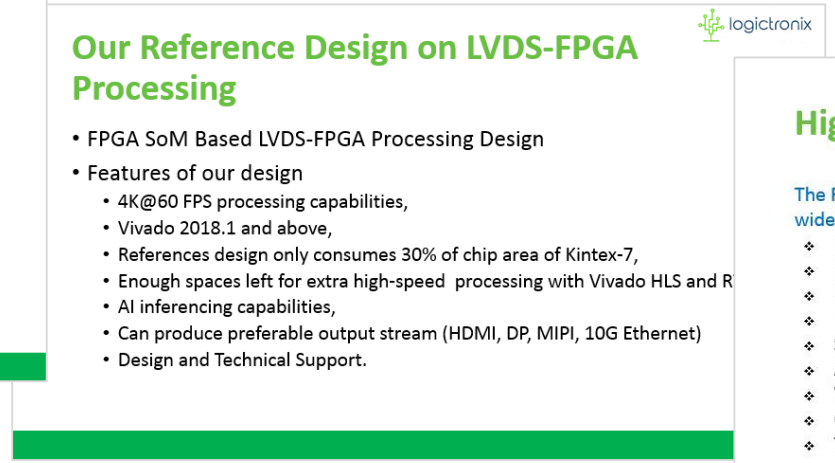
LogicTronix ML Solution (TVAS/ANPR) on Cloud

- **We are planning to host our "Edge-Kria based TVAS and ANPR" to cloud based platform**
  - Few Customer from North America (NA) and Asia Pacific are lined, who are having large parking spaces to manage.
  - Our Cloud based ML solution, TVAS is part of "Smart City" solution.
  - Cloud based solution will use number of camera input to Alveo (U30/U50) card server rack (RU) and do the video processing and ML inferencing workloads.

LogicTronix's Machine Vision solution with Xilinx FPGAs

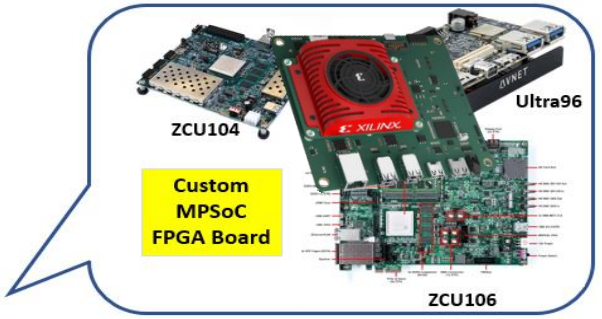
❖Machine Vision with High Speed Camera and Machine Learning

- ➢Targeted to industrial customers
- ➢For LVDS Stream Processing with FPGA is prototyped with Xilinx 7 Series FPGA then we will migrate it into Kria SoM.



ML Acceleration Flow: top-level Recipe of our Solutions

Machine Learning Acceleration flow on FPGA



Dataset Preparation [Public/Custom]

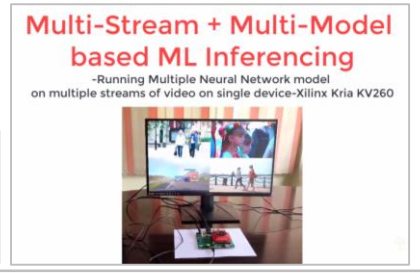
Training Neural Network [with necessary Optimization & pruning on Architecture]

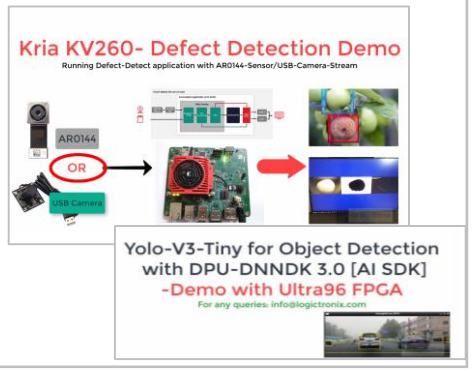
Quantizing & Compiling the trained model

Designing FPGA IP-System & Embedded Linux [Petalinux]

Deploying on FPGA with Boot System with Camera/HDMI input

Designing Custom FPGA Boards – PCB Design





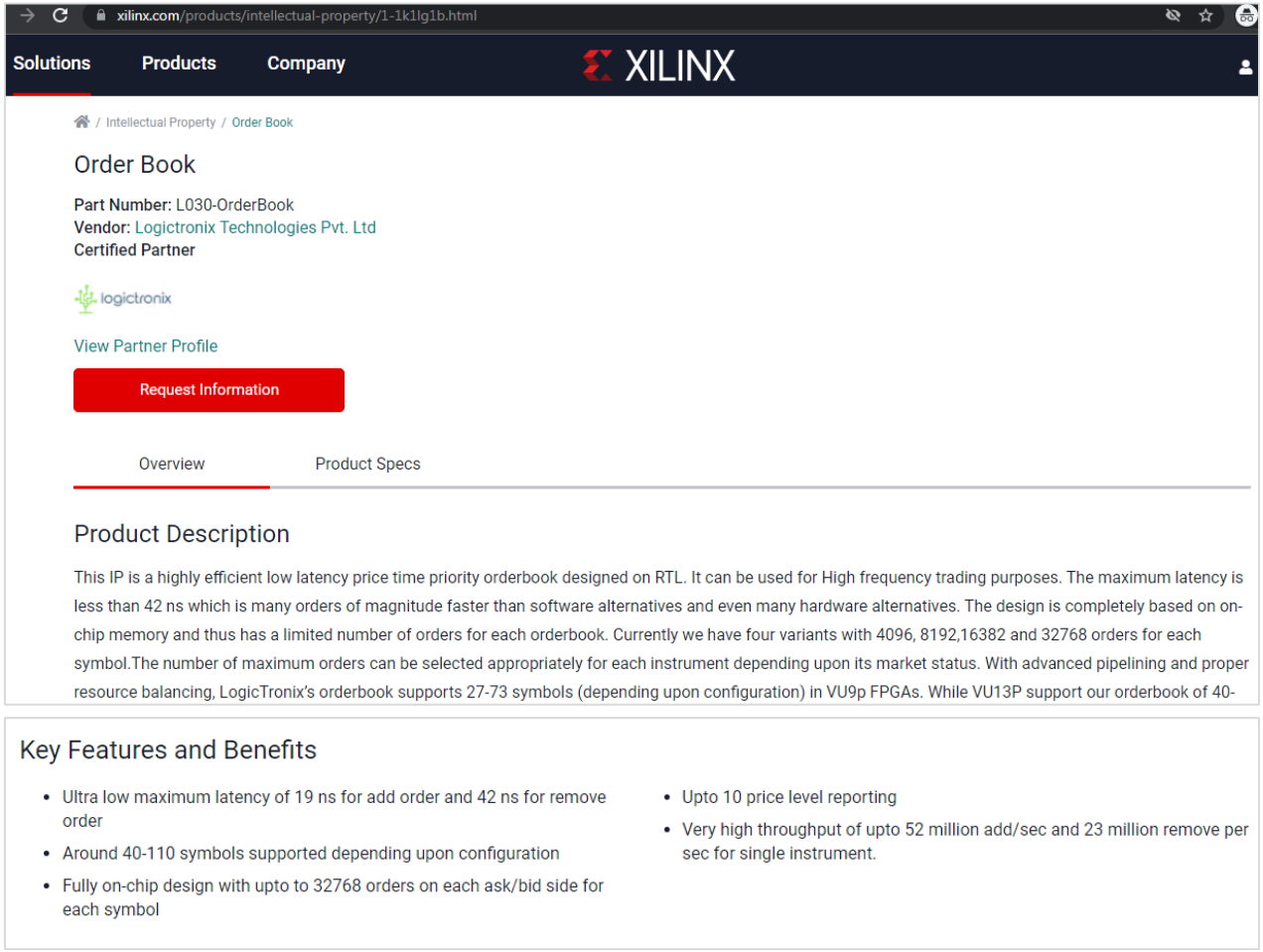
https://logictronix.com/machine-learning-with-fpga/

LogicTronix IP Portfolio on

1. HFT
2. Crypto Hashing
3. Machine Learning
4. Computer Vision

Our IP Portfolio: Categories

❖HFT: Order Book IP Core



LogicTronix Order Book at Xilinx IP Page: www.xilinx.com/products/intellectual-property/1-1k1lg1b.html

Our IP Portfolio: IP Cores with Categories

❖ Computer/Machine Vision , Machine Learning and AI Inferencing

i. **Non-Uniform Correction (NUC)-IP Core** for Machine Vision Application and Thermal Imaging Applications
ii. **Thermal Color Profile (ThCP) IP core** is applied for Machine Vision, Thermal Imaging , Industrial and Biomedical Applications
iii. **Auto Contrast Enhancement (ACE) IP Core** for Thermal Imaging Applications.
iv. **Bayer2RGB IP** core for low FPGA resource based Camera Image processor
v. **GammaCorrection**, **SharpEnhancement**, **EdgeEnhancement** and **AlphaBlending** .

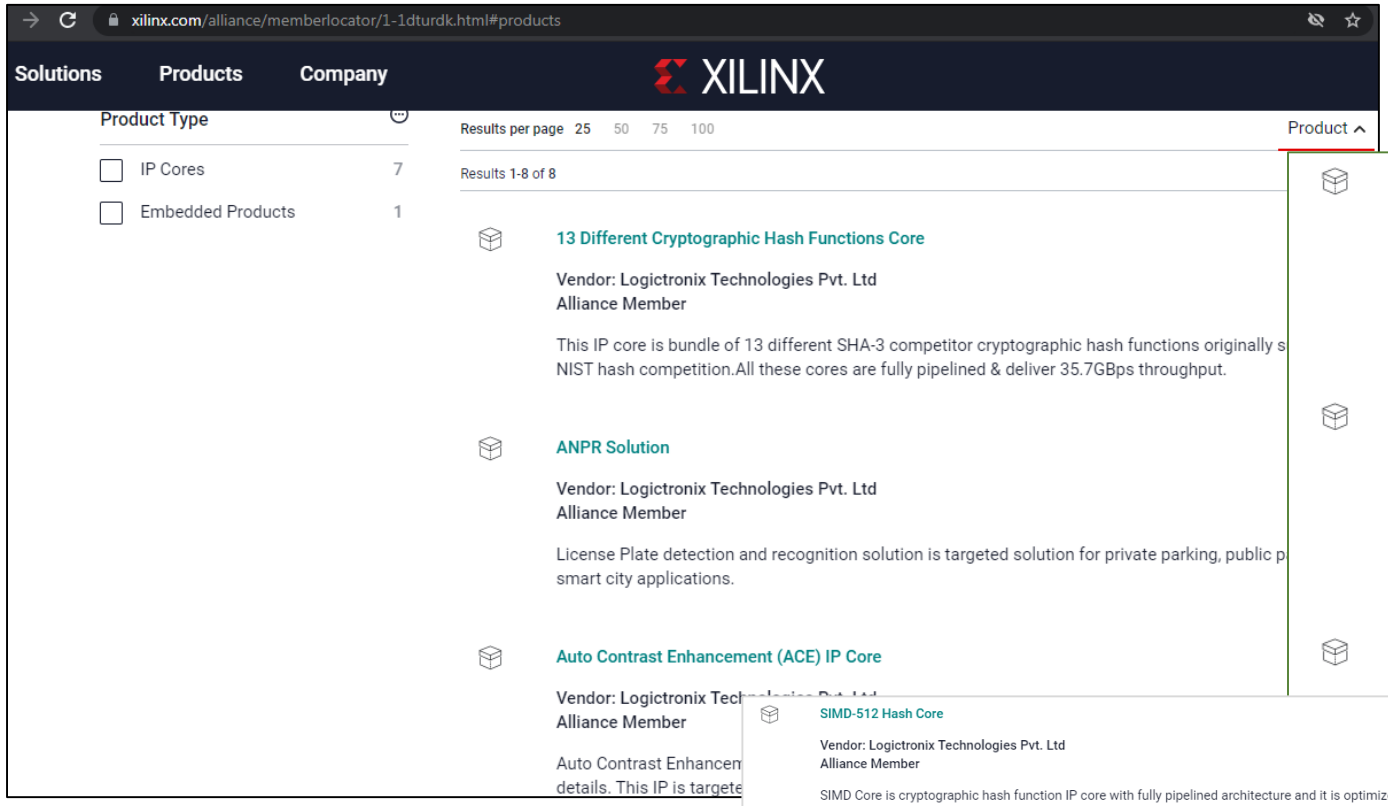
❖Cryptographic Hash Function IP cores

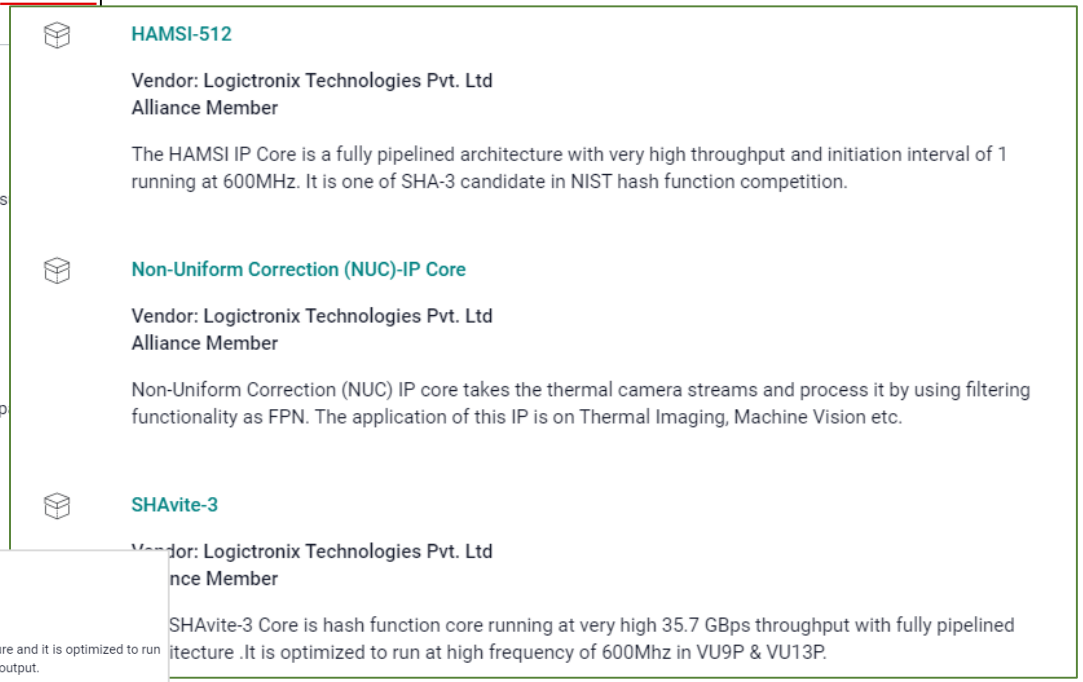
i. HAMSI-512
ii. SHAvite
iii. SIMD
iv. 13 different cryptographic hash function IP Cores- bundle [SHA-3, Keccak, Blake, Grostl, JH, Skein, BMW, Echo, Shabal, Cubehash, Fugue, Luffa, Whirlpool]

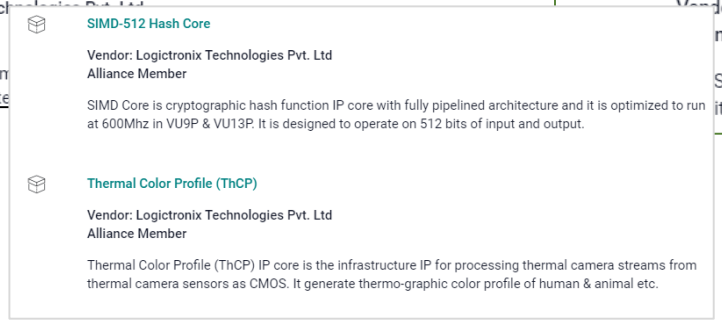
@ 600 Mil hash/Sec

For IP Cores, Sales and Support, contact: ip-sales@logictronix.com

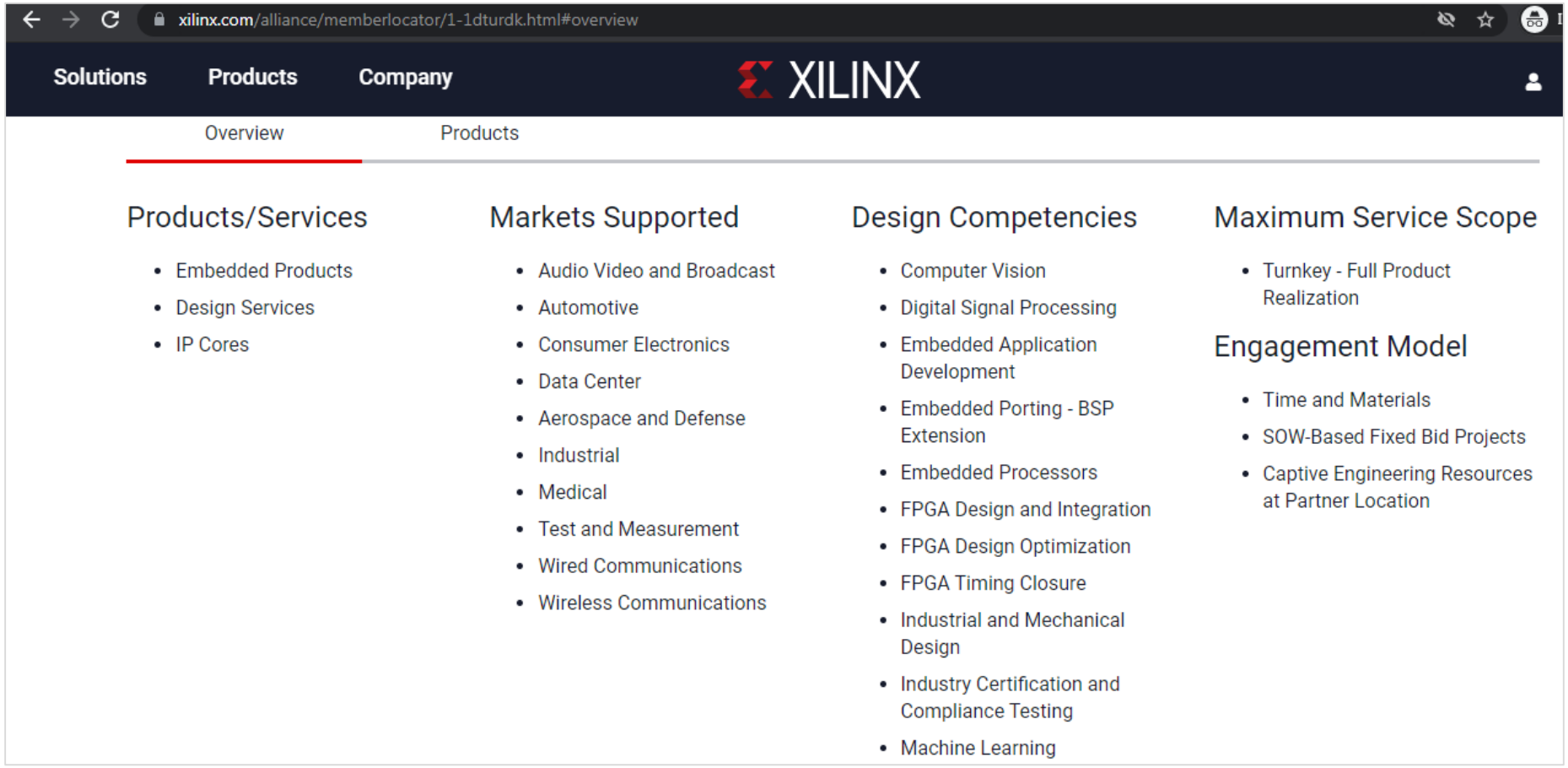
Our IP Portfolio: 25+ IP cores available for customers







Our Design Services: details

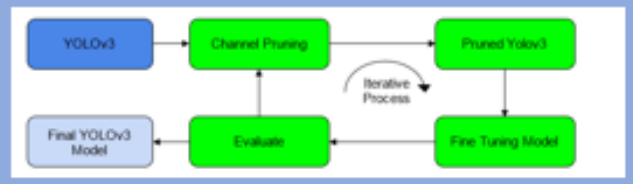


LogicTronix Xilinx IP Page: Link

Our White Paper and Resources

Some of Our White-Paper's

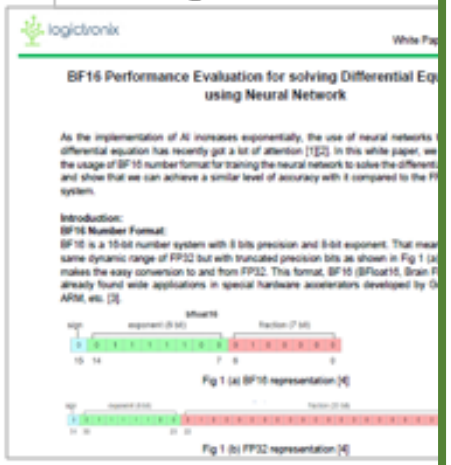
WPL053 on "Pruning Neural Network models

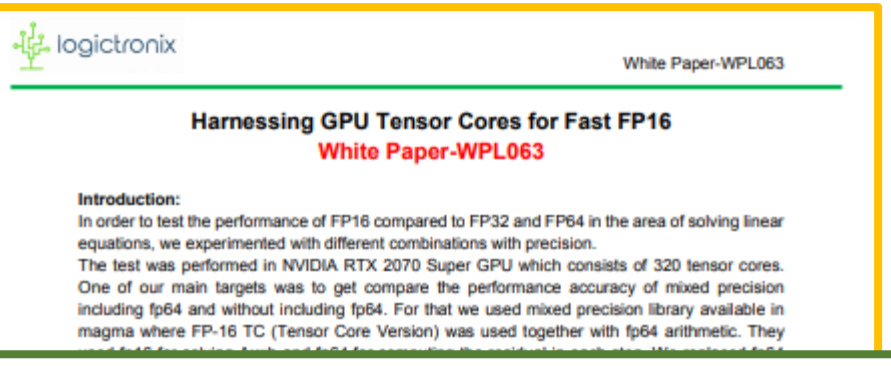


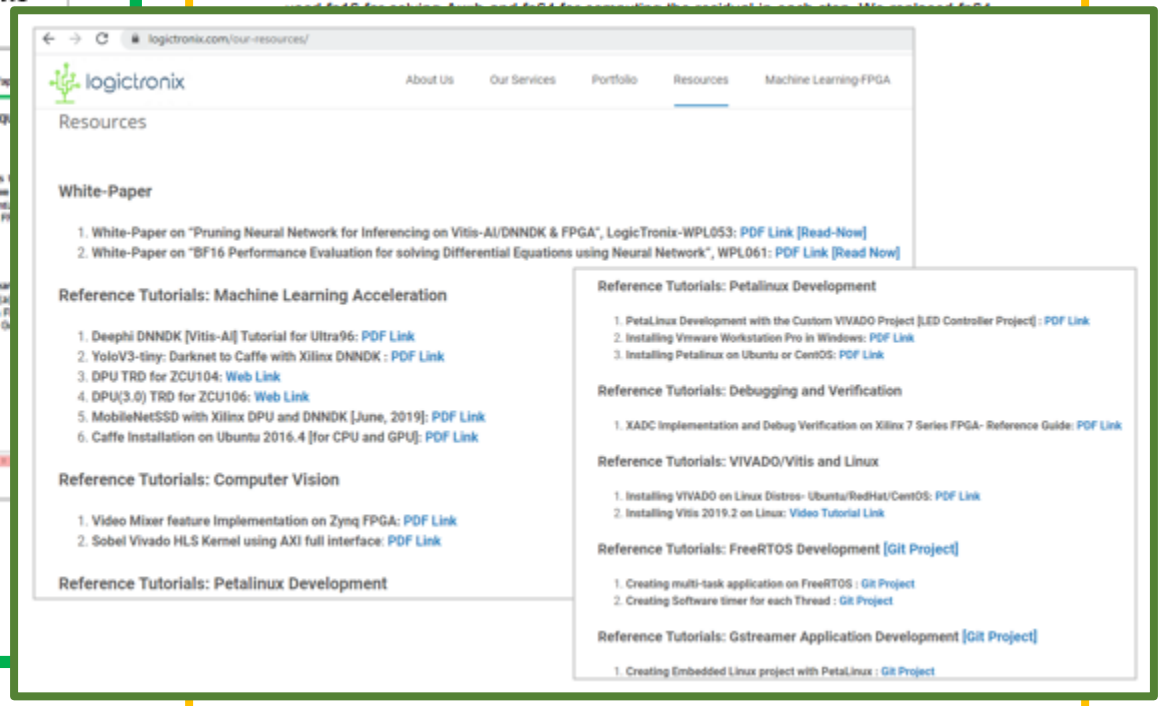
Model	Global threshold (Pruning ratio)	Input Size	GFL
License Plate Original Yolov3	-	512*512	98.
		640*640	154
		960*960	347
License Plate Pruned Model 1st Iteration	0.5	512*512	25.
		640*640	39.
		960*960	88.
License Plate Pruned Model 2nd Iteration	0.5	512*512	11.
		640*640	17.
		960*960	39.

BDD Model Original Yolov3	-	512*512	99	42.96	246.5 MB
		640*640	154.687	45.97	
		960*960	348.046	42.43	
BDD Pruned Model 1st Iteration	0.5	512*512	39.464	42.83	112.6 MB
		640*640	61.662	46.61	
		960*960	138.739	44.93	
Face+Person Original Yolov3	-	512*512	98.912	77.61	246.3
		640*640	154.549	76.96	
		960*960	347.736	62.26	
Face+Person Pruned Model 1st Iteration	0.5	512*512	40.801	70.12	113.6
		640*640	62.502	74.93	
		960*960	140.629	63.59	
Face+Person Pruned Model 2nd Iteration	0.5	512*512	18.254	76.25	50.1
		640*640	28.522	73.11	
		960*960	64.174	50.16	

WPL061:
BF16 Performance Evaluation for solving Differential Equations using Neural Network







www.logictronix.com/our-resources/

Satisfied Clients

LogicTronix Team has done very well job on Computer Vision and Machine Learning with FPGA
-Besma, Video Analytics Company, USA

LogicTronix has good skills on VIVADO, Xilinx FPGAs and Computer Vision
-Anh Nguyen, ODM, Vietnam

LogicTronix made very good work on Video Processing and FreeRTOS development
-Andre, Video Processing System Product Company, San Francisco, USA

"LogicTronix help me on Creating Thermal Imaging and Profiling Work easier"
-Ros, Video Solution Company, Moscow, Russia

Team have good expertise on architectural design for AI Processor
-Xu ling, AI Processor Design Company, Beijing, China

"LogicTronix is very good at high throughput and latency centric design"
-David, Crypto ASIC Design Company, San Francisco, USA

Our Collaborators and Partners

- Our Collaborators
  - Sitlab AB, Sweden and Sitlab UK
  - Excelpoint Singapore: specialized on marketing solutions based on FPGA, Machine Learning for different industries
    - Having distribution network at Asia Pacific-APAC region
  - iWave India: Specialized on designing and manufacturing production grade FPGA boards.
- Our Partner
  - Xilinx
- Partner in Network:
  - Avnet
  - Design Gateway, Thailand
  - PLC2, Germany
  - Mikrotron, Germany
  - CuDes-Technology Brokerage Firm, USA

Team Details: *FPGA and ML Acceleration*

Team Size on FPGA and ML Acceleration : 13 Engineers

- FPGA Engineer-10
  - 2 Engineer with 5+ years of experience
    - With skillset on FPGA design with Verilog/VHDL, VIVADO/Vitis Flow, Machine Learning Acceleration on FPGA, Petalinux Development for embedded development, Gstreamer based UI development for Embedded applications, FreeRTOS etc.
  - 3 Engineer with 3+ years of experience
    - With skillset on Computer/Thermal/Medical/Machine Vision and Video Processing with FPGA, VHDL/Verilog design methodology, implementing algorithms on low latency and high performance design methodology
  - 3 Engineer with 2+ years of experience
    - Experience with signal processing, video processing , FPGA design with MATLAB/System Generator, VIVADO and Vitis
  - 2 engineer with 1+ year of experience:
    - With skillset on computer vision based implementations
- Machine Learning Acceleration Engineer- 3
  - ML team has experience from 2 years to 4 years.
    - Expertise on Tensorflow/Pytorch/Caffe/Darknet and Xilinx Vitis AI flow.
    - Skillset on Machine Learning for Computer Vision, Reinforcement learning for prediction type of workloads/problems.
    - Implementing custom CNN and Neural Networks on GPU/CPU and FPGA Platforms [Xilinx MPSoC].
    - Quantization and pruning of Neural Network to increase the “model performance”.

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Thank you!

Contact: info@logictronix.com