

RISC-V Taiwan Alliance (RVTA) Update

Alex Wang
President
Powerchip Technology Corp.



November 12, 2019

Taiwan Semiconductor Ecosystem

The background of the slide features a faded, grayscale image of a city skyline with various skyscrapers. A large, solid blue arrow points from the left side of the slide towards the right, partially overlapping the city image and the title text.

Highly Specialized Supply Chain

Foundry (Worldwide 70% market share) and OSAT worldwide 50% are both world leading, and IC design 20% next only to the U.S., with extensive IP and design services.

While RVTA gathers industry and academia expertise, momentum of RISC-V is building up primarily by business and research opportunities.

Examples of RISC-V announcements

RISC-V Taiwan Alliance (RVTA)

Foundry

TSMC Open Innovation Platform (OIP) in collaboration with SiFive.

IP

Andes Launches RISC-V FreeStart Program with its Commercial-Grade CPU N22.

Design service

Faraday Unveils RISC-V ASIC Solution to Support Edge AI and IOT SoCs, proven in mass production.

Highlight: Processing in Memory*

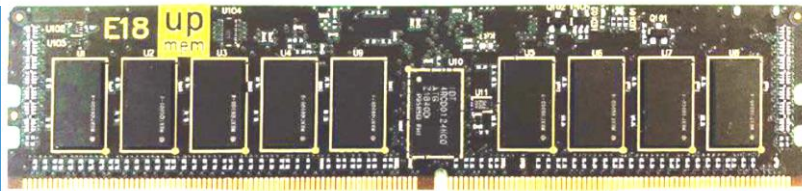
Powerchip forms AI Memory Corp. for solutions to the memory wall in computing.

Processing in Memory*

Unprecedented scalable
ultra-efficient PIM*
architecture and chip

Boosting **20x** data
intensive applications

4 Gb DRAM memory
chips, embedding
8 processors on die



Power efficiency **10x**
better

Delivered as standard
DDR4 2400 DIMM
modules with 16 chips

*Source: HOT CHIPS 31,
UPMEM 2019 Paper*

By reducing drastically
CPU-DRAM data
movement

Server CPU helped by
thousands of additional
cores

At marginal cost

RISC-V Application domain from edge to cloud

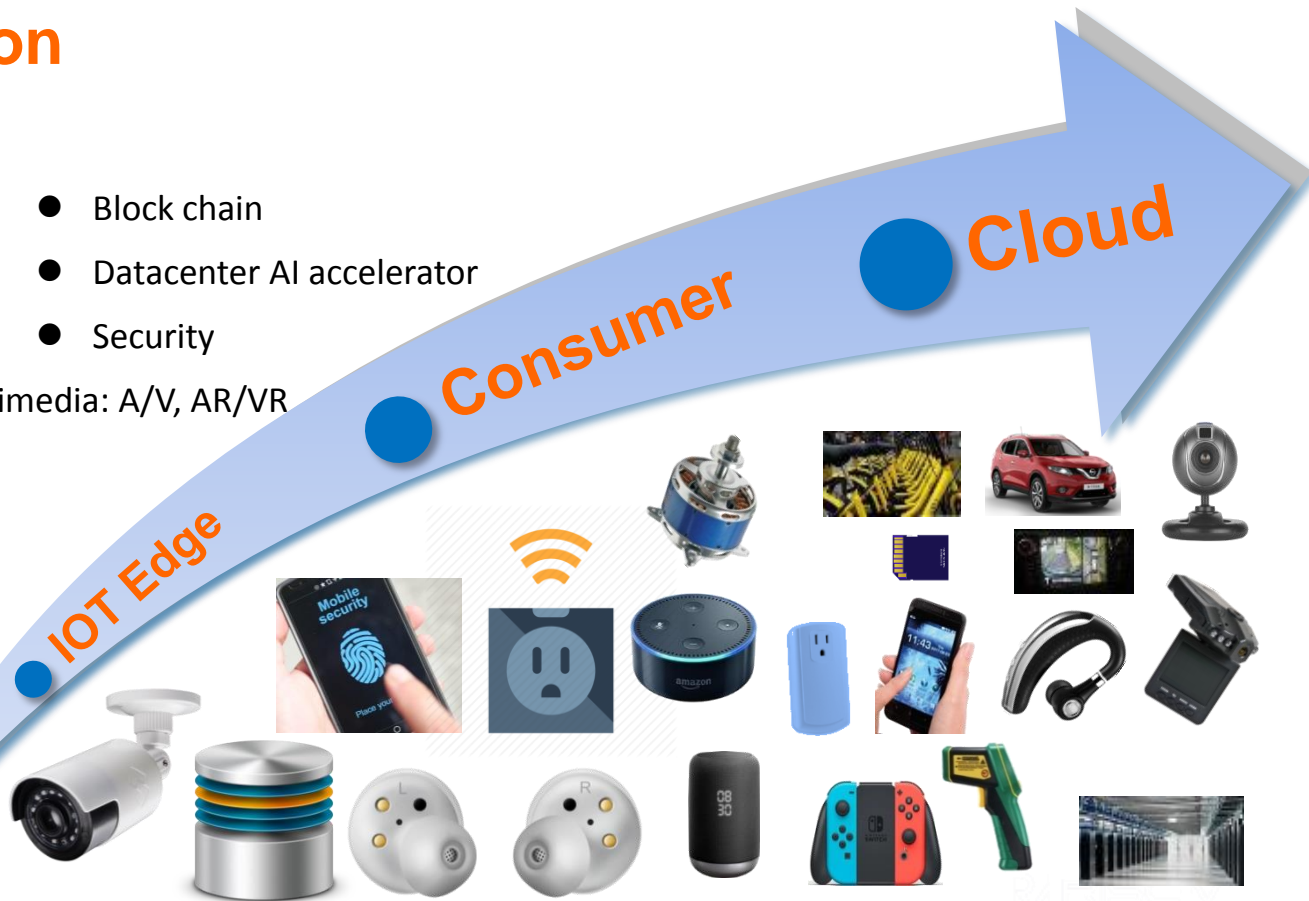
Andes V5 Adoption

Applications:

- ADAS
- AIoT at the edge
- Block chain
- Communication: BT, WiFi, 5G
- Datacenter AI accelerator
- SSD: enterprise/consumer
- Security
- FPGA
- MCU
- Multimedia: A/V, AR/VR

50% use AI

40nm to 7nm



RISC-V Application domain from edge to cloud

Andes just announced it achieved a record of 125 licensing agreements for its new family of RISC-V processors during the year of 2019 so far.



Contribution in Foundation Task Groups

RISC-V Taiwan Alliance (RVTA)



Contribution in software ecosystem

GNU-Based Toolchains

- binutils, GCC: May, 2017
- glibc: February, 2018
 - only supports rv64i-based ISAs
- newlib: August, 2017
- "Probably not a compiler bug"



SiFive

bluespec



redhat

ANDES
TECHNOLOGY

GNU Toolchains

RISC-V LLVM Porting Effort

- Alex Bradbury is in charge of RISC-V LLVM
 - Talk yesterday afternoon
 - Poster on Tuesday night
- RV32IM[A]FD support upstream
 - Missing hard-float calling convention
 - Missing 64-bit support
 - Missing compressed support
- Clang, Go, and OpenJDK have run code
 - Rust port in progress
 - Poster on Tuesday

ANDES
TECHNOLOGY



lowRISC

LLVM

Berkeley
UNIVERSITY OF CALIFORNIA

RISC-V Linux Kernel Port

- Linux: January, 2018
 - Only RV64i-based systems
 - Drivers are trickling in now

Berkeley
UNIVERSITY OF CALIFORNIA

SiFive

ANDES
TECHNOLOGY



Linux



RISC-V in University research is growing

RISC-V Taiwan Alliance (RVTA)



National Cheng Kung
University



National Chiao Tung
University



National Taiwan
University



National Sun Yat-Sen
University



National Tsing Hua
University



NAR Labs 國家實驗研究院

台灣半導體研究中心

Taiwan Semiconductor Research Institute



RISC-V Taiwan Alliance

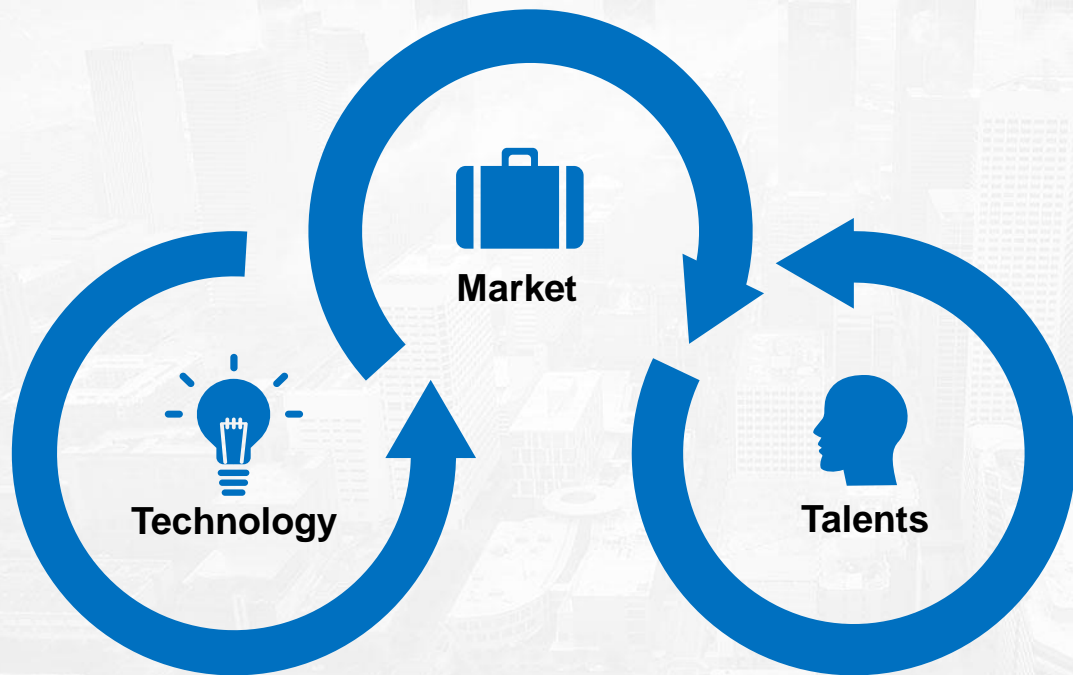
- Established on March 7th, 2019
- Initiated by Taiwan IOT industry association

RISC-V TAIWAN Alliance (RVTA) is committed to coordinating industry, academic, and research institute to work together and introduce RISC-V open architecture to Taiwan.

As soon as we connect resources from RISC-V ecosystems worldwide, Taiwan's R&D, design and application will be capable of integrating AIOT and hitchhiking 5G trends and business opportunities, improving Taiwan's industrial competitiveness.

Mission

RISC-V Taiwan Alliance (RVTA)



Market

Support Taiwan's semiconductor business to enter the core customization of IC design and expedite the RISC-V open architecture into commercial market.



Technology

Promote RISC-V technology and accelerate the development of AIoT and edge computing industry in Taiwan.



Talents

Cultivate talents, and connect resources from RISC-V ecosystems worldwide, making Taiwan's ICT industry a key player in the global supply chain and core AIoT solution provider.

Our Members

RISC-V Taiwan Alliance (RVTA)

nuvoTon

VeriSilicon

RETRONIX
Solutions for Connected World™

ANDES
TECHNOLOGY

晶心科技

FARADAY



Powerchip



Syntronix



GENESYS
LOGIC



PSMC 力晶積成電子

kaikuTek

ememory



cortus

What we have achieved

- Mar 7th , 2019
RVTA was established
- May 22nd , 2019
Chairman Wang visited MIIT in Beijing
- May 29th , 2019
RVTA hosted the RISC-V forum at COMPUTEX TAIPEI
- Jul 30th & Sep 17th ,2019
RVTA co-hosted cross-strait standards forum in RISC-V section



RISC-V Taiwan activities 2020

RISC-V Taiwan Alliance (RVTA)

Event in Trade Show

Embedded
Technology
Design Forum
at COMPUTEX
TAIPEI

Cross-Strait Standards Forum

Discussion in
RISC-V open
architecture
standards

April

VLSI-TSA &
VLSI-DAT
Symposium

**Campus
promotion**

June

Aug.

VLSI Design/
CAD Symposium

**Summer
Workshop**

Sep.

Concluding Remarks

RISC-V Taiwan Alliance (RVTA)

Community is a great force to advance technologies.

But, you must be able to work with it and tolerate its pace.





www.twiota.org/risc-v

THANK YOU!