

MSX 0 for **IoT(Internet of Things)**
MSX 3 for **hobby & education**
MSX turbo for **personal supercomputing**

“Applying FPGA to the next generation of Computing”

DevCon 2 Spain

Barcelona

January 28, 2023

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To all of you

- Thank you for your support for MSX over the last 40 years.
 - You have prolonged the life of MSX for these years.
- At age 60, I thought what should I do before I die.
 - I decided to go back to engineering again.
- Launched the University of Tokyo IoT Media Laboratory
 - Teaching, research and development on the projects of IoT
- Age 65 is retirement age from university.
 - Established NPO and Research continues. Lab members also joined.
- I want to create a new generation MSXs for the 40th anniversary of MSX.
 - Something completely new, but with software compatibility.

Purpose of DEVCON

- A computer without software is not a computer
- I want to apply the technological advances in hardware and software over the last 30 years
- Those who make hardware want to hear the wishes of those who make software and those who use it.
- I want to hear their voices directly.
- I want to enjoy and value not only the final product but also the process of making it

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DEVCON Schedule

- Japan:
 - Tokyo, Osaka, Nagoya, Sapporo, Fukuoka, Sendai, Hiroshima
- Overseas:
 - Spain, Netherlands, Italy, Brazil
- Worldwide:
 - via internet zoom

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What was the essence of MSX?

- Plug-and-play with ROM cartridges
- MSX BASIC
- GML, MML
- MSX V9938/58 VIDEO
- 8 bit Z80 products under MS-DOS • Windows

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3rd generation

3 areas: IoT, MSX, Supercomputer

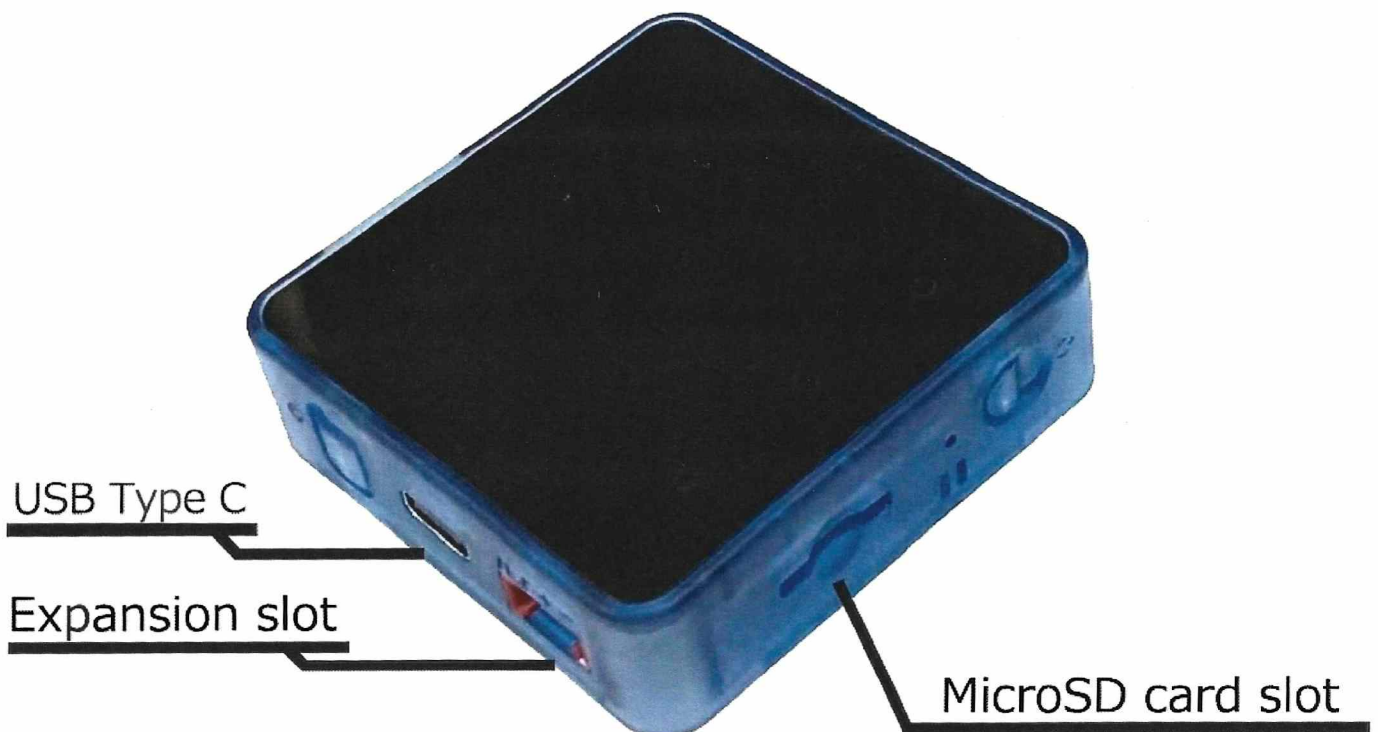
- What is IoT? What's next after LED blinking, temperature, humidity?
- What is MSX ---Fun, educational, introductory machine
- What is a supercomputer? You can see it, but you can't touch it...
What do you do with it?
- We will never understand computers and smartphones.
- And we never figure out the game console.
 - It's the next three types: X, P, S
- Hardware we will never touch
- Stop hardware, we'll all be programmers!!!!!!!!!!



- Using Emulator
 - MSX OS
 - MSX, MSX2, MSX2+
 - BASIC interpreter, compiler
- Download BASIC binaries in remote environment situations and remote control
- Export remotely from BASIC to the cloud

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MSX  Stack



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MSX OS by Néstor and Tools



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MSX BASICi, MSX BASICc

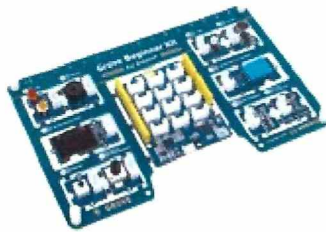
- Clock: 700MH z 200 times
- CPU is R800 10 times
- BASICc 10 times

Totally 20,000times fast

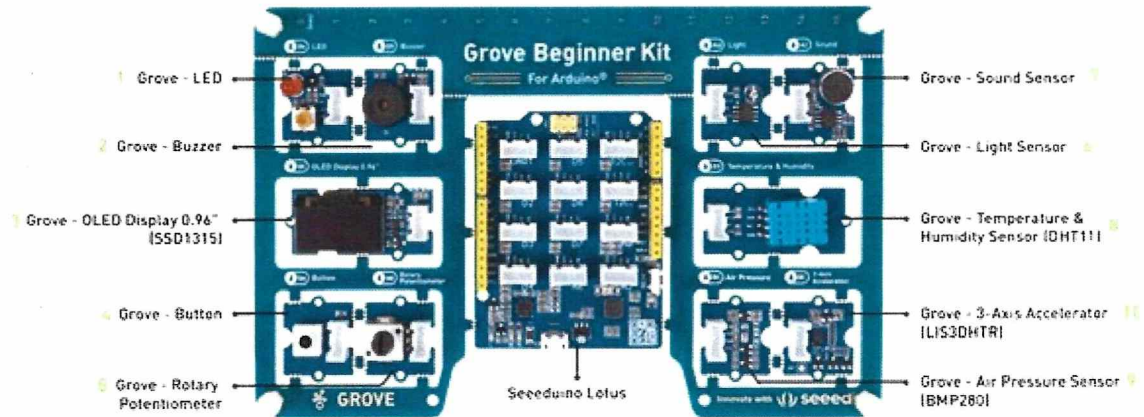


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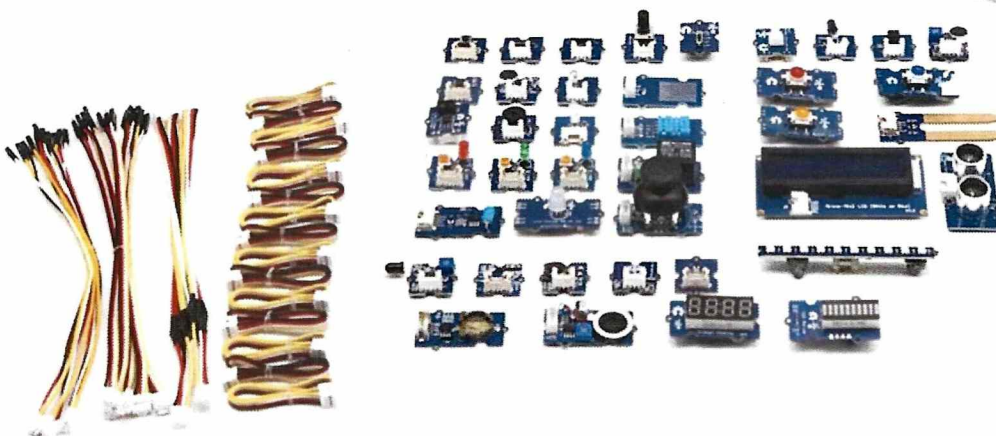
Seeed Grove Sensor



Grove Beginner Kit (10pcs)



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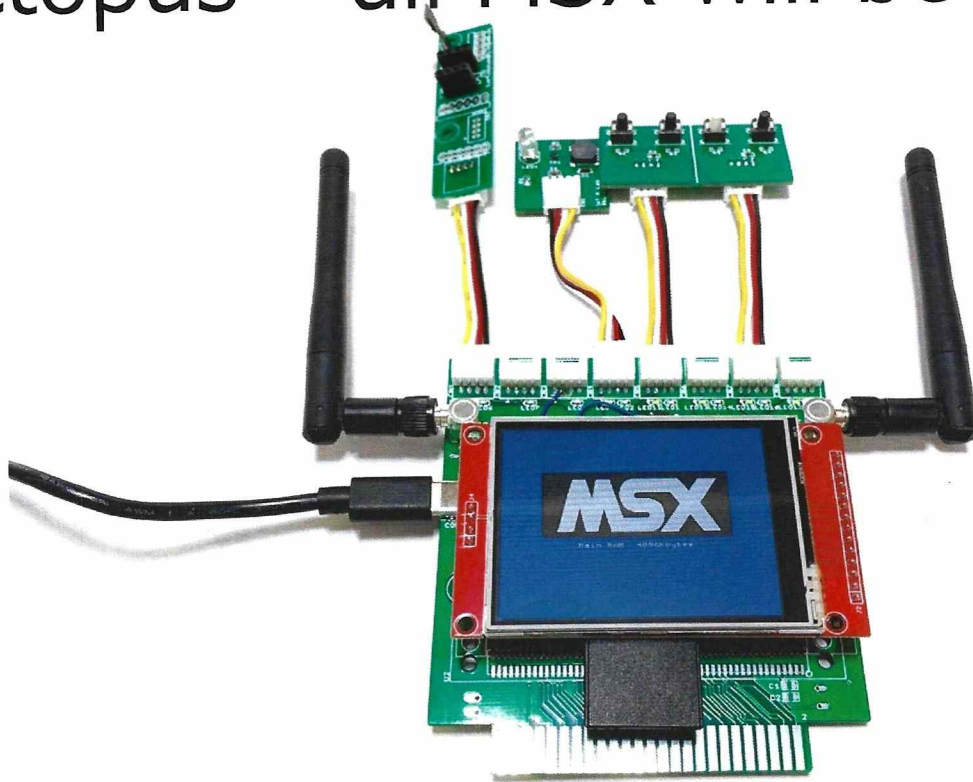
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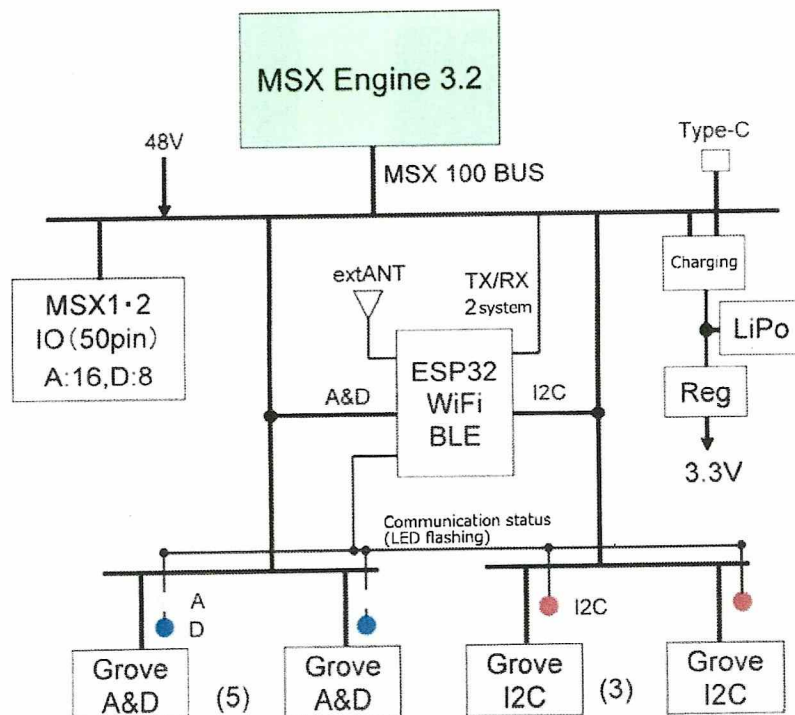
MSX 0 Cartridge

Octopus – all MSX will be MSX0



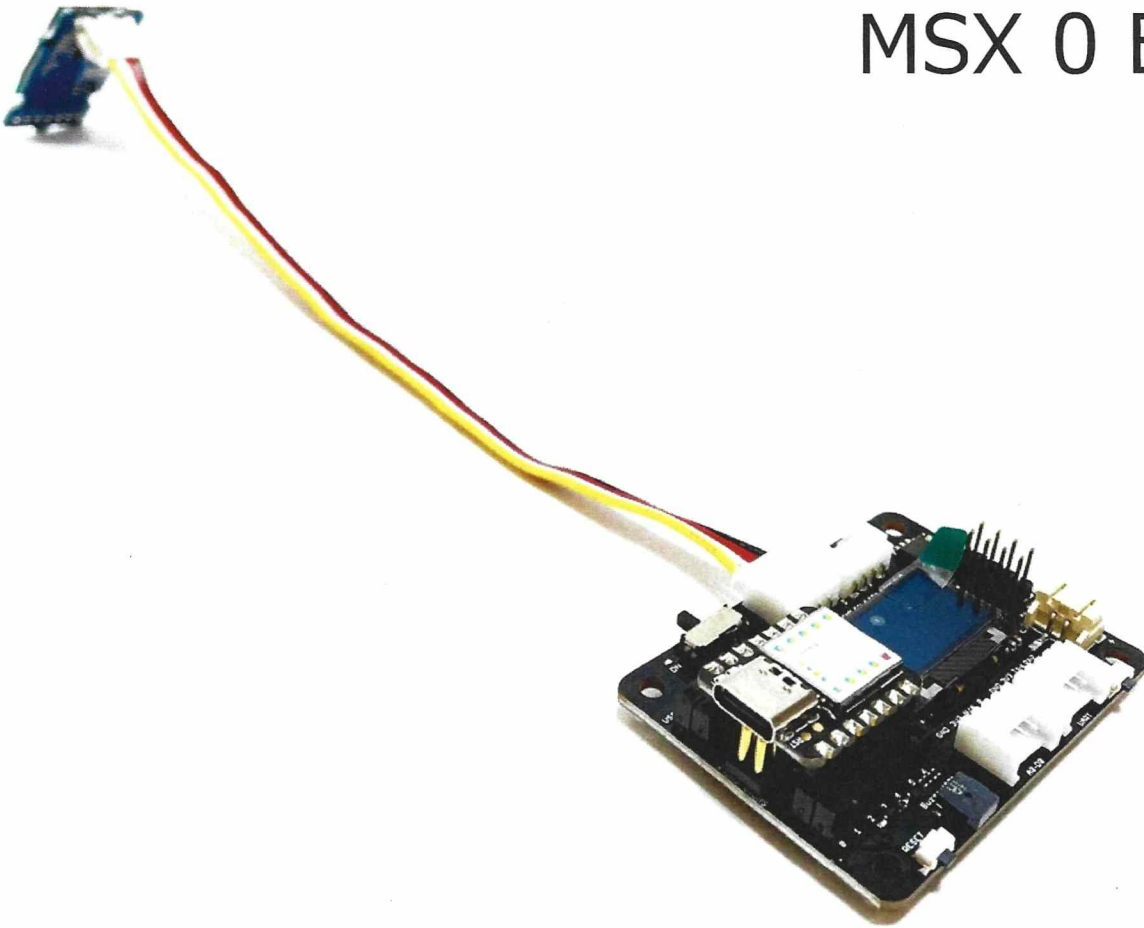
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System diagram of MSX 0 Octopus



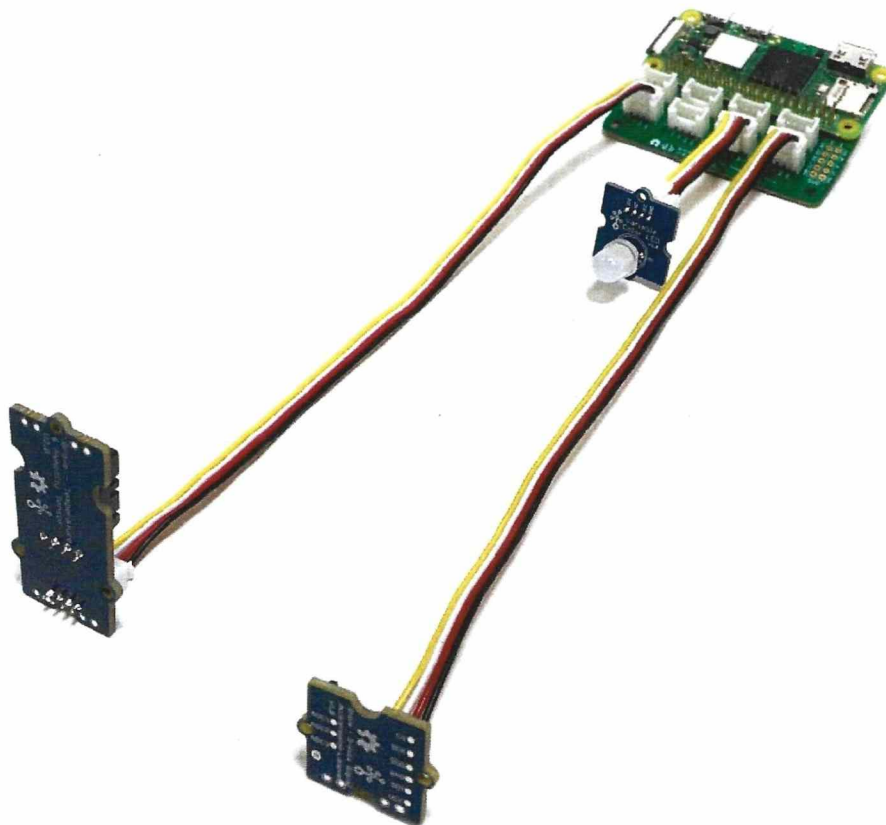
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MSX 0 ESP



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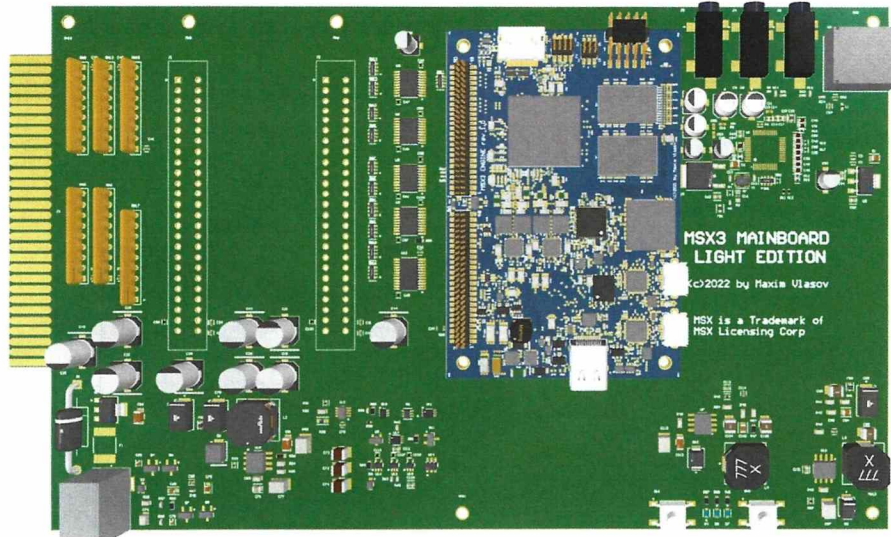
MSX 0 Zero



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MSX3 System Developer's Kit

- MSX engine 3 and other MSXM
- + Motherboard light for MSX 3 engine



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Pi-size **MSX** 100bus **Module** (MSXM)

- Same size as Raspberry Pi
- Two holes same positions and
Two holes other positions

- MSX engine 3
- MSX engine 6
- MSX video engine
- MSX audio engine



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50 pin Cartridge

- USB Cartridge
- Grove Cartridge



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60 Pin Cartridge

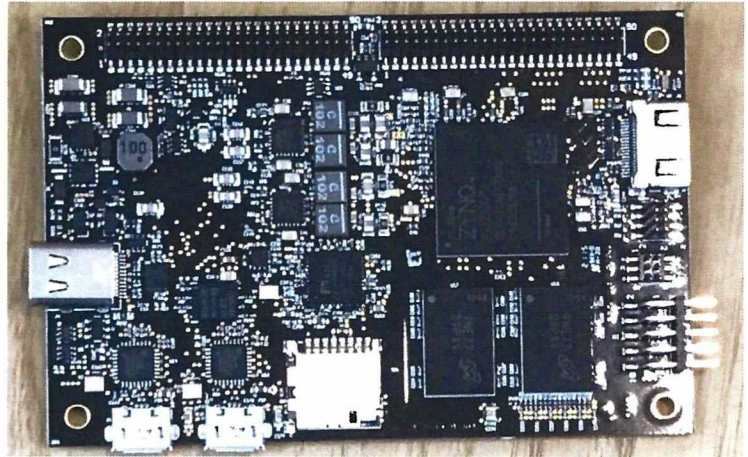
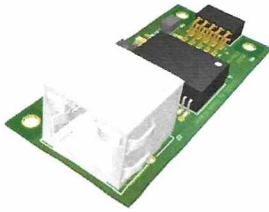
- MSX audio engine
- Same size as Synthesizer Module from YAMAHA



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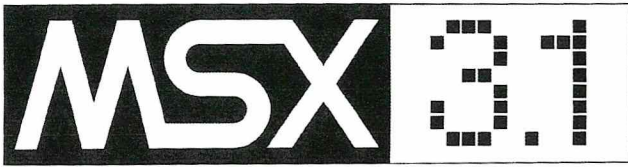
- MSX engine 3



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Zynq 7000 series comparison table					
Device name	Type name	Price(USD)	System Logic Cell (K)	Block RAM (Mb)	DSP Slice
Z-7010	XC7Z010-1CLG400C	75.32	28	2.1	80
Z-7020	XC7Z020-1CLG484C	136.71	85	4.9	220
Z-7030	XC7Z030-1FBG676C	289.90	125	9.3	400
Z-7035	XC7Z035-1FBG676C	1082.40	275	17.6	900
Z-7045	XC7Z045-1FFG676C	1732.90	350	19.1	900
Z-7100	XC7Z100-2FFG1156I	3988.89	444	26.5	2020

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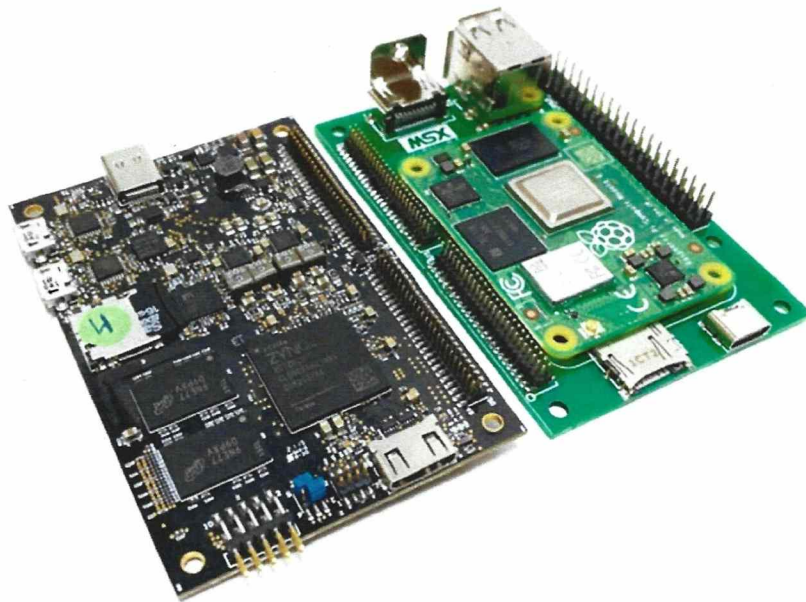
- MSX engine 3
- MSX engine 6



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Ultrascale+ MPSoC comparison table					
Type name	Price (USD)	Evaluation boards			Logic cell
XCZU2CG-1SBVA484I	348.60				103K
XCZU3CG-1SFVC784E	480.20				154K
XCZU3EG-2UBVA530I	697.41	UltraZed-EG	Ultra96-V2		154K
XCZU7EV-2FFVC1156I	4,737.96	ZCU104	ZCU106	UltraZed-EV	504K
XCZU9EG-2FFVB1156E	5,181.40	ZCU102			599K

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MSX engine 3 + Raspberry Pi CM4 = MSX 3.14

- MSXM with MSX3 engine 3 and
Stacking MSXM with Raspberry Pi CM4
- 2 x ARM32 + 4 x ARM64 + Pi GPGPU
- Pi software also runs
- 4K graphics

Support of ORIN NANO, ORIN NX,

- Recommend using Open GLes

- Graphics

- 9998 2k
- 9999 4k
- Pi GPU 4k
- ORIN NANO GPU 4k
- ORIN NX GPU 4k



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GPGPU comparison table				
Board	AI Performance	Floating operation	Price(Yen)	the source of price
Jetson Nano	* 0.47TFLOPS	0.5TFLOPS	112,146	RAKUTEN
Jetson NX Xavier	* 6TFLOPS	10TFLOPS	228,000	Amazon - J
JETSON AGX Orin 32GB	* 66TFLOPS	-	373,780	NTT - X store
A100 80GB PCIe	** 19.5TFLOPS	312TFKOPS	2,447,830	PC4U Online shop

* : FP16

** : FP32

Linux

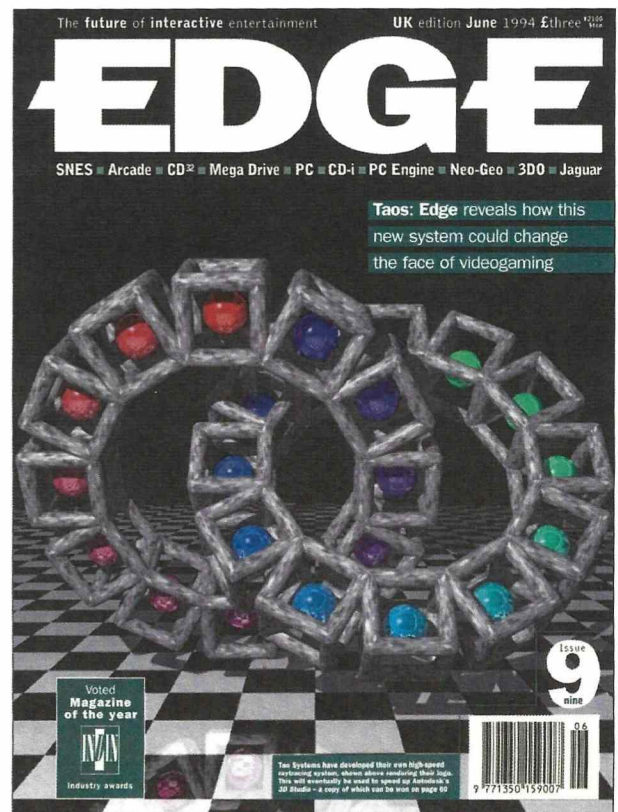
- All of languages runs on Linux
 - Python
 - Cython
 - LISP
 - C
 - C++

Linux move to TAOX

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TAOX VM64 emulator

- Developed by Chris Hinsley
- Long history
- Now working
 - Linux
 - 32 bit
 - 64 bit
 - Windows
 - MAC



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MSX OS by Néstor and Tools



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MSX BASICi, MSX BASICc

- Clock: 700MH z 200 times
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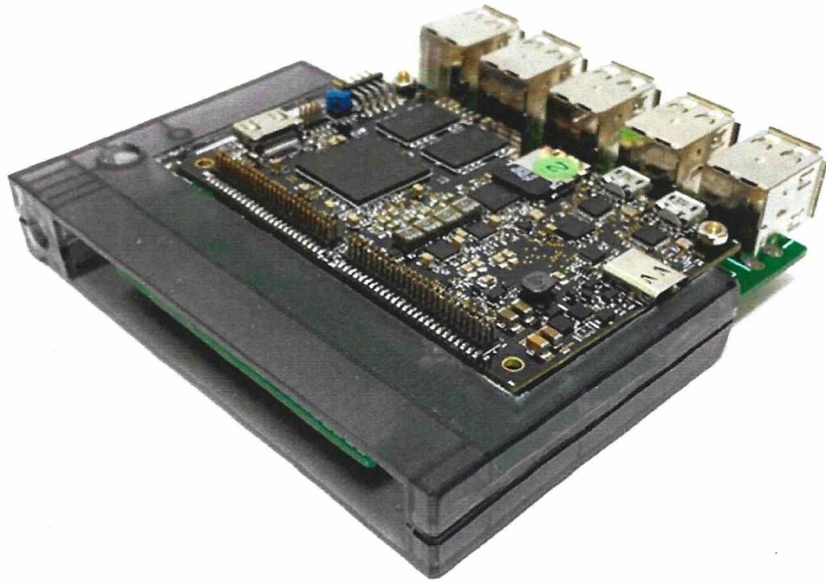
Totally 20,000times fast



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MSX 3 Cartridge

- MSX, MSX2, MSX2+, MSXTR upgrade to MSX3 when plugged in



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1chip MSX3 from D4E



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MSX3 Cube under developing



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MSX3 notebook under developing



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MSX3 pocket in developing by
a company in Kyoto

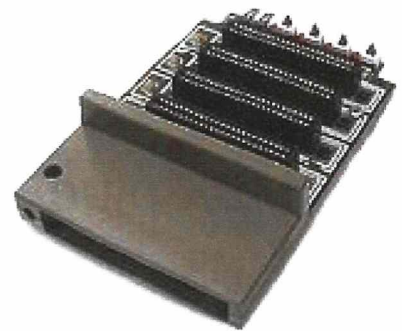


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MSX3 KB Pro under developing

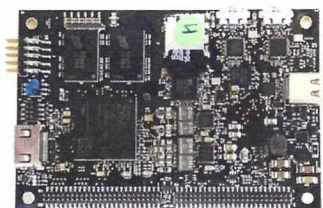
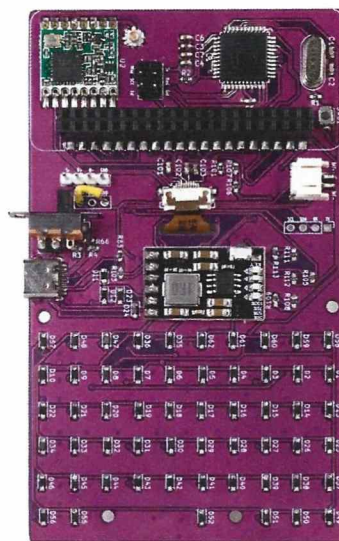
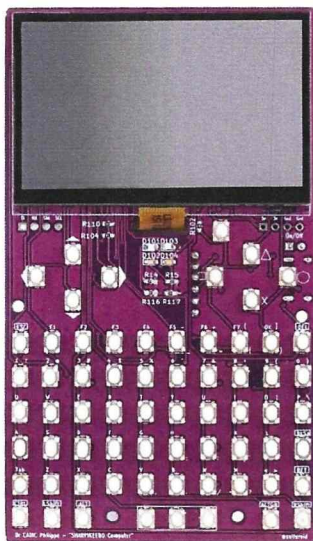


MSX3 KB Light under developing



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Hand Held MSX3 TBD



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MSX turbo

- MSX turboA8
 - MSX turboA16
 - MSX turboX128
 - MSX turboM256
 - MSX turboS4096
-
- MSX plugin card for desktop tower

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MSX turbo desktop Tower



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4U MSX 200bus Plug in Card

- 4U height
- x4 MSXM
- 19inch Rack-size compliant
- 18 sheets
- 16 in Tower Rack



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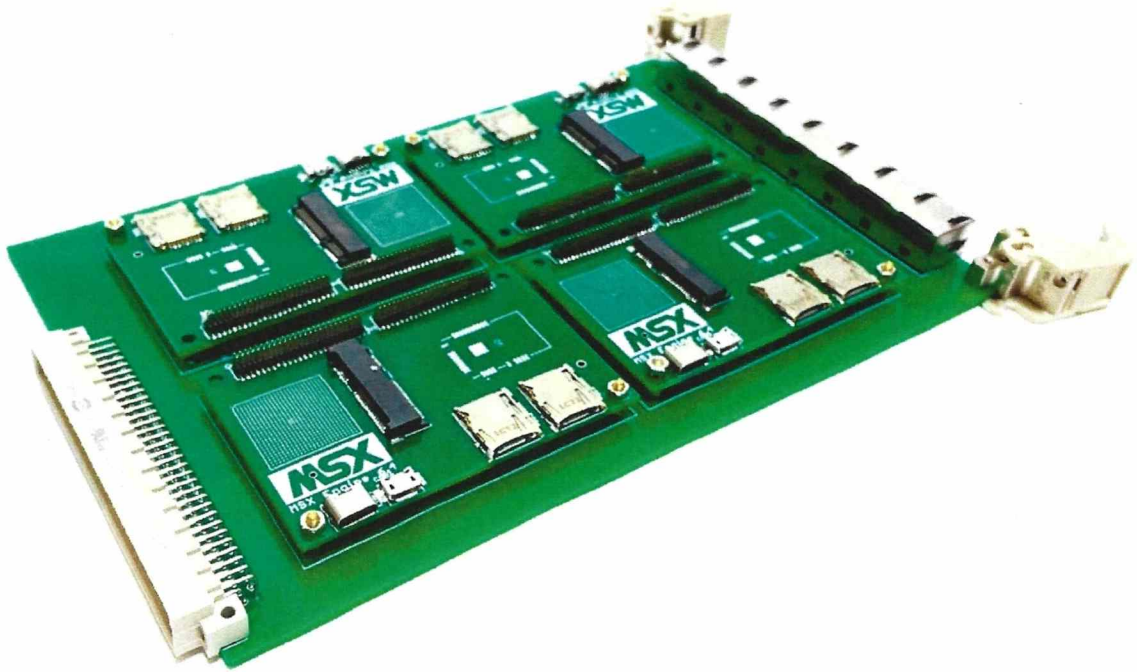
FORTTRAN / MPI, Occam3

- FORTRAN for 32 bit ARM
- We are going to use parallel compiler OCCAM2 for MSX3, which have been used for Transputer



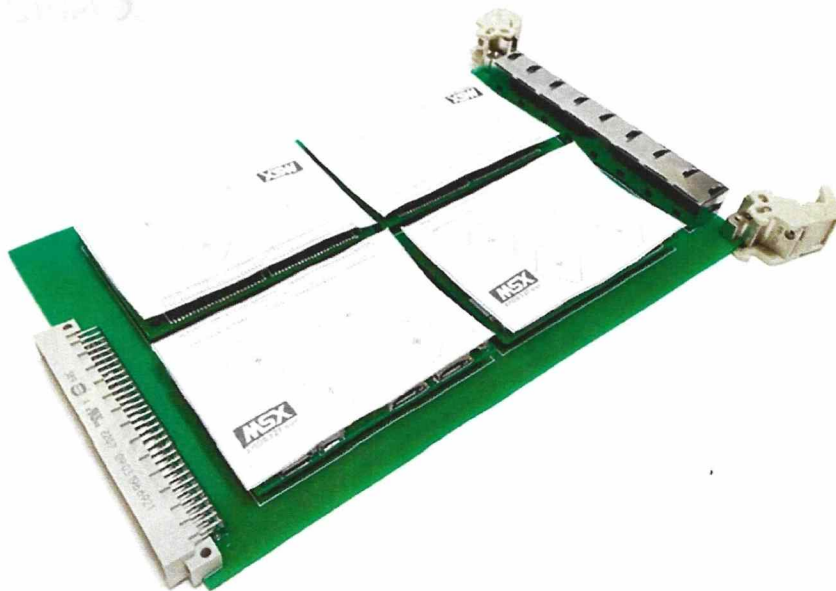
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MSX turbo A8/A16 Xilinx ARM64bit



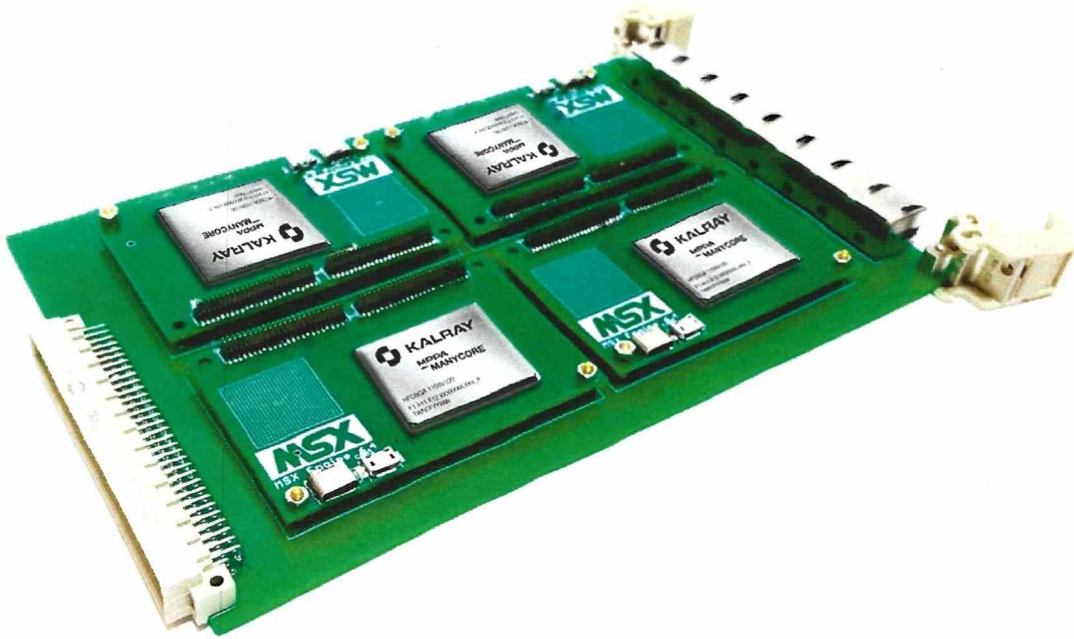
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MSX turbo X 512 XMOS 32bit



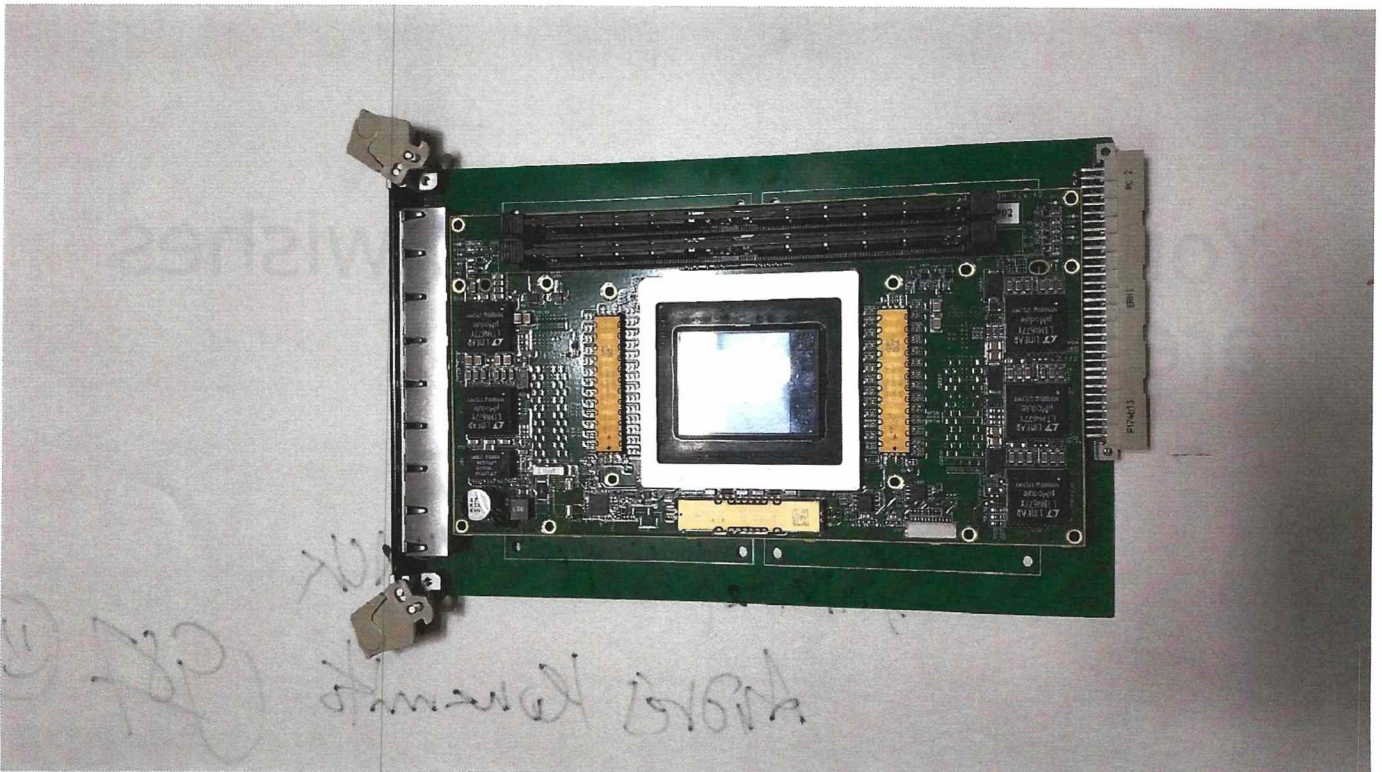
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MSX turbo M 1024 32bit MPPA VLIW



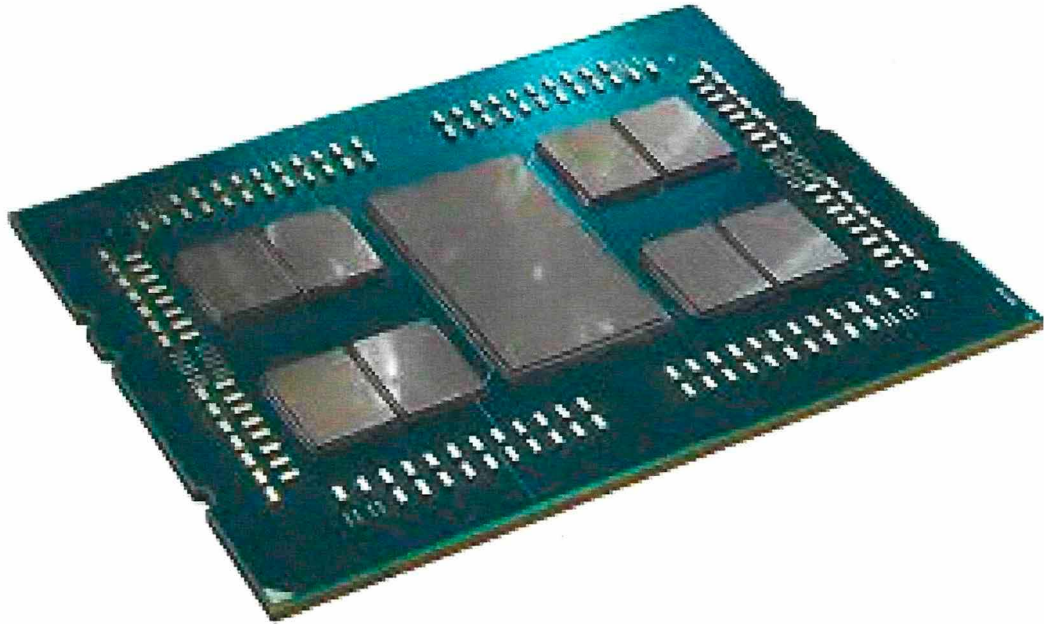
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MSX turbo S 4096



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MSX turbo N128 Threadripper PRO



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Your comments and wishes
are highly welcome.