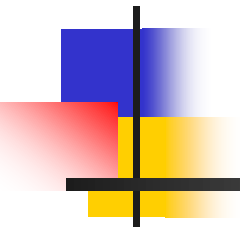
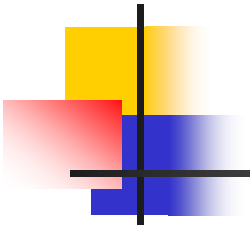


Evolution of Forth Chips

Chen-Hanson Ting

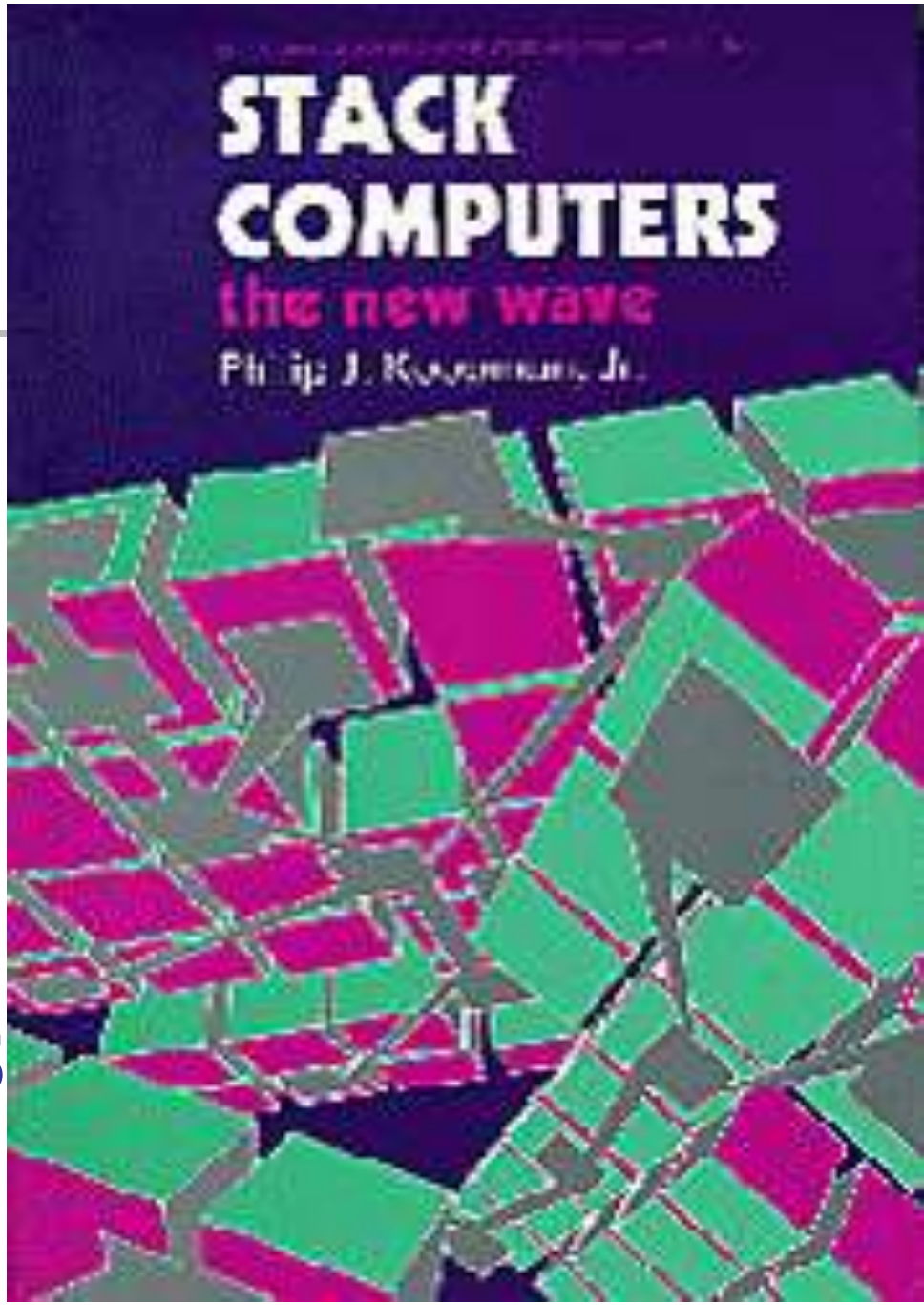
SVFIG

November 19, 2016



Forth Chips

1985	WISC CPU/16, CPU/32
1985	Novix NC4016
1986	John Hopkins FRISC-3/SC32
1988	Harris RTX 2000/2001
1988	ShBoom
1995	MuP21
2000	P8/P16/P24/eP32/eP16
2009	F18A/GA40/GA144



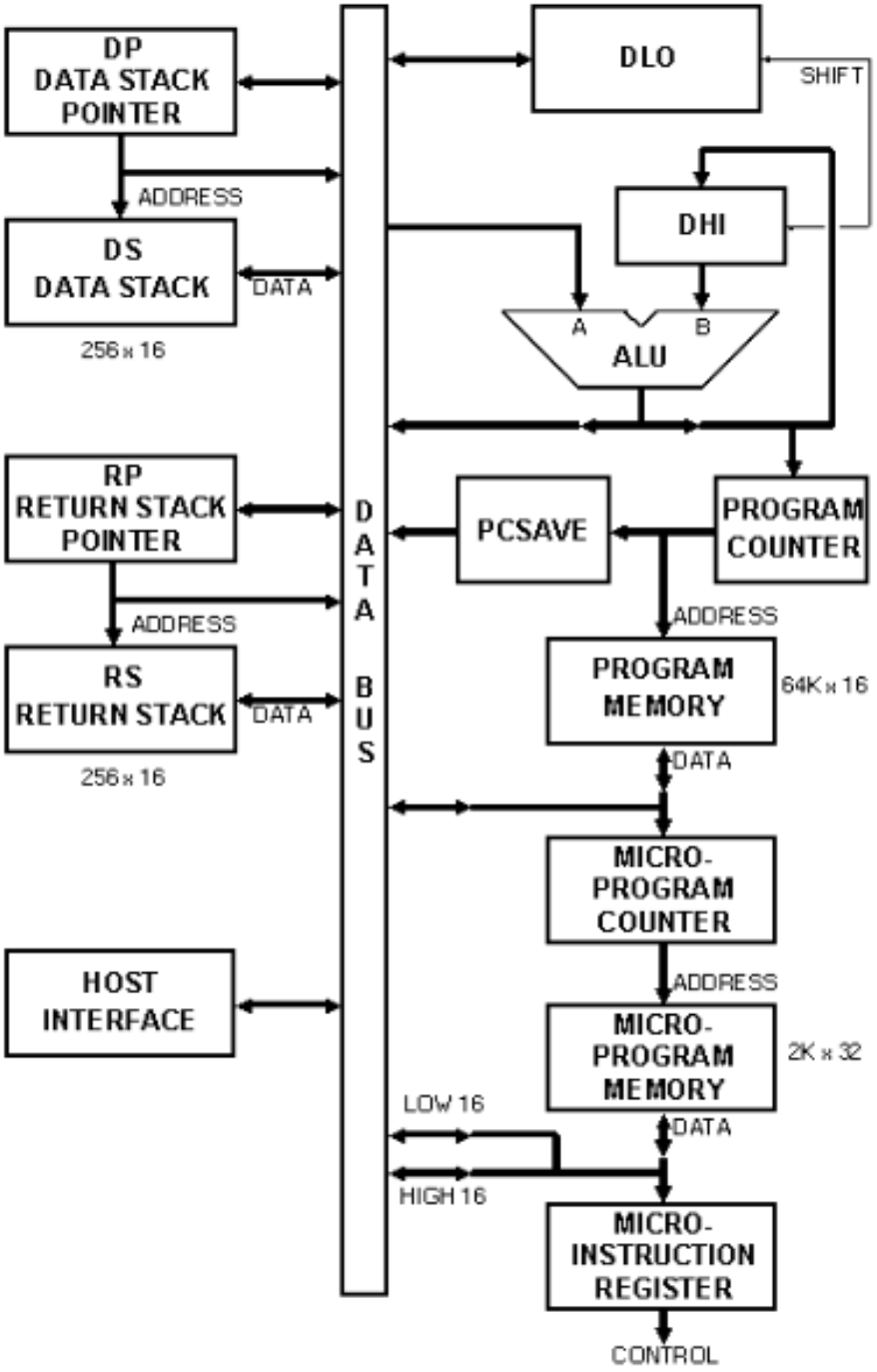
Phil Koopman

Stack Computers

The New Wave

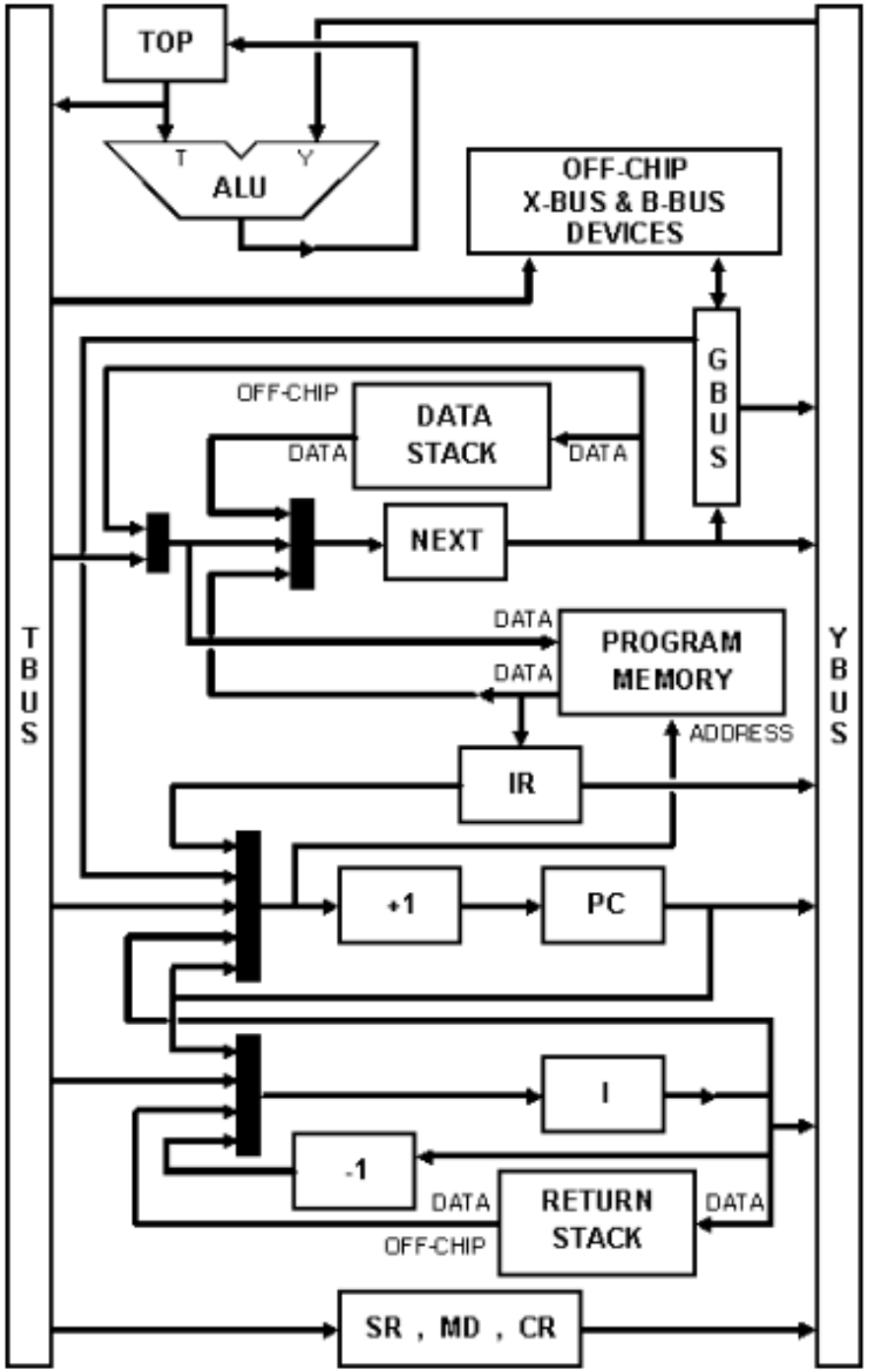
Phil Koopman
CMU

WISC CPU/16 (1985)



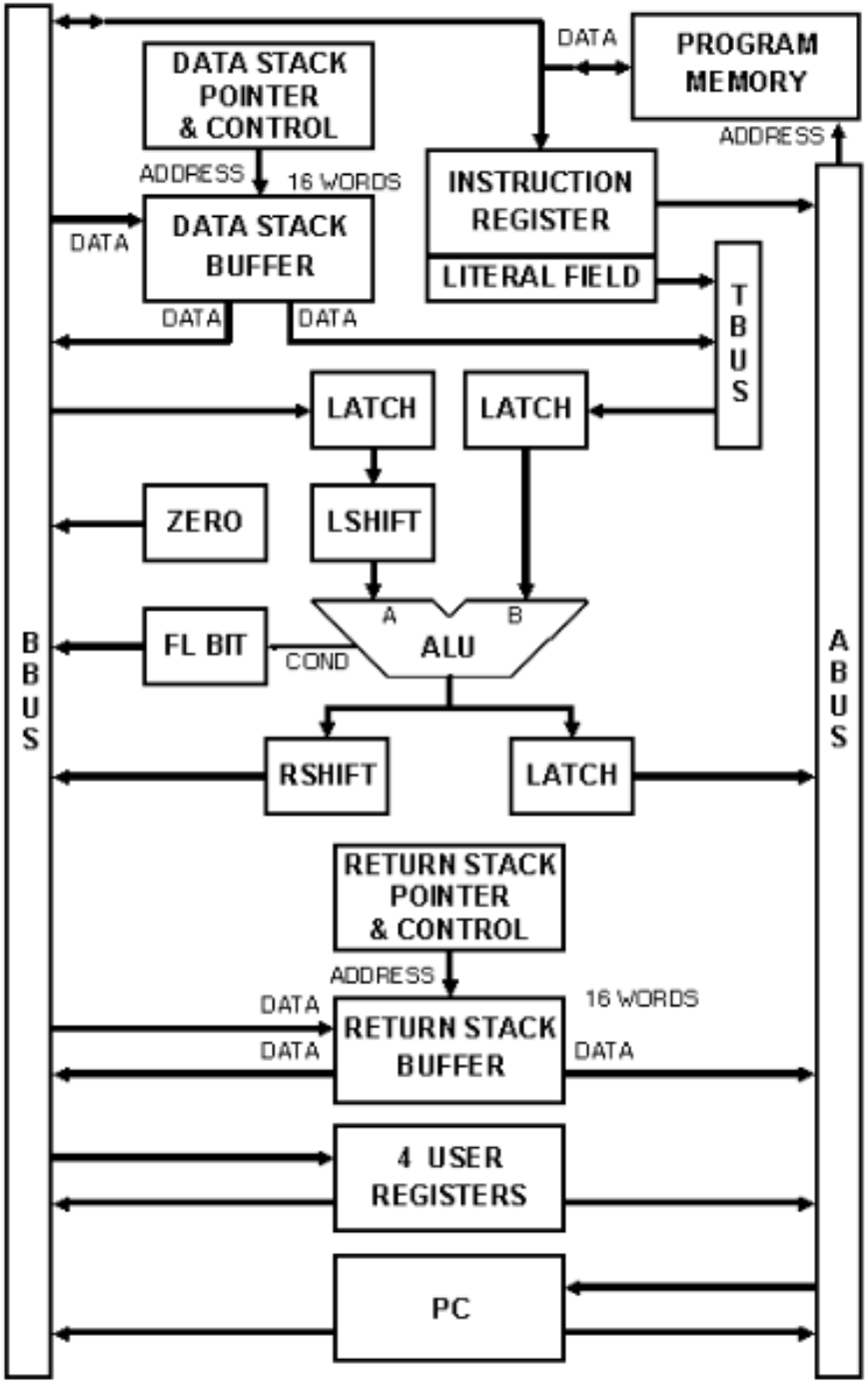
Glen Hayden

NOVIX NC4016 (1985)

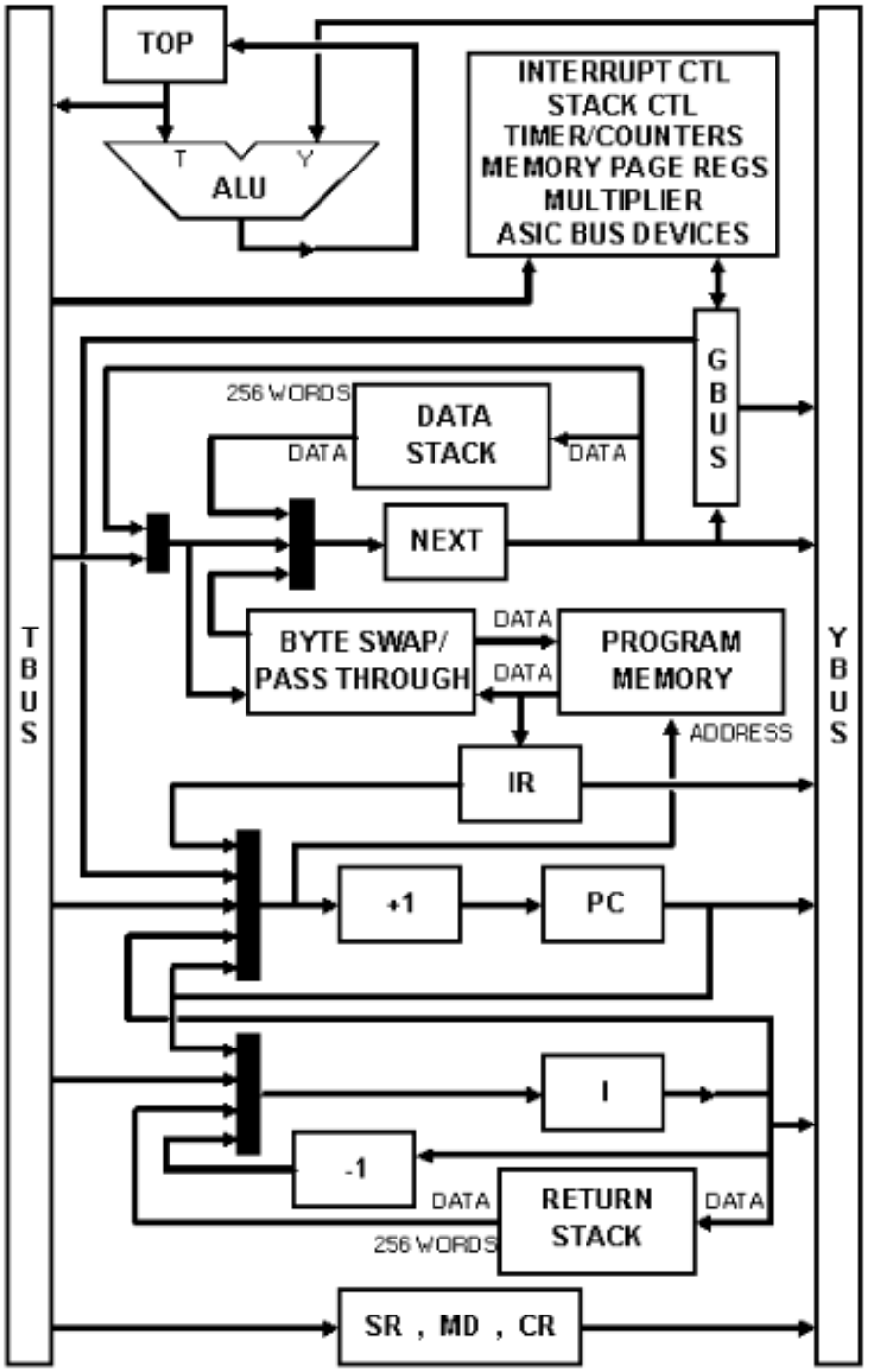


NOVIX 4016

John Hopkins FRISC3/SC32 (1986)

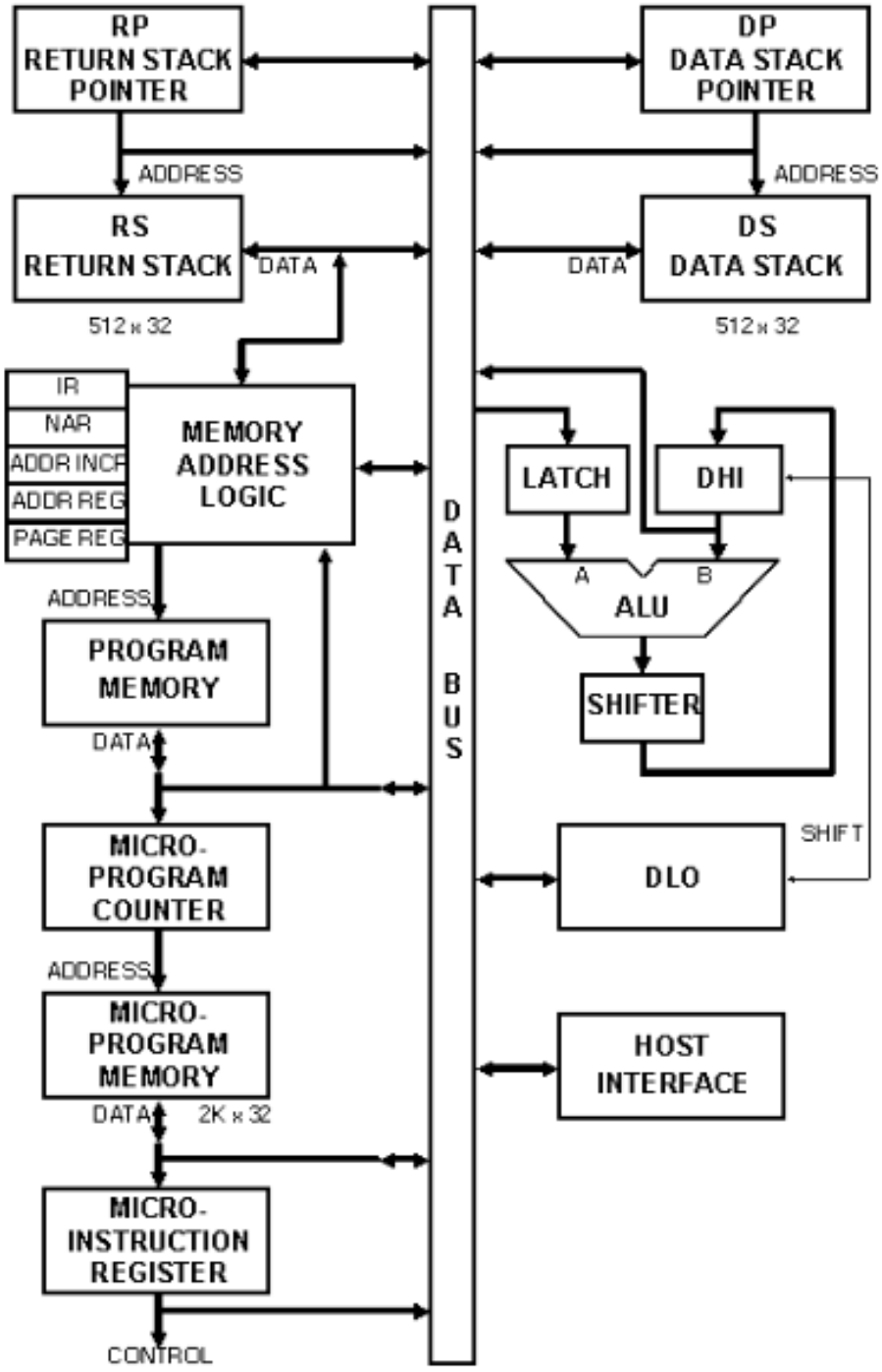


Harris RTX 2000/1 (1988)

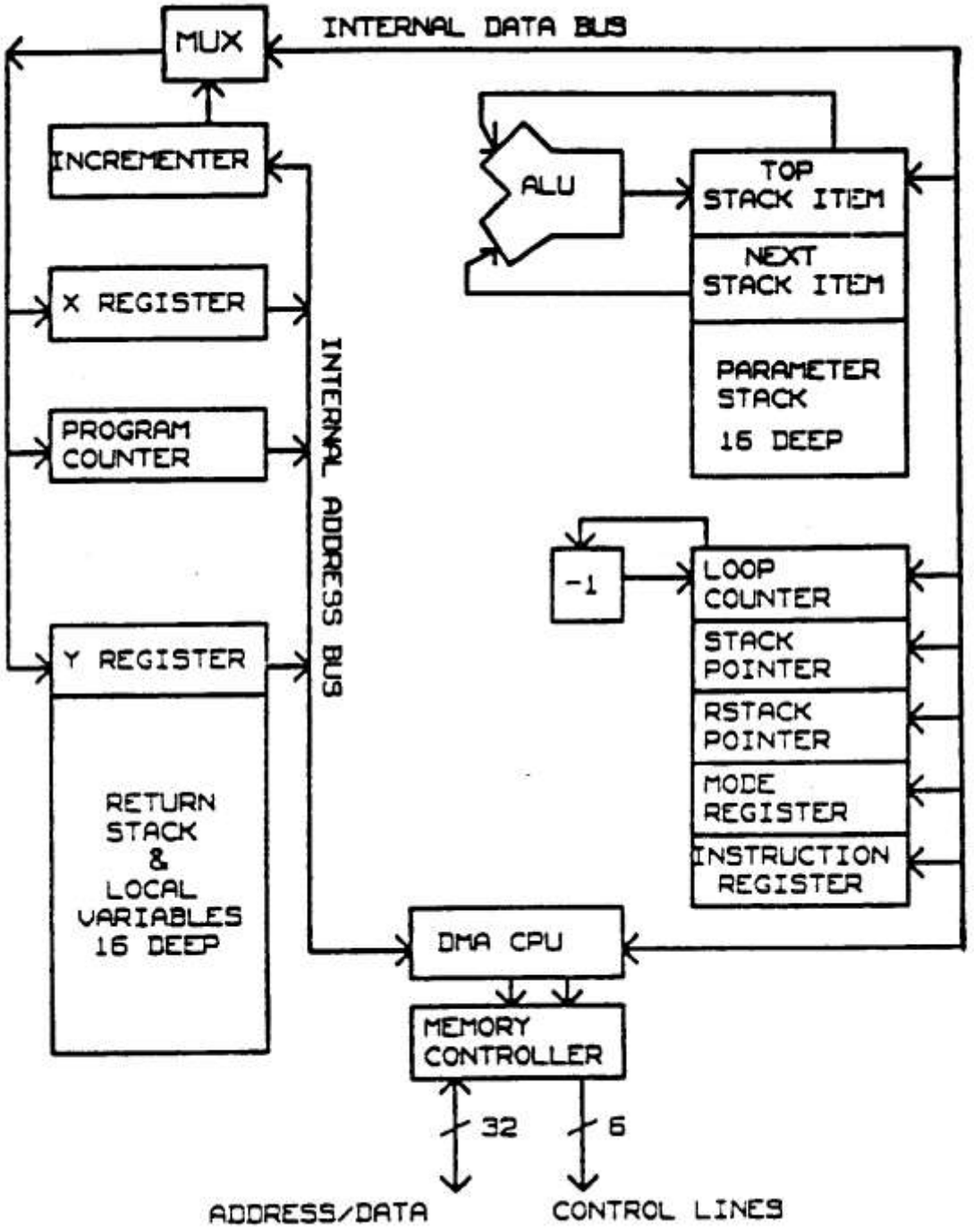


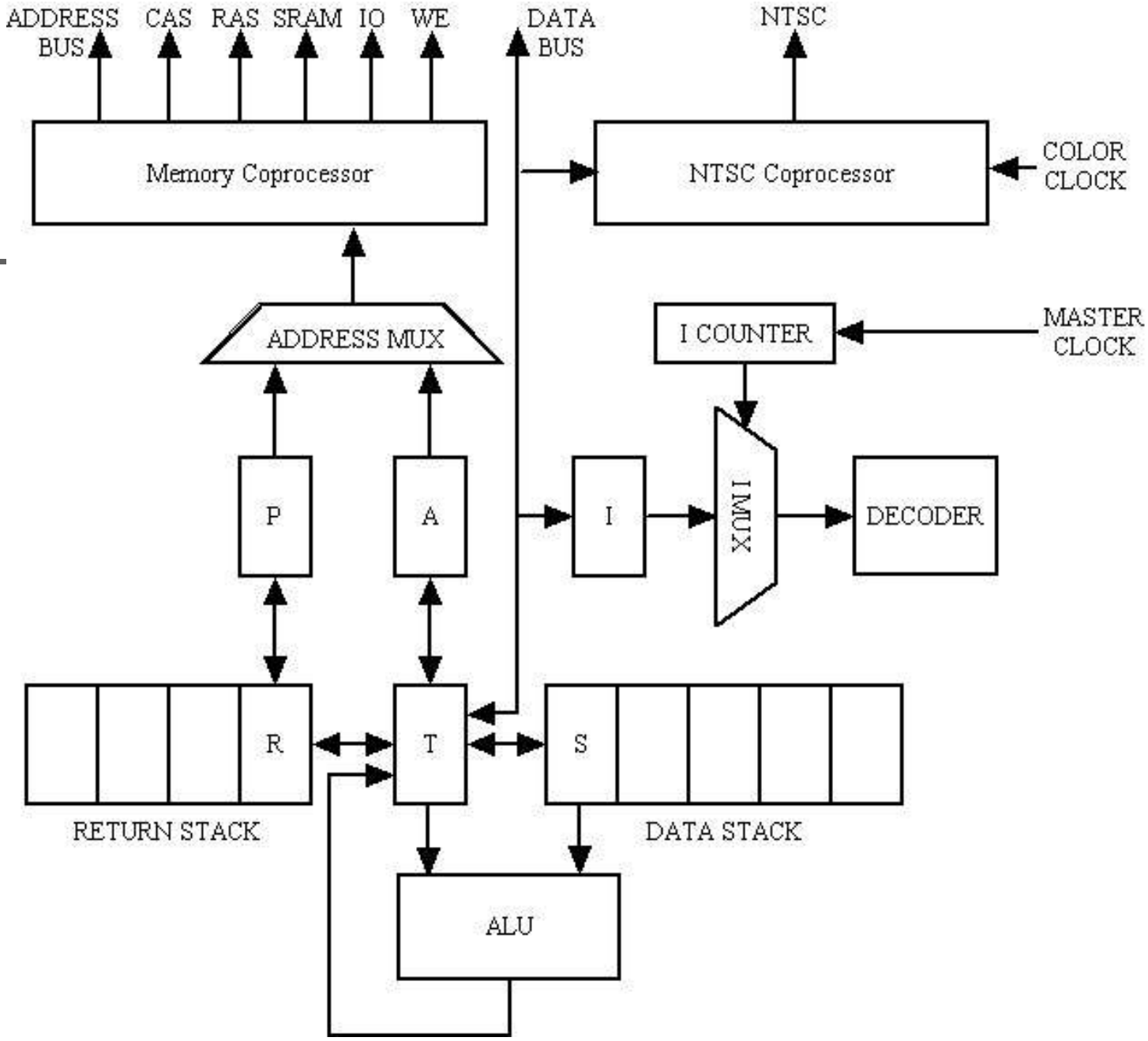
RTX2001

Harris RTX 32P (1989)



ShBoom (1988)


MUX
INTERNAL DATA BUS
INCREMENTER
ALU
TOP STACK ITEM
NEXT STACK ITEM
X REGISTER
PARAMETER STACK
16 DEEP
PROGRAM COUNTER
INTERNAL ADDRESS BUS
-1
LOOP COUNTER
STACK POINTER
RSTACK POINTER
MODE REGISTER
INSTRUCTION REGISTER
Y REGISTER
RETURN STACK & LOCAL VARIABLES 16 DEEP
DMA CPU
MEMORY CONTROLLER
32
6
ADDRESS/DATA
CONTROL LINES

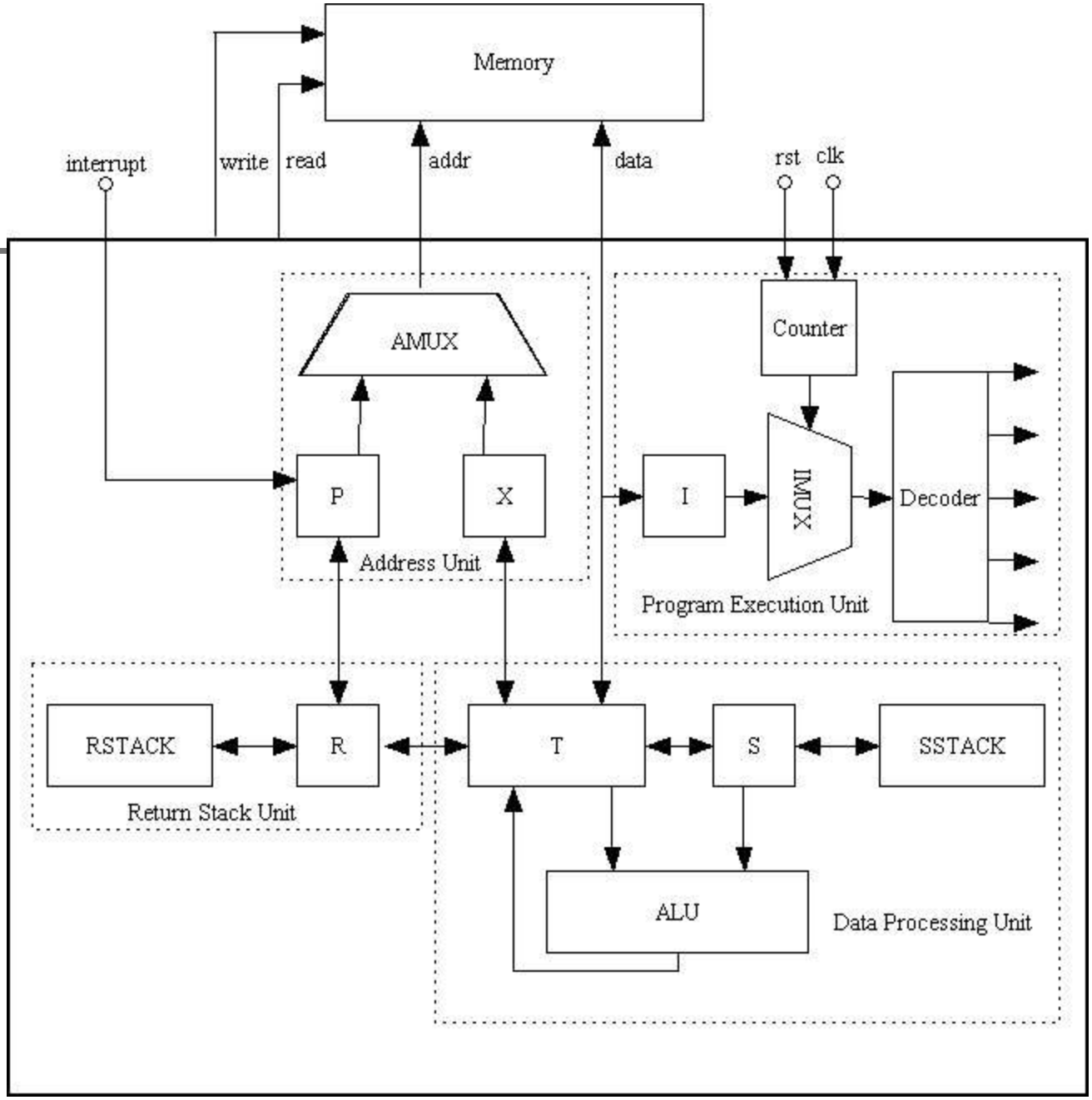

ADDRESS BUS
CAS
RAS
SRAM
IO
WE
DATA BUS
NTSC
Memory Coprocessor
NTSC Coprocessor
COLOR CLOCK
ADDRESS MUX
I COUNTER
MASTER CLOCK
P
A
I
IMUX
DECODER
R
T
S
RETURN STACK
DATA STACK
ALU

MuP21 (1995)

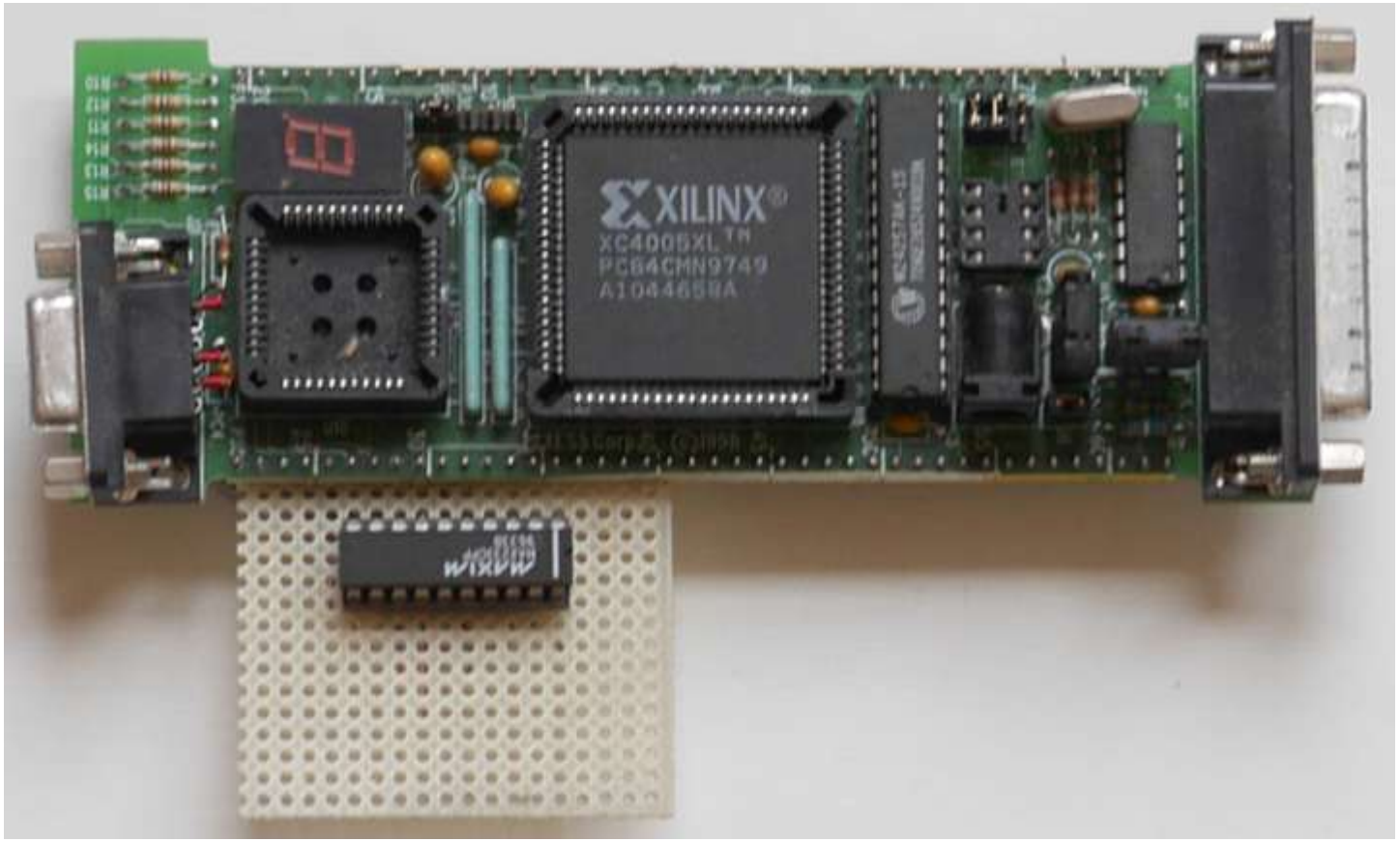
MuP21


P21A3 July 1994
(c) Copyright, C. H. Ting
Offete Enterprises
J1
J2
J3
J4
CD74HCT245E
RCA H 945

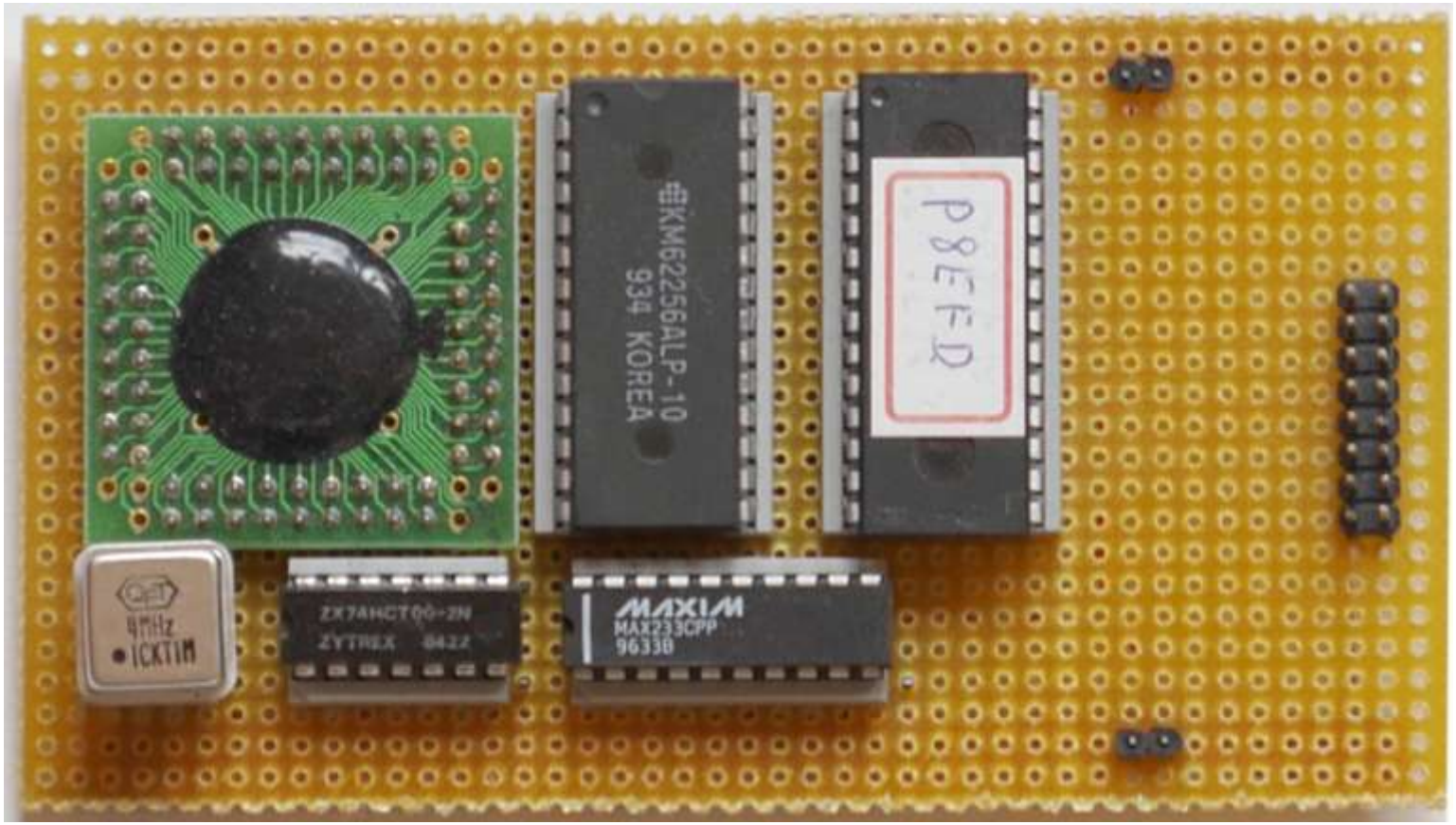
P8
P16
P24
eP32
eP16
(2000)



P8

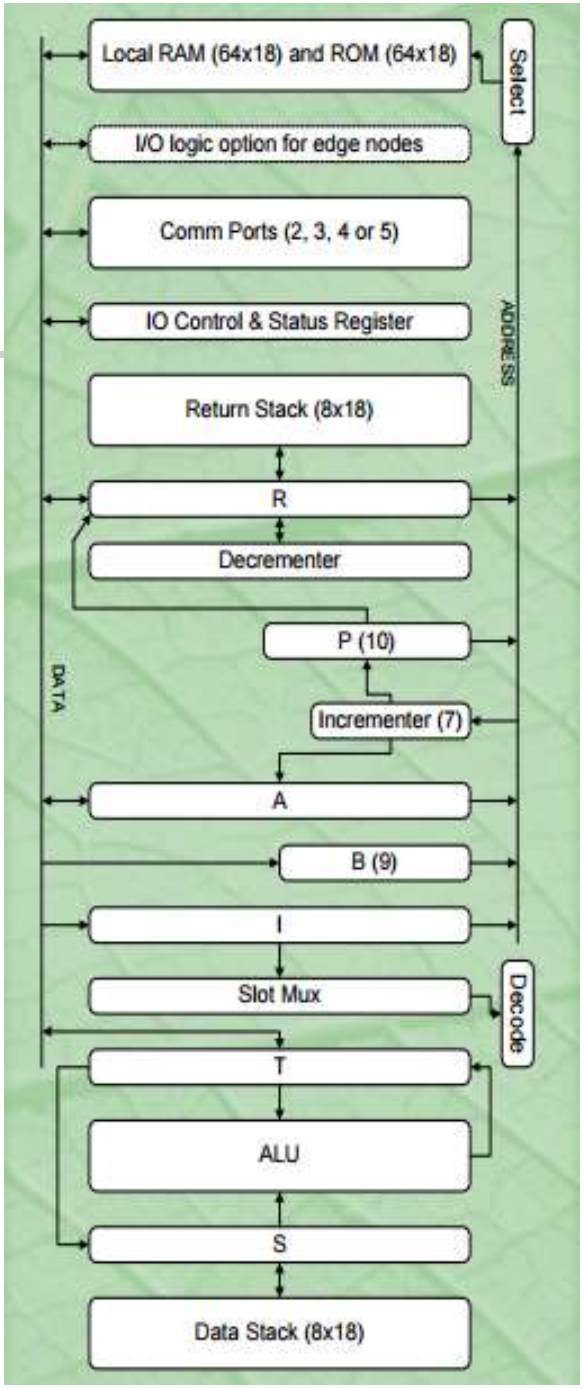


P16

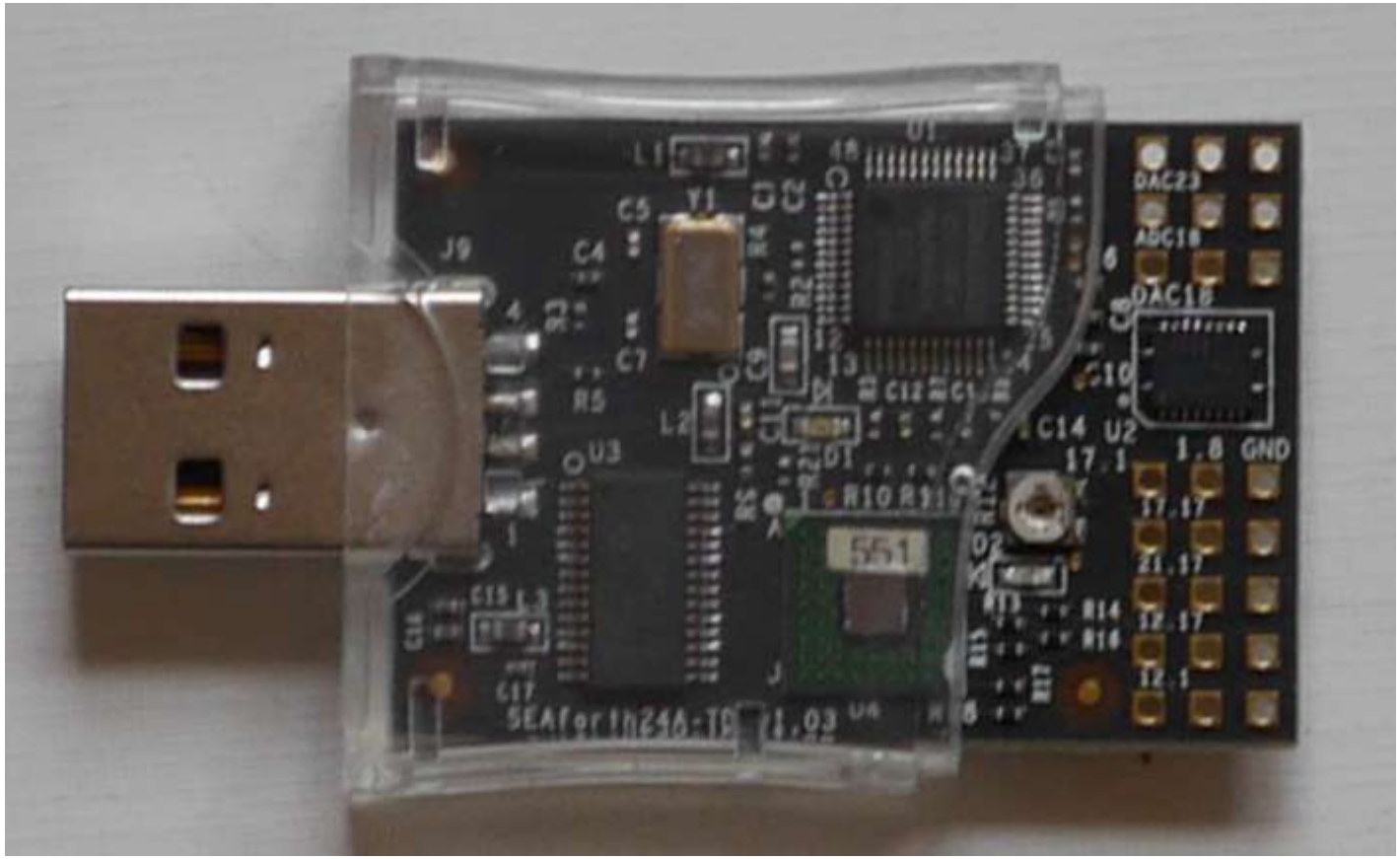

KM62256ALP-10
934 KOREA
P8EFD
4MHz
ICKTIM
ZX74HCT00-2N
ZYTREX
MAXIM
MAX233CPP
96330

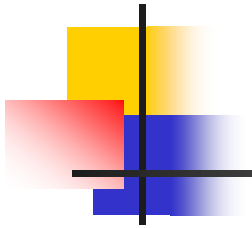
eP32

Green Arrays
F18A
GA40 (2009)
GA144 (2012)

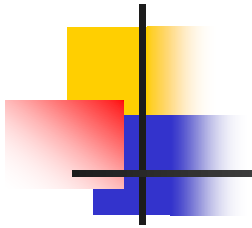


GA40

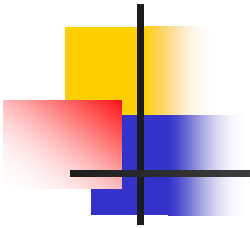




Questions?

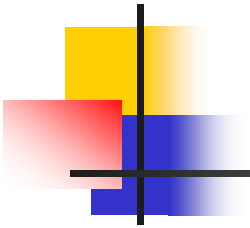


Thank you.



ESP8266

- It looks that ESP8266 12E will replace Arduino Uno, with its WIFI capability, 32-bit processor, and large memories.
- We need a WIFI ready eForth implementation to participate in the new revolution



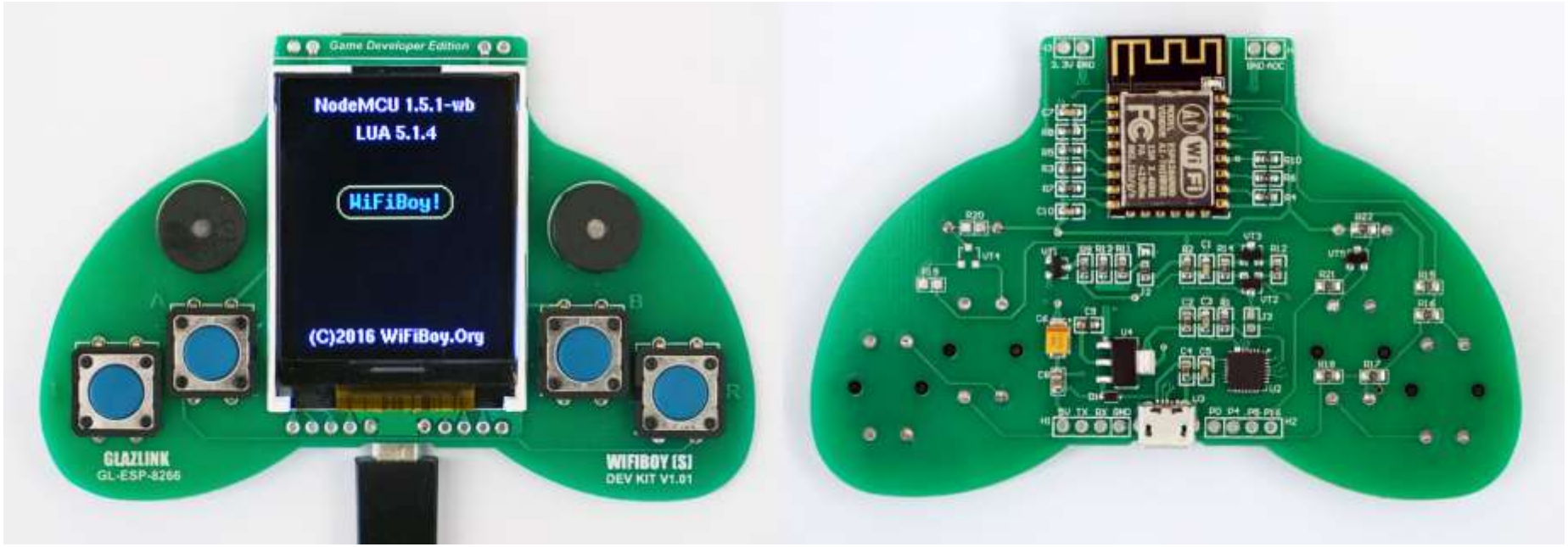
espForth

- I ported my eForth written in C to WiFiBoy kit successfully.
- I have to communicate with it through TCP/IP. Help will be appreciated.

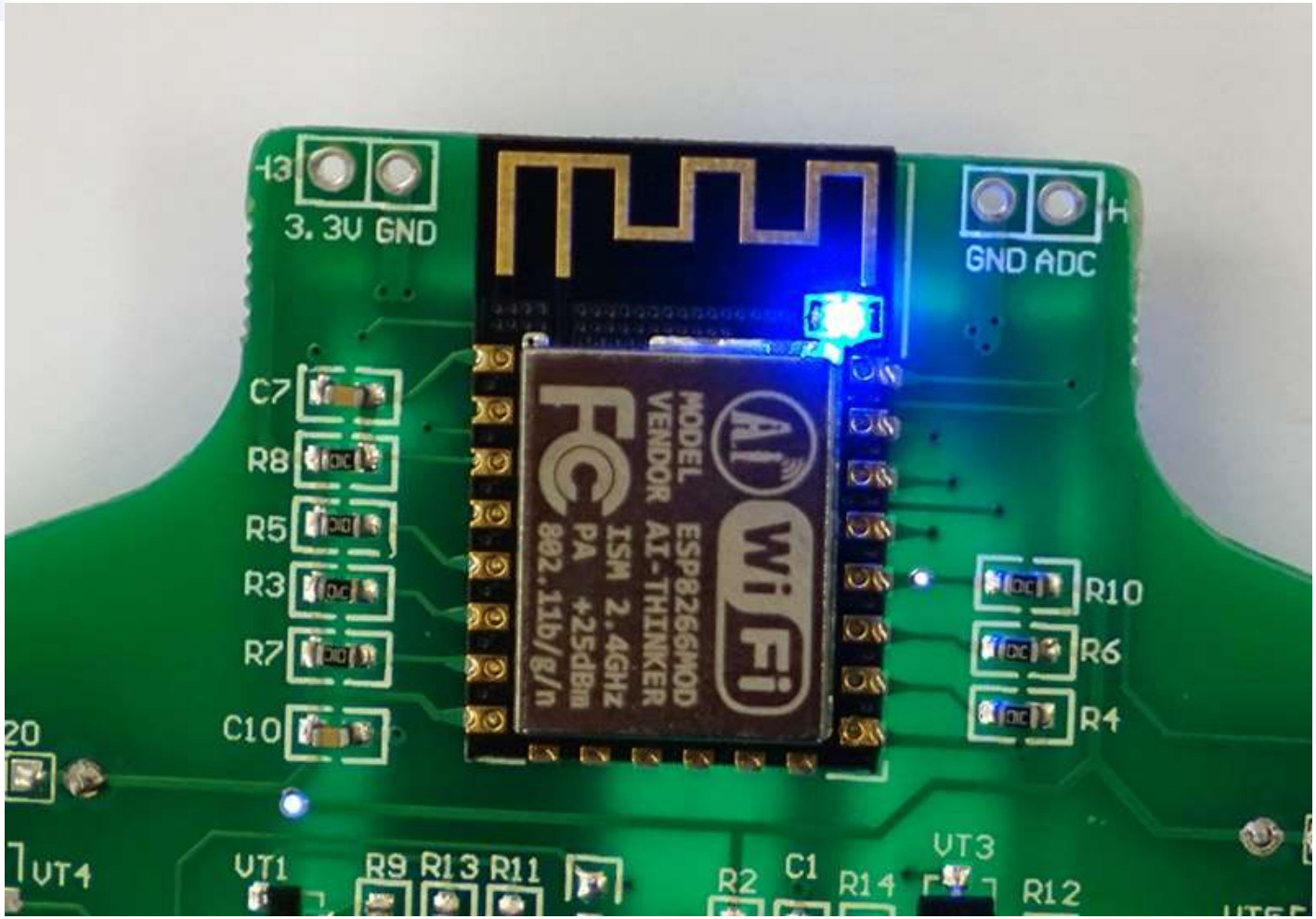
ESP8266

- 32-bit Xtensa LX106 at 80 MHz
- 64 KB program RAM, 96 KB of data RAM
- IEEE 802.11 b/g/n Wi-Fi
- GPIO, SPI, I²C, UART, ADC

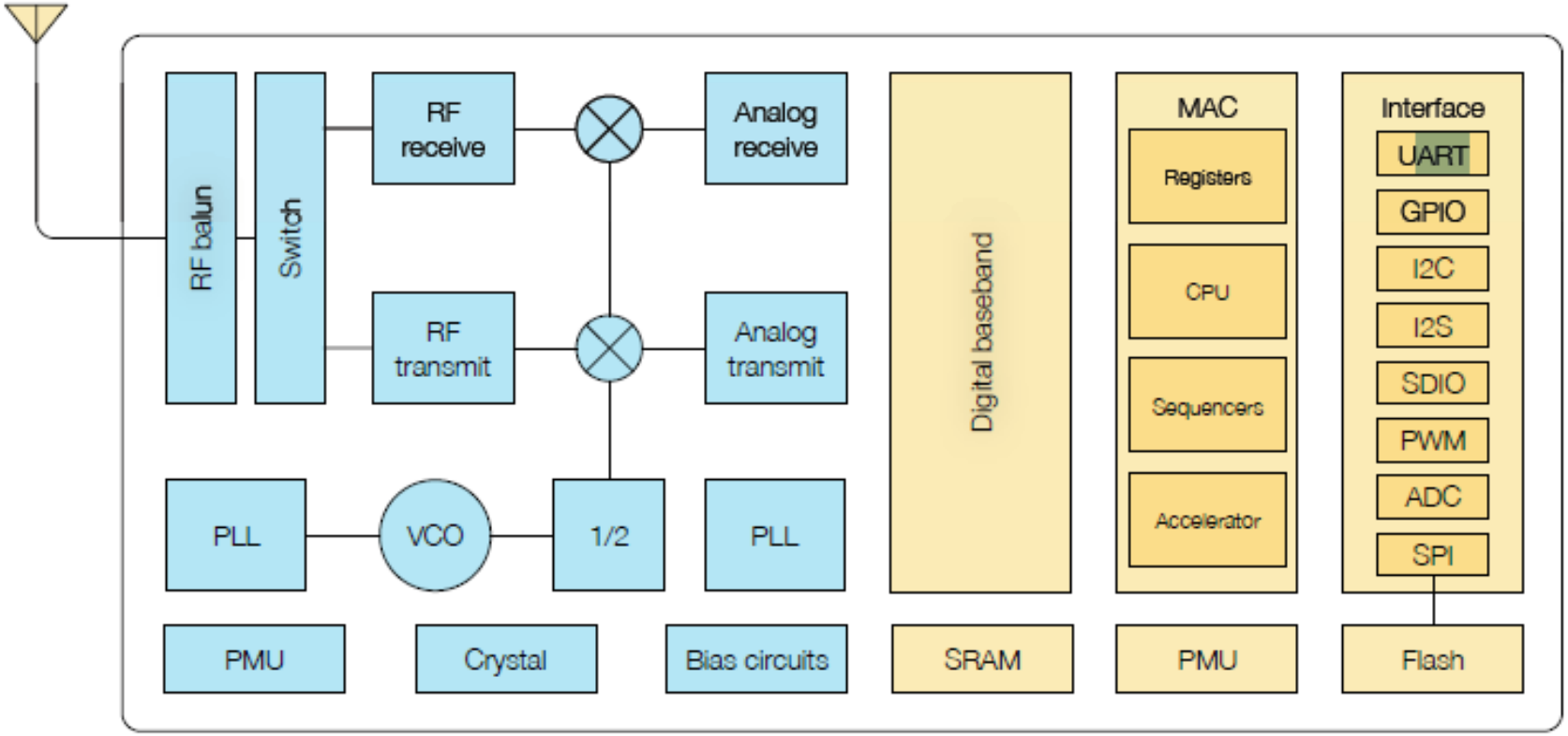
WiFiBoy


Game Developer Edition
NodeMCU 1.5.1-wb
LUA 5.1.4
WiFiBoy!
(C)2016 WiFiBoy.Org
GLAZLINK
GL-ESP-8266
WIFIBOY [S]
DEV KIT V1.01

ESP8266


H3
3.3V GND
H
GND ADC
C7
R8
R5
R3
R7
C10
R10
R6
R4
MODEL ESP8266MOD
VENDOR AI-THINKER
ISM 2.4GHz
PA +25dBm
802.11b/g/n
VT4
VT1
R9 R13 R11
R2
C1
R14
VT3
R12

ESP8266


RF balun
Switch
RF receive
RF transmit
Analog receive
Analog transmit
PLL
VCO
1/2
PLL
Digital baseband
MAC
Registers
CPU
Sequencers
Accelerator
Interface
UART
GPIO
I2C
I2S
SDIO
PWM
ADC
SPI
PMU
Crystal
Bias circuits
SRAM
PMU
Flash