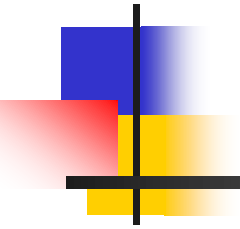
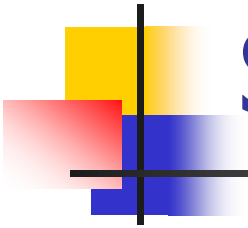


stm8eForth

Silicon Valley FIG

July 24, 2010

Chen-Hanson Ting

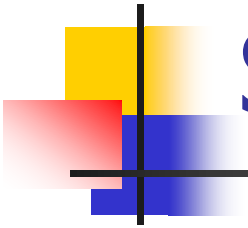


Summary

- STM8S-Discovery Board
- STM8S105C6 Microcontroller
- STVD Tool Set
- eForth Implementation
- Demo

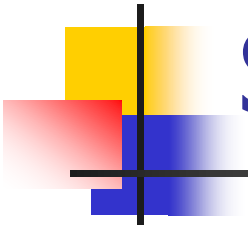
STM8S-Discovery Board

- PC board 1-3/4”x4-1.4”
- Breakable ST-Link USB port
- STM8S105C6 Microcontroller
- LED
- Beeper
- UART port



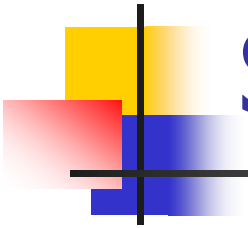
STM8S-Discovery Board

- Free in Embedded System Conference
- $8.89 from Mouser
- Excellent kit for experimentation
- Horrible C compiler
- Best vehicle for FORTH



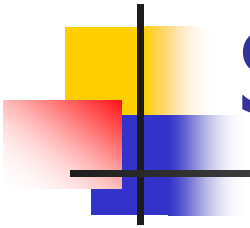
STM8S105C6 Microcontroller

- Almost a 16 bit CPU
- 24 bit addressing space
- 32 Kbytes flash
- 2 Kbytes RAM
- 16 MHz clock
- GPIO, timers, UART, ADC, SPI, I2C



STM8S105C6 Microcontroller

- 8 bit accumulator A
- 16 bit index registers X,Y
- 24 bit program counter PC
- 16 bit stack pointer SP
- 20 addressing modes

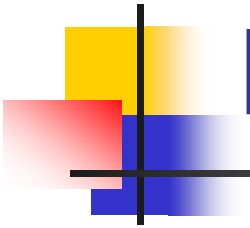


STM8S Instructions

- 80 instructions, average 2 bytes
- 16 bit arithmetic instructions
- 8x8 multiplication
- 16x16 division
- Bit manipulation
- Memory to memory transfer

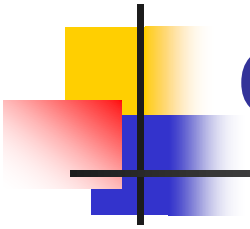
STM8S Tool Set

- STVD Visual Development
- STVP Visual Program
- ST-Link for debugging/programming
- Assembler
- 3rd Party C compilers
  - Cosmic
  - Renaissance



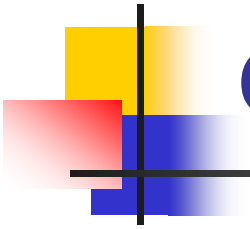
Horribe C Compilers

- I only tried Cosmic C compile
- Huge source code
- Huge library code
- Amazing that it actually worked



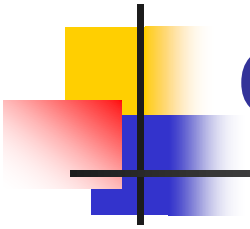
eForth Implementation

- STM8S is very similar to 68HC11/12
- Use EF12.ASM as basis
- Limitations in addressing modes make FORTH Virtual Engine much less efficient



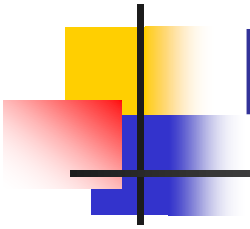
eForth Implementation

- The hardest work was to get UART2 port talking to Hyperterminal.
- STM8S boots up with internal 2 MHz clock
- It has to be re-configured to use 16 MHz external crystal.
- Realtime debugger is very useful.



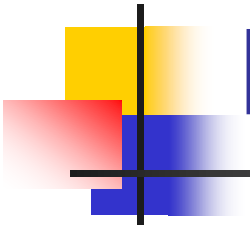
eForth Implementation

- Main FORTH dictionary (5.5 KB) resides in flash
- New words are added to RAM
- At 16 MHz, 2.5 us per empty loop
- UART interface to Hyperterminal



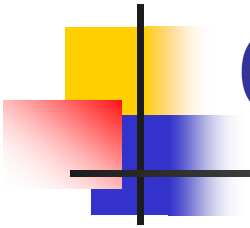
Demo

- Turn LED on
  - 0 500F C!
- Turn LED off
  - 1 500F C!



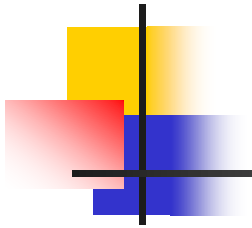
Demo

- Turn on 1 KHz beeper
  - 3E 50F3 C!
- Turn on 2 KHz beeper
  - 7E 50F3 C!
- Turn on 4 KHz beeper
  - FE 50F3 C!
- Turn beeper off
  - 1F 50F3 C!

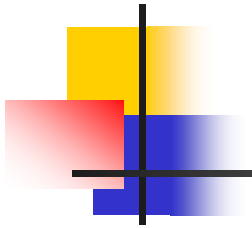


Conclusions

- Discovery is the cheapest microcontroller board ever.
- It shows how much pain C programmers are willing to suffer in using microcontrollers
- It can be a very good platform to teach FORTH.



Questions?



Thank You.