MICROCONTROLLER VIRTUAL MEMORY

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OVERVIEW

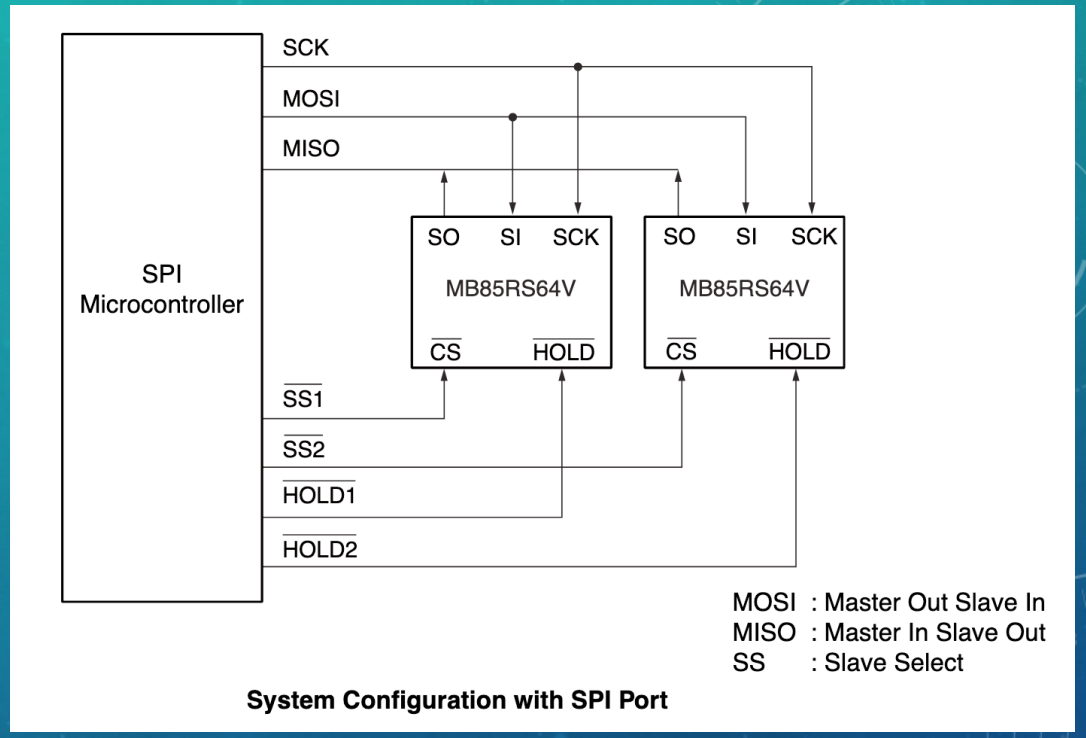
- Atmel SAMD21G18A microcontroller
- 2 Fujitsu 64KB SPI FRAM chips. With current configuration, up to 8 slave chips are supported.
- 1 Four-line serial LCD display (8-bit AVR microcontroller)
- FRAM sits in an array with functions to read/write to the chips using a virtual address space, abstracting the number of chips or placement of data on chips

FERROELECTRIC RAM

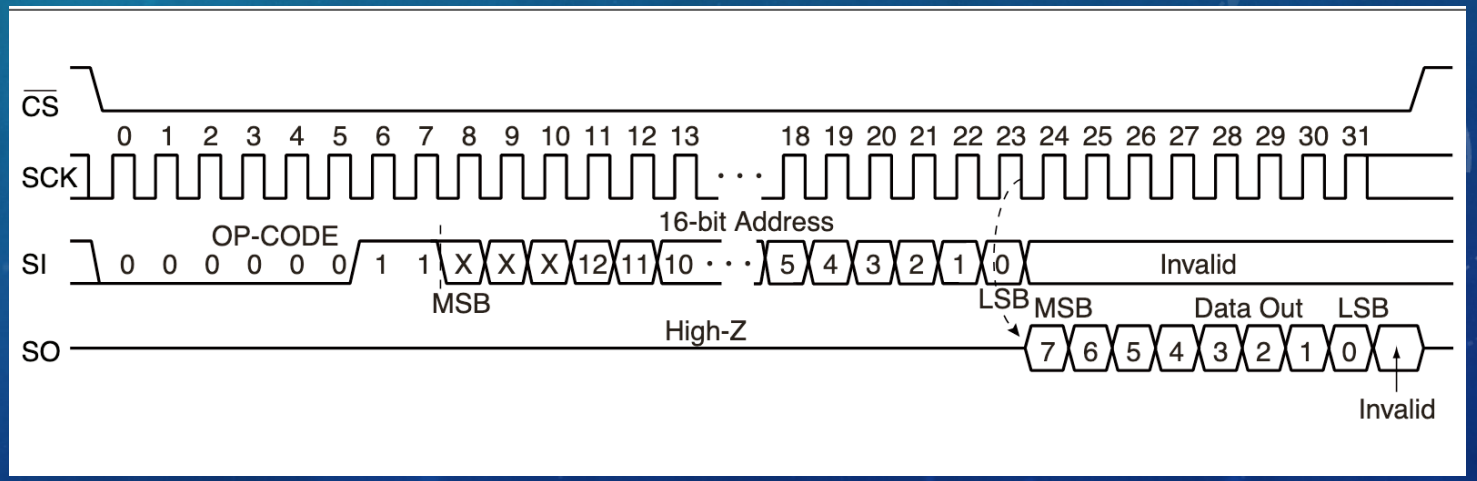
- Similar to Dielectric RAM except non-volatile
- Expensive ($12 for 128Kb)
- Excellent read/write endurance and data retention.

SERIAL PERIPHERAL INTERFACE

- Very fast synchronous serial protocol
- Supports multiple devices on a single bus, triggering slaves on and off using a slave select line.
- Similar to I2C, but uses hardware to target a single device, therefore messages are smaller and more data may be transferred in a period of time.



System Configuration with SPI Port



PROJECT COMPLICATIONS (THESE ARE EMBARRASSING)

- One FRAM chip has decided it doesn’t need to work (kind of).
- Mistakes were made while assembling the project. True SPI is unable to be implemented.
- Was planning on being able to store a text file on FRAM array. I purchased a USB -> UART adapter with a logic level incompatible with the microcontroller.

DEMO

- Microcontroller iterates through both chips, starting roughly 7/8 of the way through the first one.
- For each iteration, the controller writes one byte, then reads it back to check for consistency. The byte is incremented by one for every address on the chip.
- In order onscreen, you can see the current virtual address, the chip number and chip address it translates to, the number being written out to the chip, and the number read back from the chip.