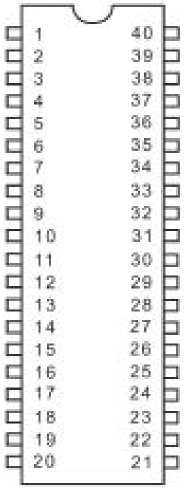
CS122A: Intermediate Embedded and Real Time Operating Systems

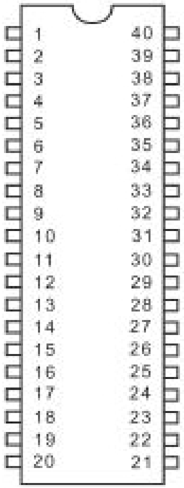
Jeffrey McDaniel

University of California, Riverside

Serial Communication

μC_M μC_S





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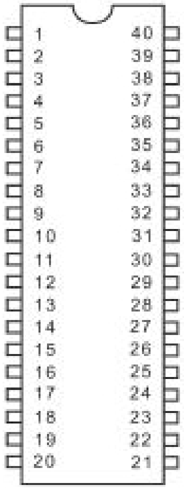

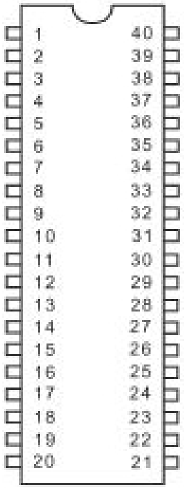

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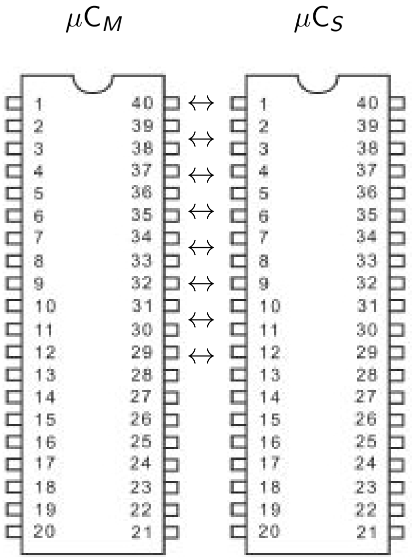

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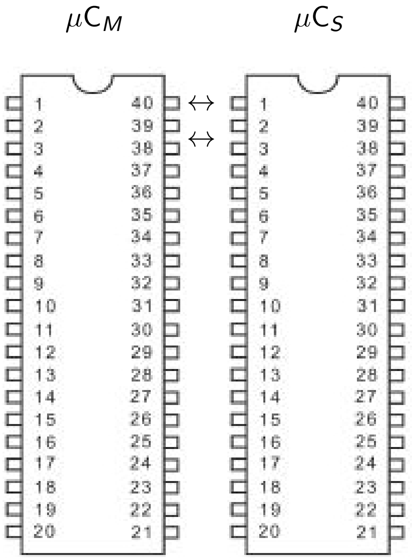

- Microcontrollers need to communicate with each other
- and with other devices
- Connecting a pin for each bit of data is intractable
- **Serial communication** allows us to use fewer pins

Serial Communication

We will be discussing:

- Universal Asynchronous Receiver/Transmitter (UART)

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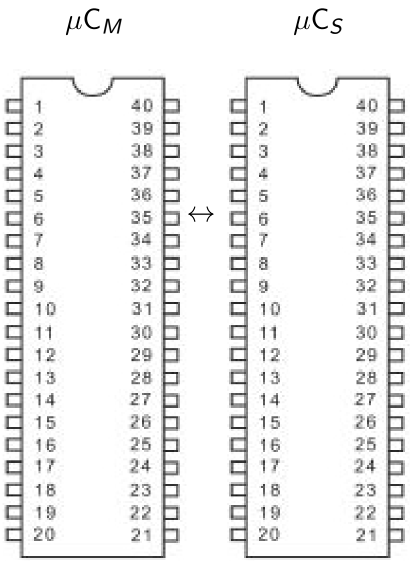

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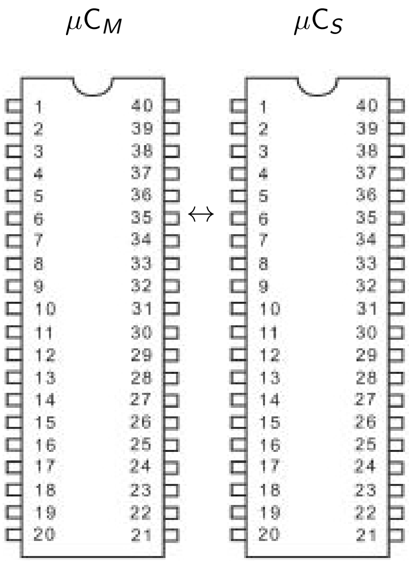
UART Communication

μC_M $\leftrightarrow$ μC_S



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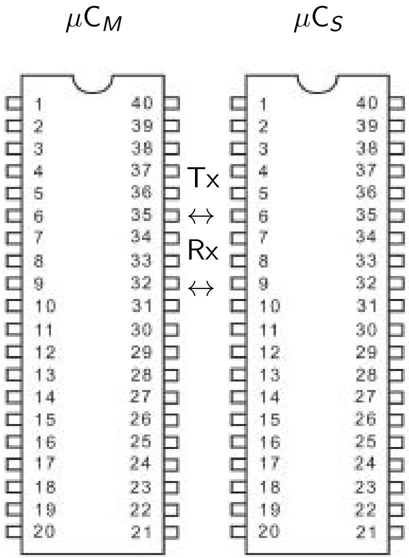
- UART automatically transmits 8 bits of data serially (one bit at a time) over a single pin

UART Communication



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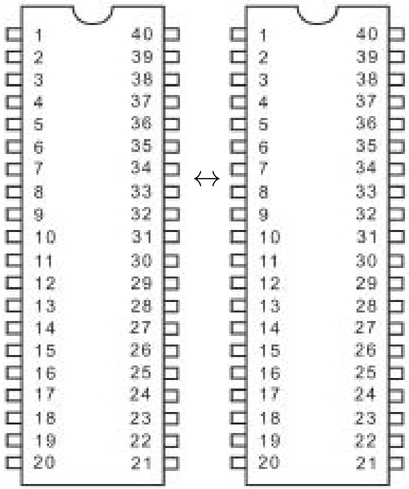
- UART automatically transmits 8 bits of data serially (one bit at a time) over a single pin
- Transmit (Tx) and Receive (Rx) over two separate pins

UART Communication

μC_M μC_S

T R



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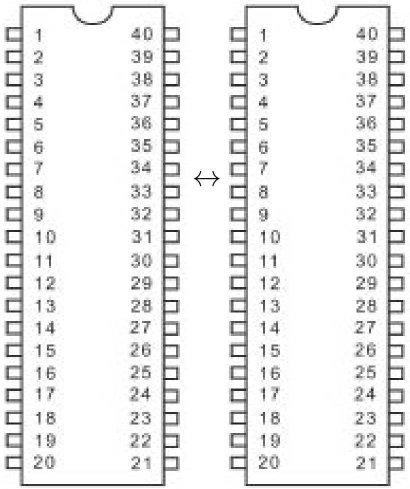

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UART Communication

μC_M

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μC_S

R

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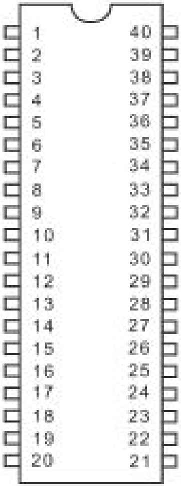

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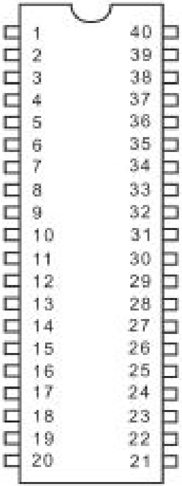

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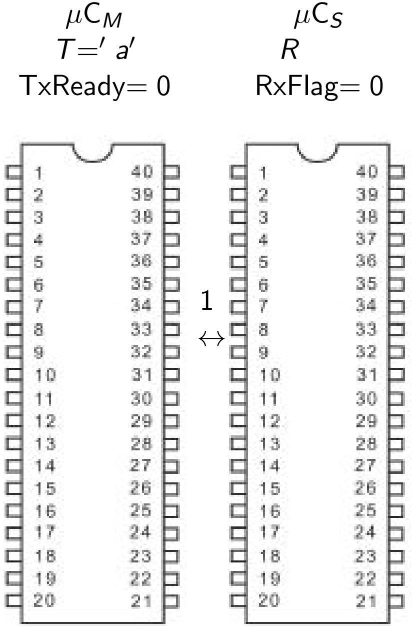

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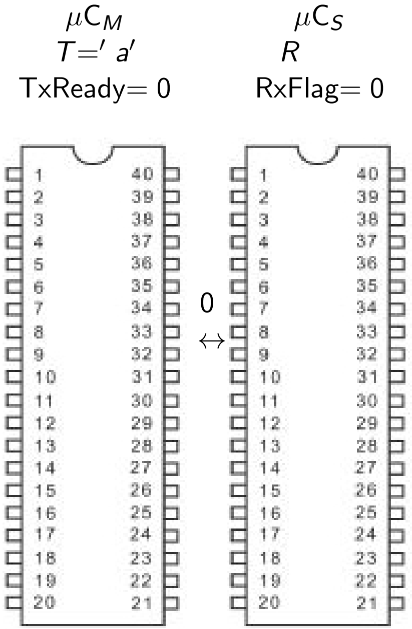

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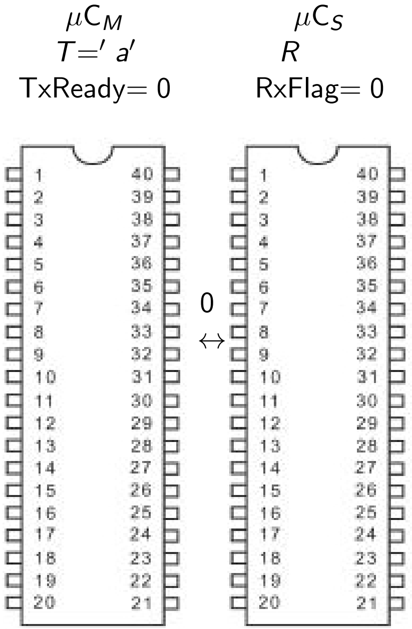

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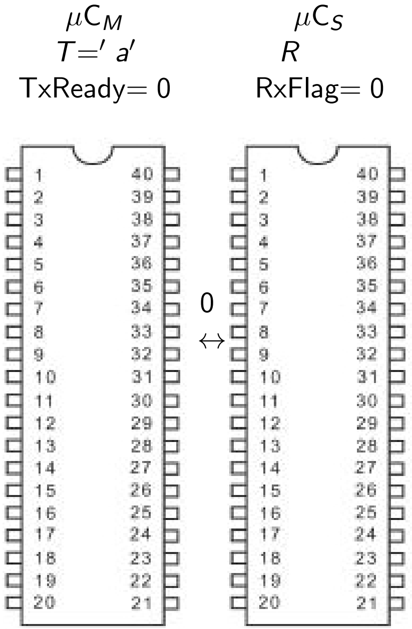

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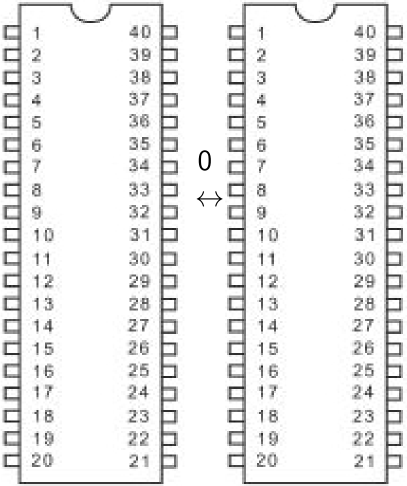
μC_M $\quad$ μC_S

$T='a'$ $\quad$ R

TxReady$=0$ $\quad$ RxFlag$=0$



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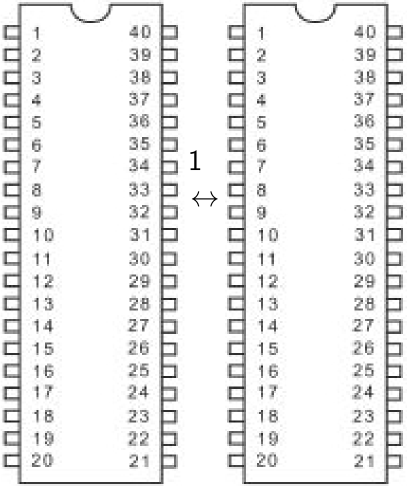

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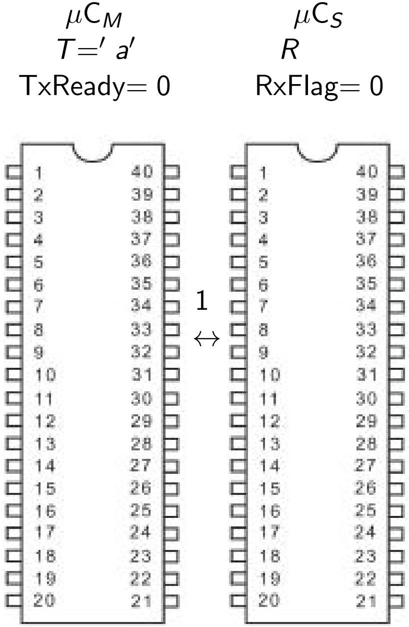

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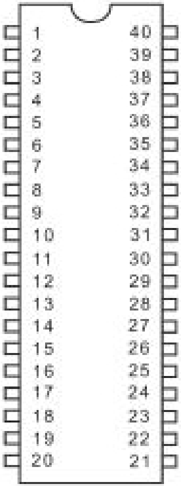

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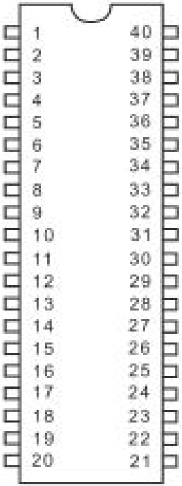
$\leftrightarrow$



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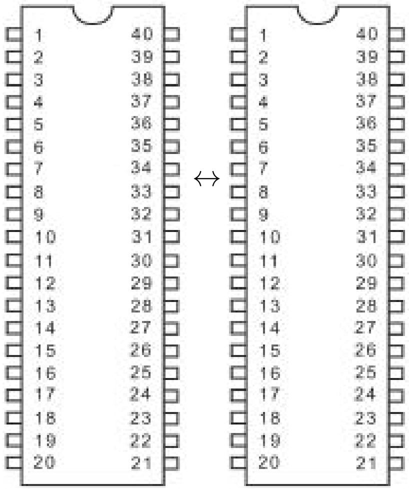

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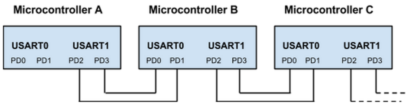

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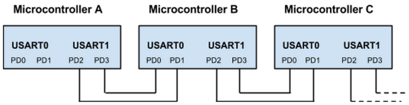

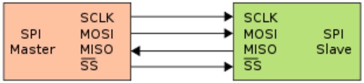

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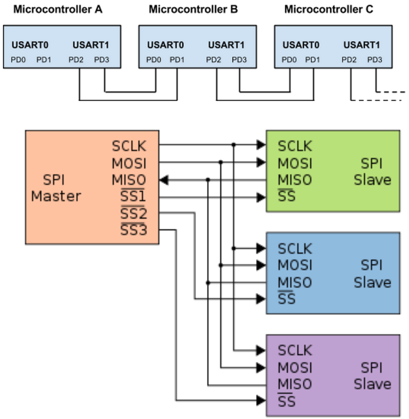

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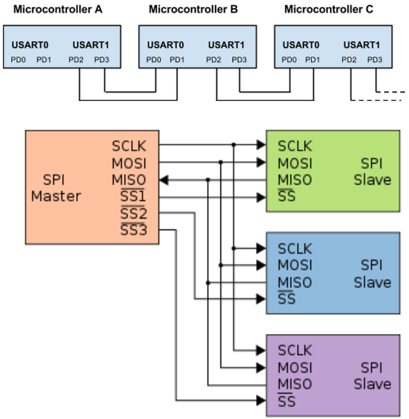

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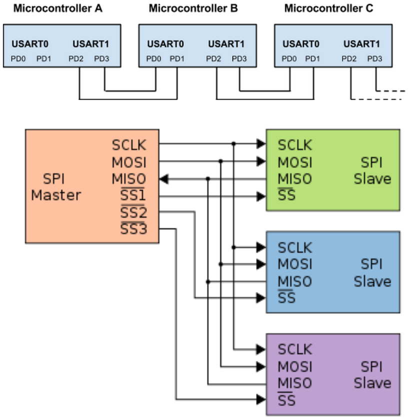
- With 4 peripherals USART requires more wires than SPI (8:7)



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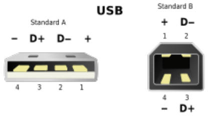

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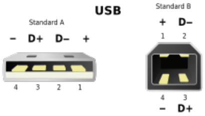

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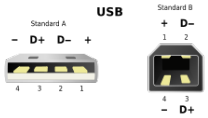

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