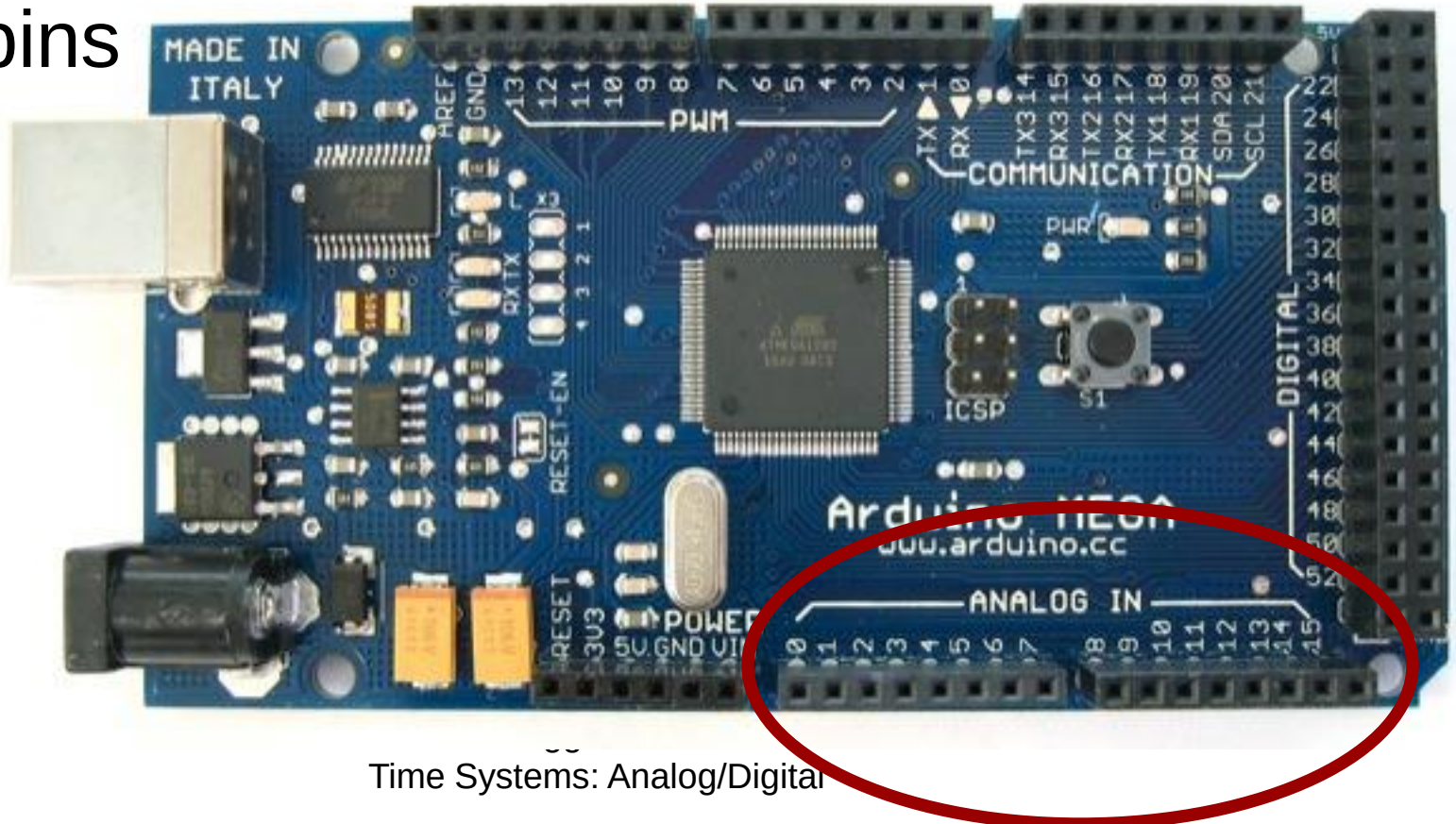
Analog to Digital in the Atmel Mega 2560

Questions?

Quiz

A2D in the Mega2560

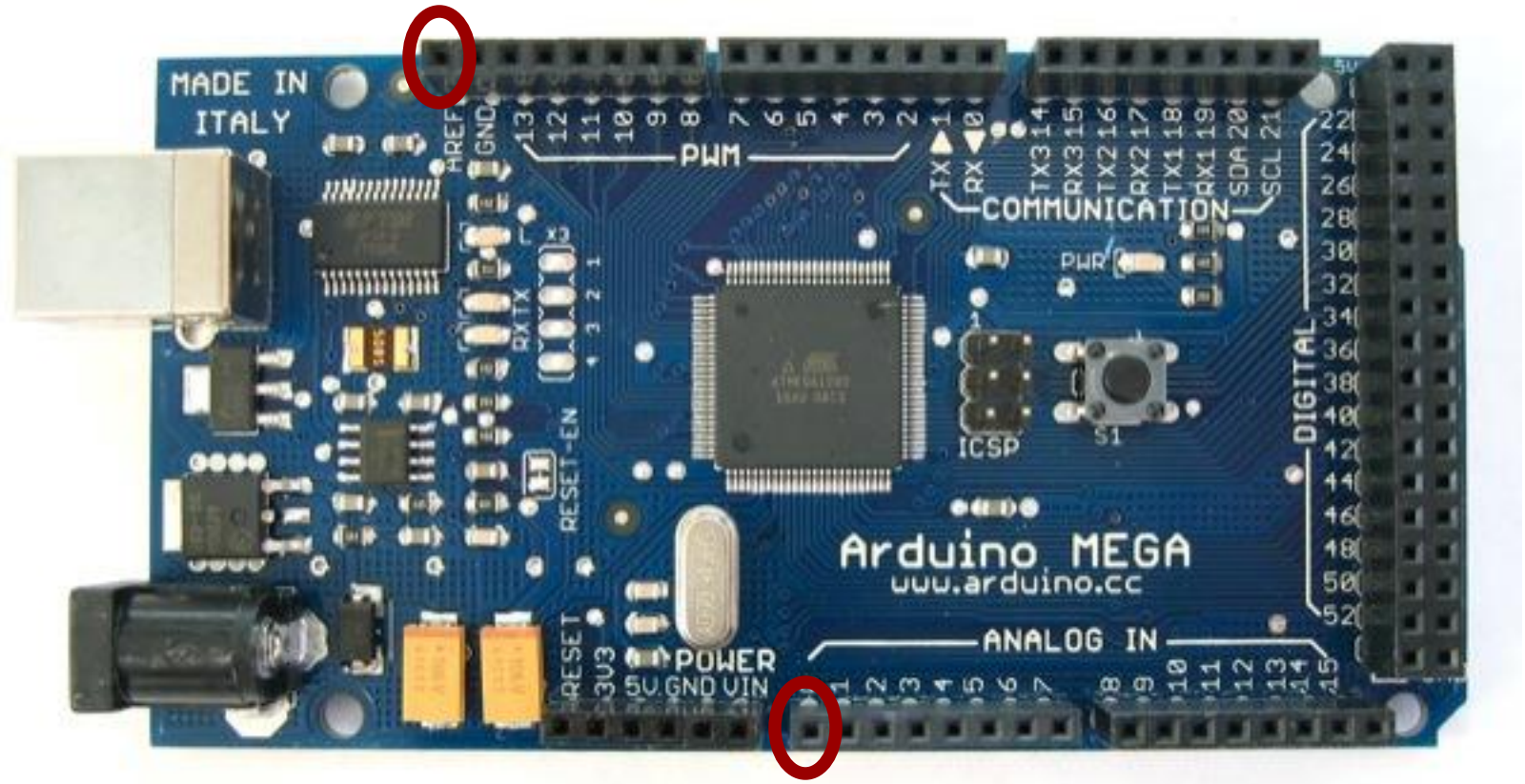
- The mega2560 contains hardware that implements successive approximation
- 16 mega2560 pins can be configured as analog input pins



Mega2560: The Connections

AREF: (for our purposes) connect to +5V

- ADC will measure voltages between 0 and AREF



Connect input analog signal to the appropriate ADC pin

A Code Example: Configuration (do this once)

```
// Initialize adc
adc_set_reference(ADC_REF_AREF);        // Use the AREF reference pin
adc_set_adlar(0);                       // For our purposes, always use 0
adc_set_prescalar(ADC_PRESCALAR_128);   // Necessary with 16MHz clock
                                        //  and 10 bit resolution

// Turn on ADC Converter
adc_set_enable(ADC_ENABLE);
```

A Code Example: Use

```
uint16_t val;

// Can do the following an arbitrary number of times

adc_set_channel(ADC_CHANNEL_0);        // ADC0
// Actually start a conversion
adc_start_conversion();

<Could go off and do something else for a while>

val = adc_read();  // Read the analog value
```

Analog Conversion Notes

- All functions are provided in oulib
- See OUlib documentation for the definition of constants

- Can get to the example code from the Atmel HowTo

  www.cs.ou.edu/~fagg/classes/general/atmel

Analog Conversion Notes

- Setting the maximum voltage:

```
adc_set_reference(ADC_REF_AREF);       // Use the AREF reference pin
```

- Can also used a fixed voltage (+2.56V):

```
adc_set_reference(ADC_REF_2p56V);
```

Analog Conversion Notes

- Determining how fast the conversion requires:

```
adc_set_prescalar(ADC_PRESCALAR_128);  // Necessary with 16MHz clock
                                       //  and 10 bit resolution
```

- Conversion requires:

  128 * 15 / 16000000 seconds

  – Can convert faster, but may not get the full 10-bit resolution

Analog Conversion Notes

- Reading out the value:

```
val = adc_read();        // Read the analog value
```

- Blocks until conversion is complete
- Will return a value between 0 and 0x3FF (1023)

Next Time

Project 4: analog to digital conversion