Getting Started with the Teensy Circuits and Programming

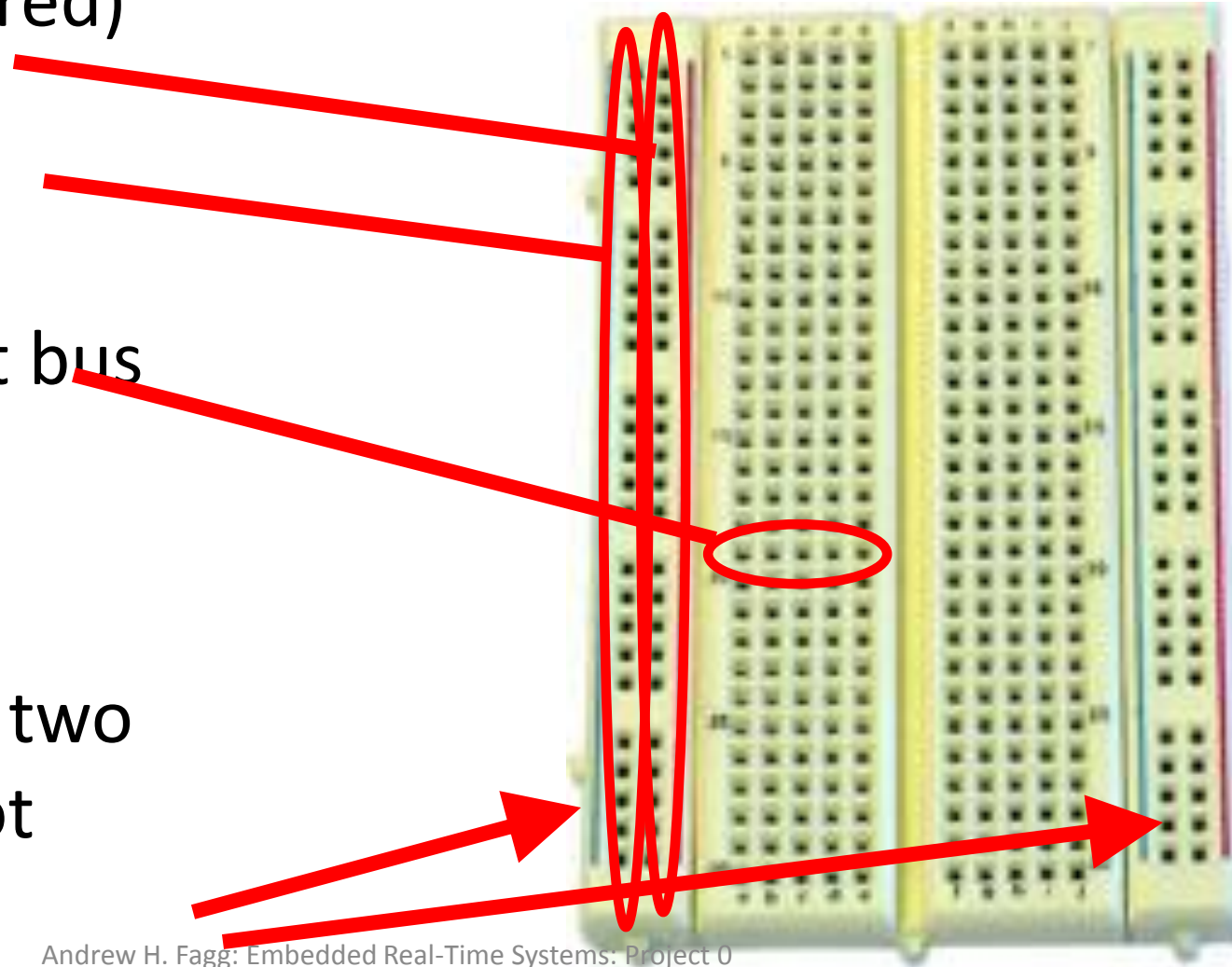# Solderless Breadboards

Power bus (red)

Ground bus

(blue)

Component bus

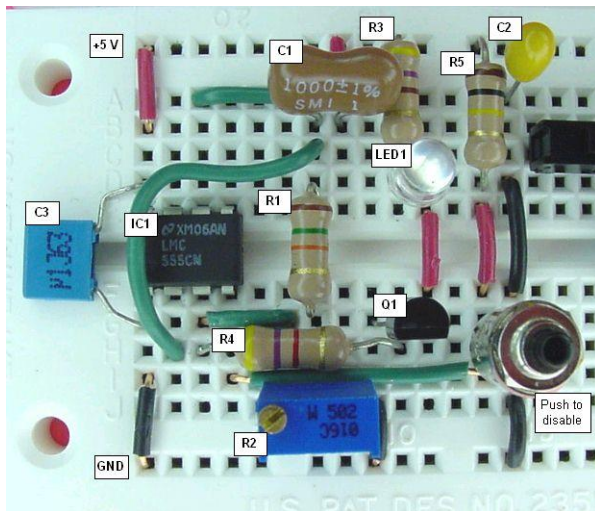Note that the two sides are not connected

Wiring Standards

When possible, use wire colors for different types of signals. The common color assignments are:

- Black: ground
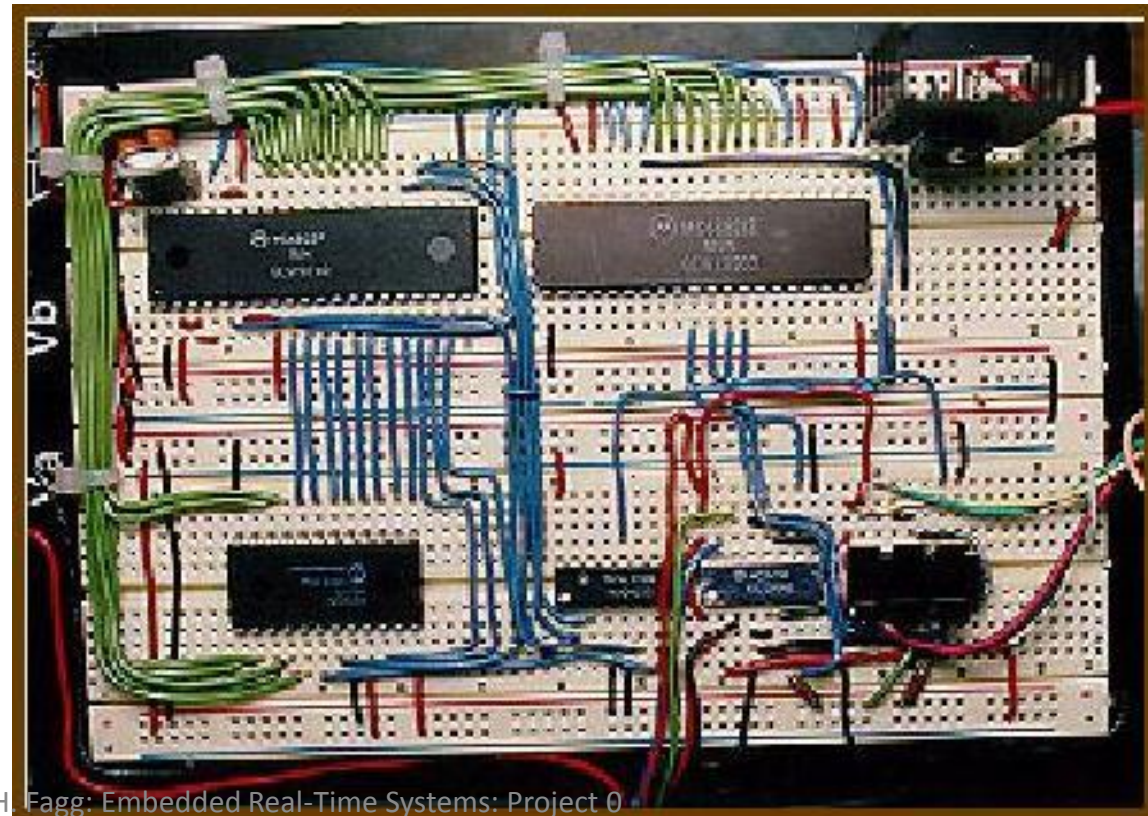- Red: power
- Other: various signals

Clean Wiring
A clean breadboard will make debugging easier – and it makes circuits more robust

www.linefollowing.com

tangentsoft.net

Care with Power

- Only insert components and wires into the breadboard when power is disconnected
- "Wire, check-twice, then power"
  - Never reverse power and ground (this is a very common mistake)

Care with Power

We are using a mixture of 3.3V and 5V components

- Be careful: we can't always mix and match
- The teensy can be powered by USB or via a connection to the Vin pin
- The teensy can provide 3.3V supply (up to 250mA)
- Even though the teensy uses 3.3V as its base voltage, it is 5V tolerant (but not all 3.3V components will be)

Suggested Wiring Procedure

- Power supply
- Power/ground buses
- Insert primary components
- Wire power/ground for components
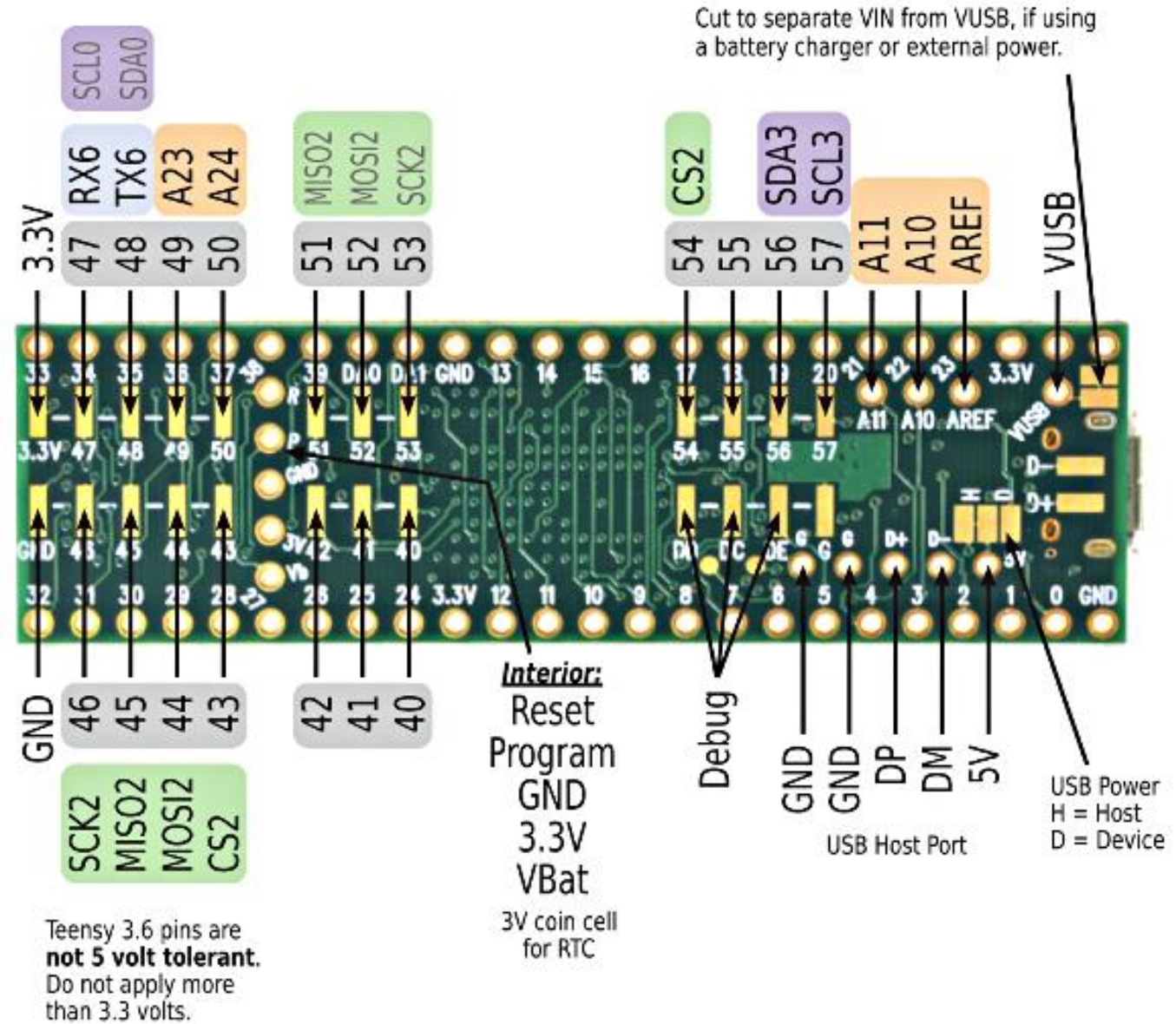- Add signals and remaining components

Debugging Techniques

- Test incrementally
- Test intermediate sub-circuits

Teensy 3.5

				GND		Vin (3.6 to 6.0 volts)				
Touch	MOSI1	RX1		0		Analog GND				
Touch	MISO1	TX1		1		3.3V (250 mA max)				
			PWM	2		23 A9	PWM			Touch
SCL2	CAN0TX		PWM	3		22 A8	PWM			Touch
SDA2	CAN0RX		PWM	4		21 A7	PWM	CS0 mosi1		
	miso1	tx1	PWM	5		20 A6	PWM	CS0 sck1		
			PWM	6		19 A5		SCL0	Touch	
scl0	mosi0	RX3	PWM	7		18 A4		SDA0	Touch	
sda0	miso0	TX3	PWM	8		17 A3		sda0	Touch	
	CS0	RX2	PWM	9		16 A2		scl0	Touch	
	CS0	TX2	PWM	10		15 A1		CS0	Touch	
	MOSI0			11		14 A0	PWM	sck0		
	MISO0			12		13 (LED)		SCK0		
				3.3V		GND				
				24		A22 DAC1				
				25		A21 DAC0				
		tx1		26		39 A20				
		rx1		27		38 A19	PWM	SDA1		
				28		37 A18	PWM	SCL1		
Touch	can0tx		PWM	29		36 A17	PWM			
Touch	can0rx		PWM	30		35 A16	PWM			
	CS1	RX4	A12	31		34 A15		CAN1RX	sda0	
	SCK1	TX4	A13	32		33 A14		CAN1TX	scl0	

MK66FX1M0VMD18
0N65N
CTAE1544G

Teensy 3.5 Reverse Side

Teensy 3.1 vs Teensy 3.5

Teensy Programming Interface

As simple as connecting the Teensy to your laptop via a USB cable

- Be careful not to torque the USB connection on the Teensy

Demonstration…

General Program Hints

- Use LEDs to show status information (e.g., to indicate what part of your code is being executed)
- Remember: on the Teensy boards, there is a LED connected to port C, bit 5
- Have one LED blink in some unique way at the beginning of your program
- Go slow:
  - Implement and test incrementally
  - Insert plenty of pauses into your code (e.g., with delay ())

Project 0

- Summary:
  - Connect 4 LEDs and a switch to your Teensy board
  - Write a program that: waits for the switch to be pressed, then displays an interesting LED flashing pattern

- Details are on the class web page

Project Completion

See me or the TA for a code review

- Every member of the group must be present
- Every member of the group must demonstrate their own program and downloading to the Teensy
- Deadline: Thursday, February 9 @1:30pm

Future projects: we will have more formal coding, documentation and hand-in procedures