

Getting Started with the Teensy Circuits and Programming

Solderless Breadboards

mbus.net

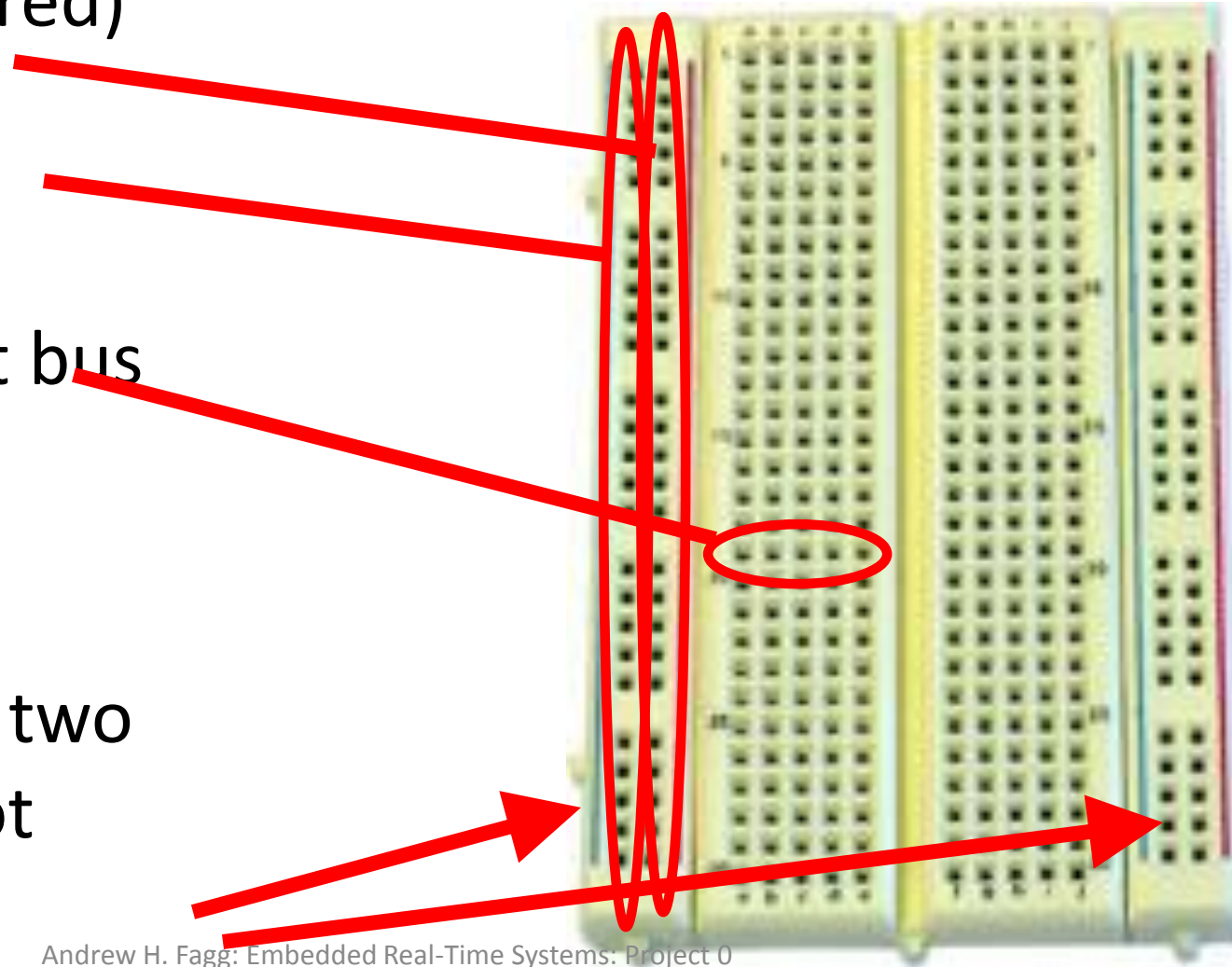
Power bus (red)

Ground bus

(blue)

Component bus

Note that the two
sides are not
connected



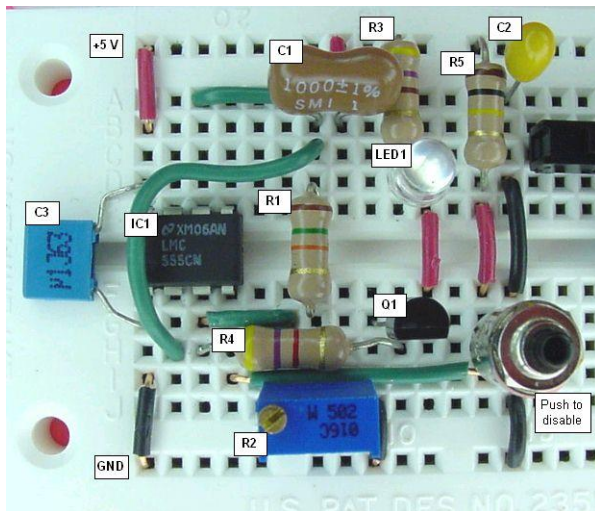
Wiring Standards

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

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

Clean Wiring

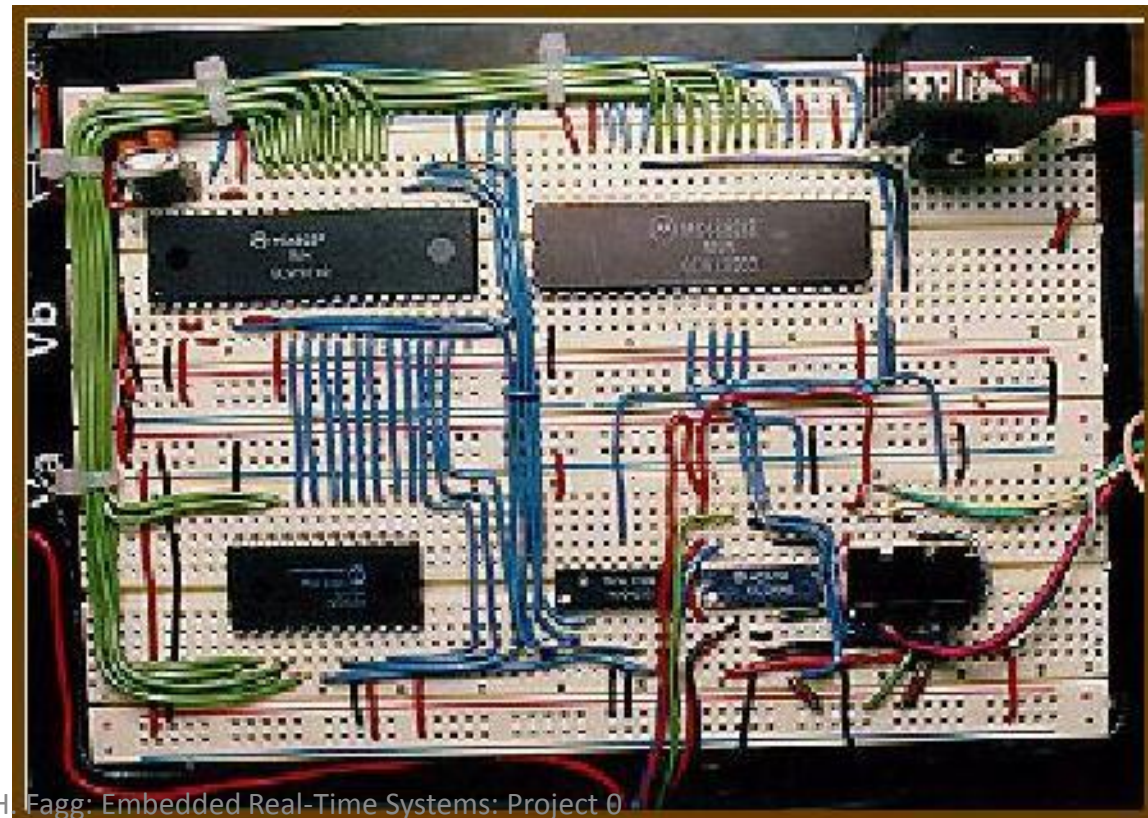
A clean breadboard will make debugging easier – and it makes circuits more robust



www.linefollowing.com

tangentsoft.net

Andrew H. Fagg: Embedded Real-Time Systems: Project 0



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 is powered by connecting 5V to Vin and GND to GND (these lines come from the lower deck)
- 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)
- USB connection does not provide power – only communication

Suggested Wiring Procedure

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

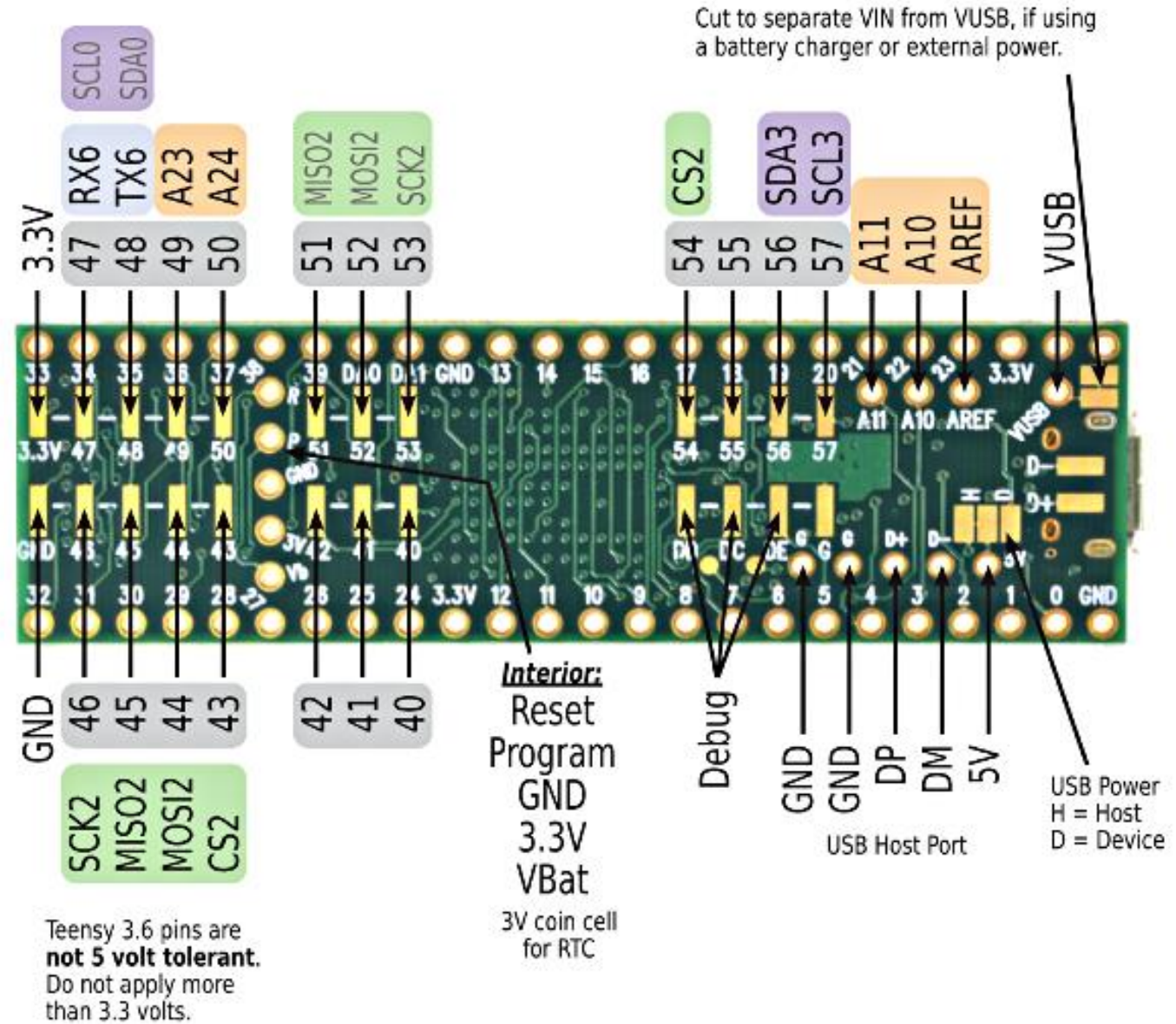
Debugging Techniques

- 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	

Teensy 3.5 Reverse Side



Teensy 3.1 vs Teensy 3.5



Teensy Programming Interface

Connect 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 6 @5:00 pm

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