Getting Started with the Teensy Circuits and Programming

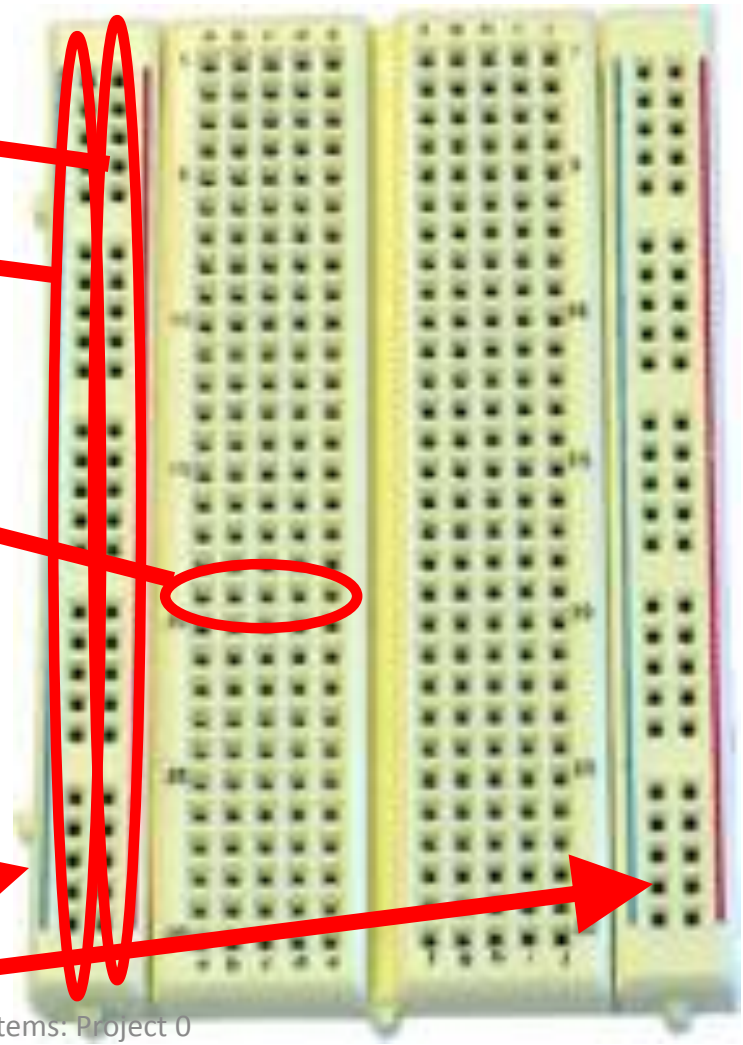
Solderless Breadboards

Power bus (red)

Ground bus (blue)

Component bus

Note that the two sides are not connected



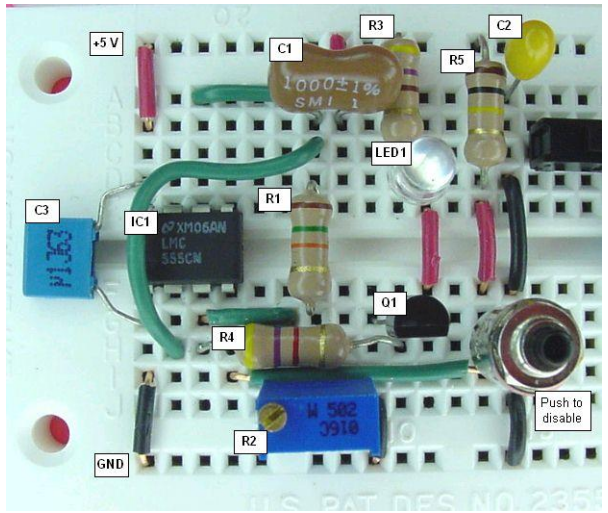
Wiring Standards

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



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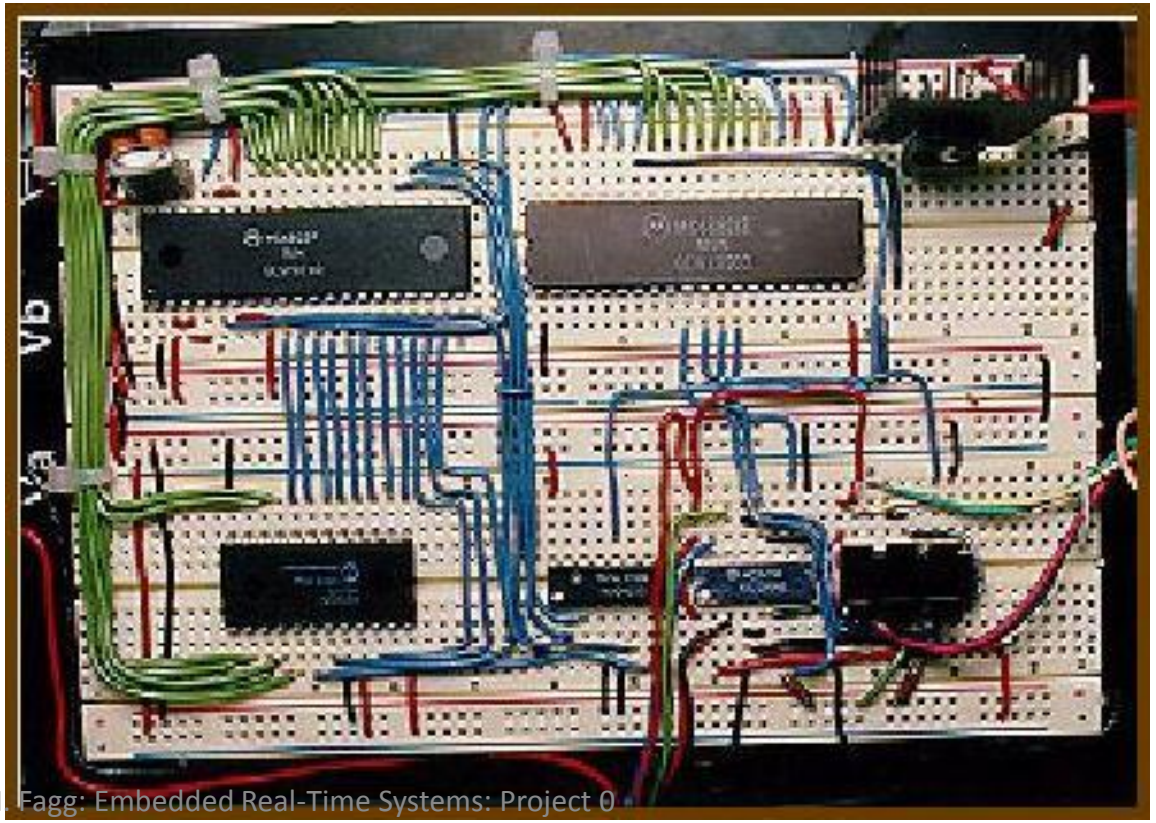

tangentsoft.net

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 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		

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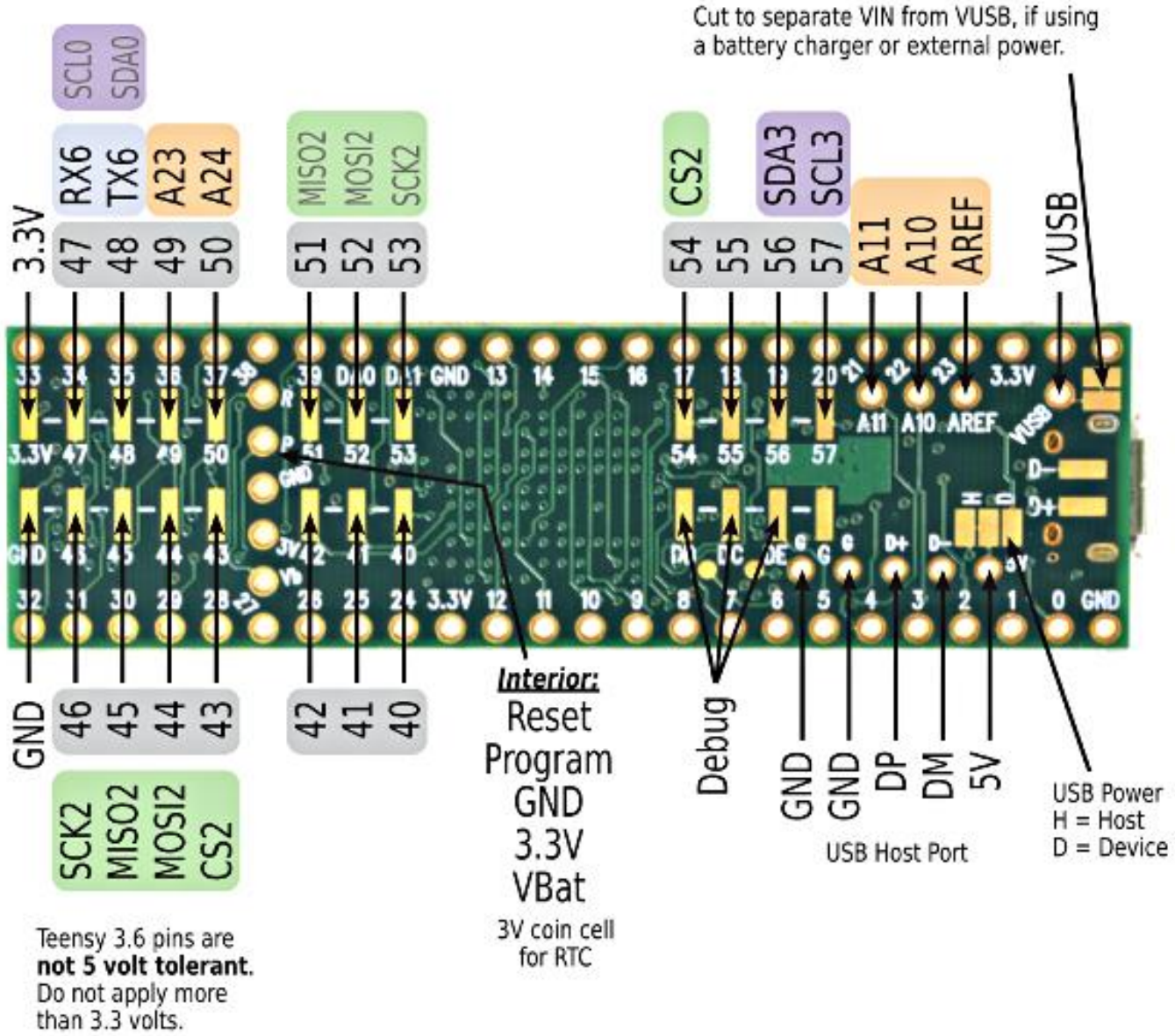
Teensy 3.5 Reverse Side



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: Friday, February 8 @3:30pm

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