

Getting Started with the Teensy Circuits and Programming

Solderless Breadboards

mbus.net

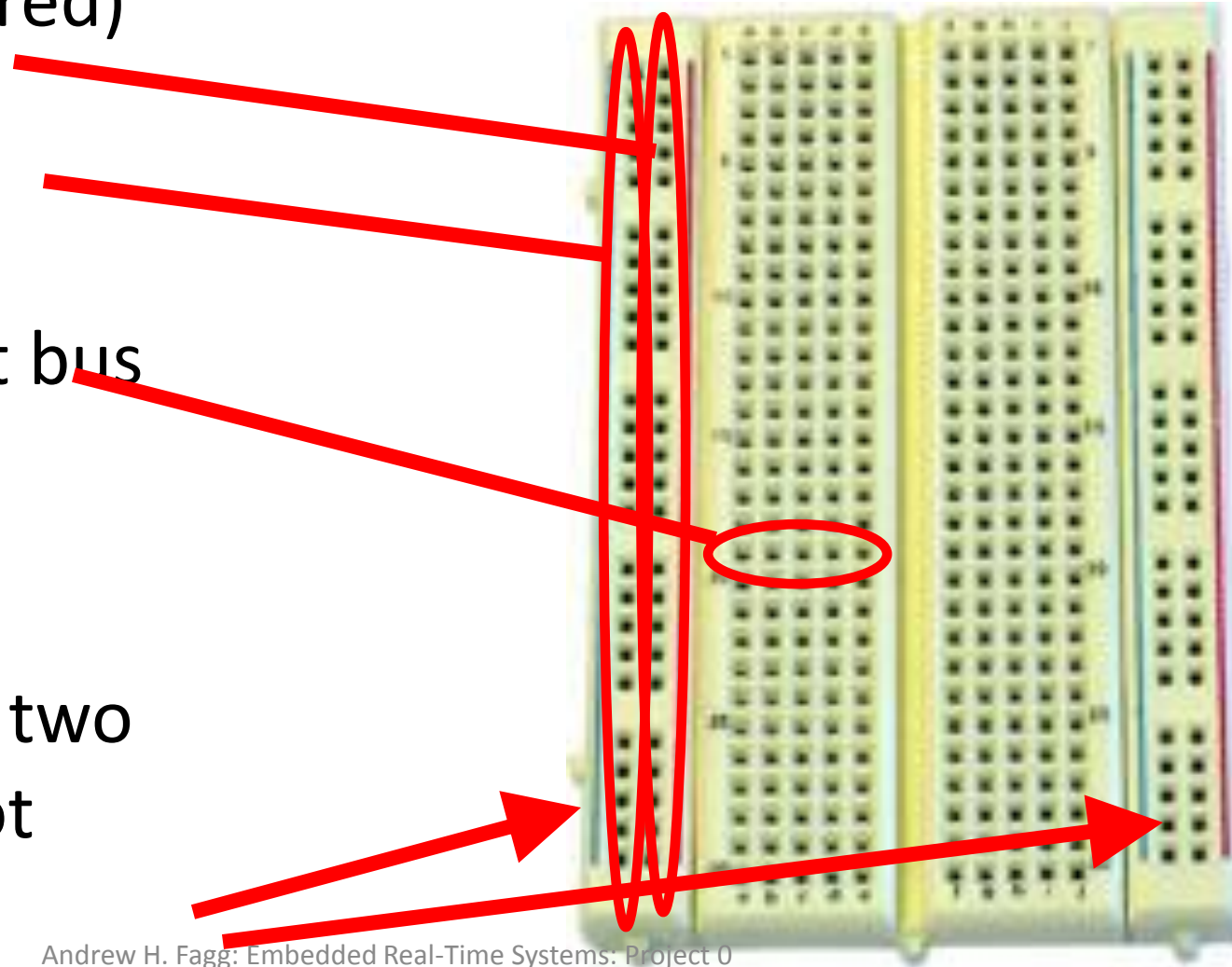
Power bus (red)

Ground bus

(blue)

Component bus

Note that the two
sides are not
connected



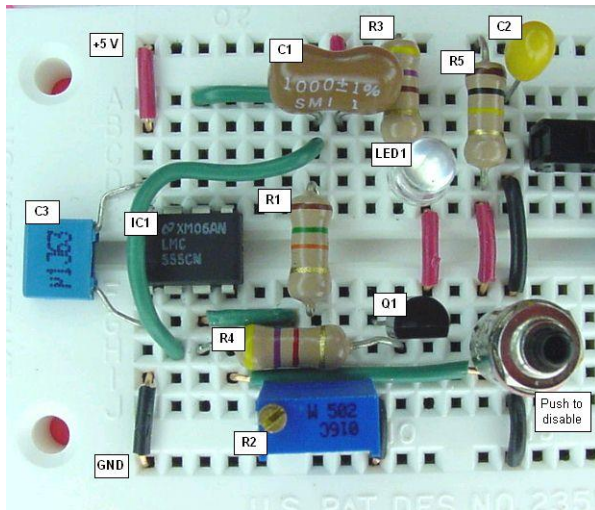
Wiring Standards

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

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

Clean Wiring

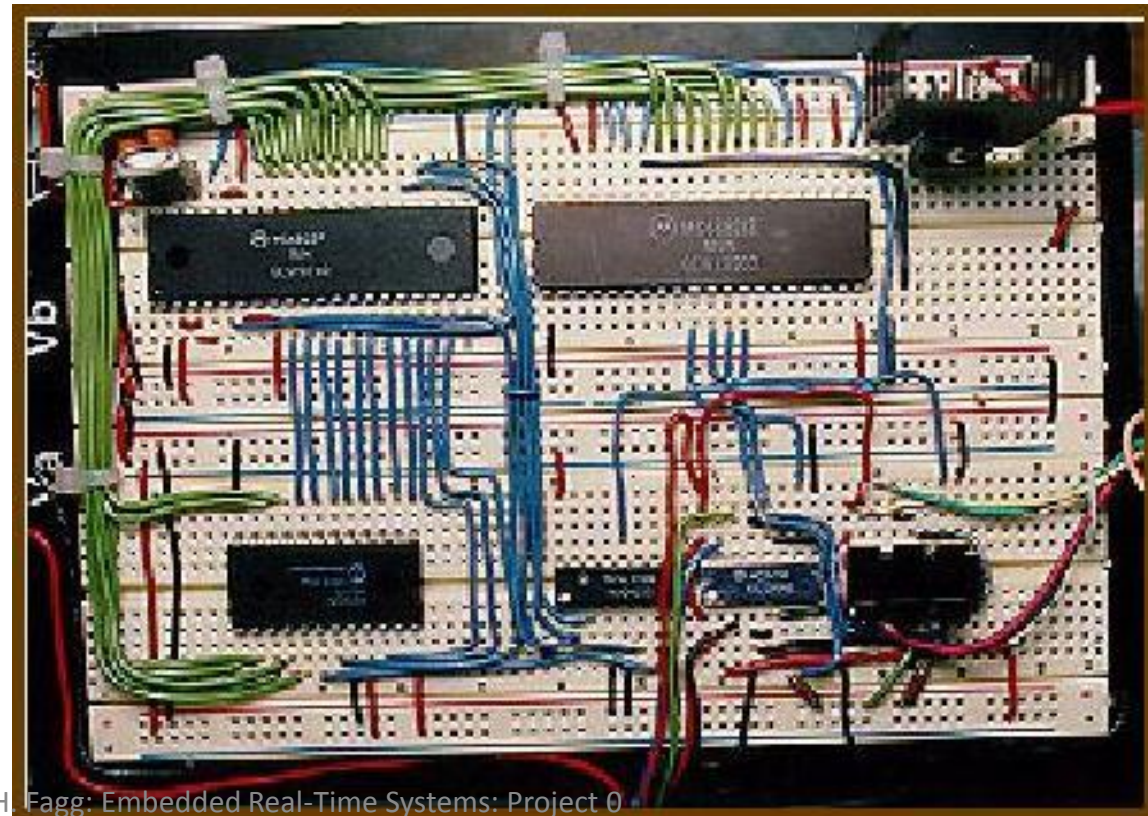
A clean breadboard will make debugging easier – and it makes circuits more robust



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
- Right now, your Teensy is powered by your computer
- For the hovercraft: 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)

Suggested Wiring Procedure

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

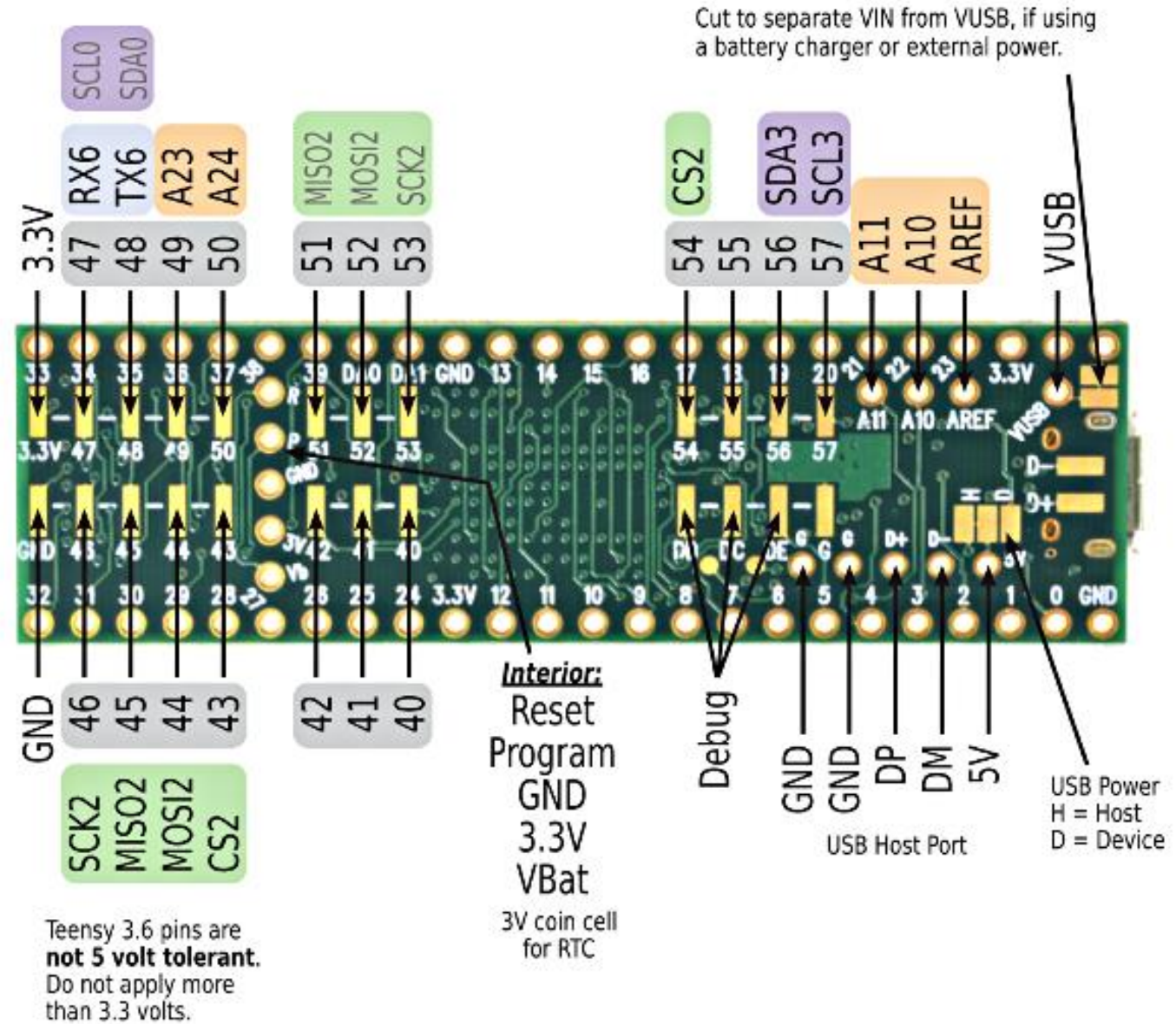
Debugging Techniques

- 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