industrial. a build log by **kagaku**. find me on GitHub.

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Sega Saturn gamepad to USB *28. July 2012*

In my opinion the Sega Saturn gamepad stands out as one of the best console gamepads ever made; at least the second generation gamepads, not the first generation gamepads that assumed all American's are giants with giant hands. I've got quite a few of these pads laying around, but until now no easy way to use them with my PC for emulation/gaming.

What is needed:

- Teensy 2.0 (or Teensy++)
- Sega Saturn gamepad (original Sega is what I used, I assume anything compatible with a Saturn would work)
- USB cable
- Soldering iron
- Wire cutters/strippers

The victim:

No turning back now:

The first step was figuring out the protocol. I was lucky to find this site which helpfully lists not only the pin out, but the protocol as well. With that in hand, I've start to solder the wires to my Teensy.

Pinout:
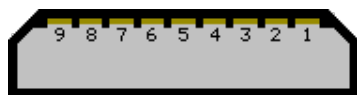
Pin	Function
1	5+ VCC
2	Data 1
3	Data 0
4	Select 0
5	Select 1
6	+5 VCC (connected to pin 1)

7	Data 3
8	Data 2
9	Ground

Using the pinout above, I soldered each of the controller wires as follows:

Saturn Gamepad	Teensy
Pin 1	+5V VCC
Pin 2	Pin 3
Pin 3	Pin 0
Pin 4	Pin 1
Pin 5	Pin 2
Pin 6	Not Connected
Pin 7	Pin 5
Pin 8	Pin 4
Pin 9	Ground

Once that was complete, I used protocol I found earlier to program the Teensy. The bit assignments used are:

S0	S1	D0	D1	D2	D3
low	low	Z	Y	X	R
high	low	B	C	A	Start
low	high	Up	Down	Left	Right
high	high	-	-	-	L

With that determined, all that's left is the code. I'm sure it could be improved, so I'm labeling it version .01 right now. The loop() sets the select0/select1 pins to high/low based on the table above, then reads the state of each data line. There are four iterations of this to read all 13 buttons successfully. After the buttons are read, some logic is added around the directional pad to properly map it as a joystick hat control.

The code is well commented and should be pretty easy to follow. With that said, my goal is to expand it a bit to add support for two controllers. I'm trying to track down an old Sega Saturn to donate some controller ports for that project. Once I get it working I'll update this tutorial.