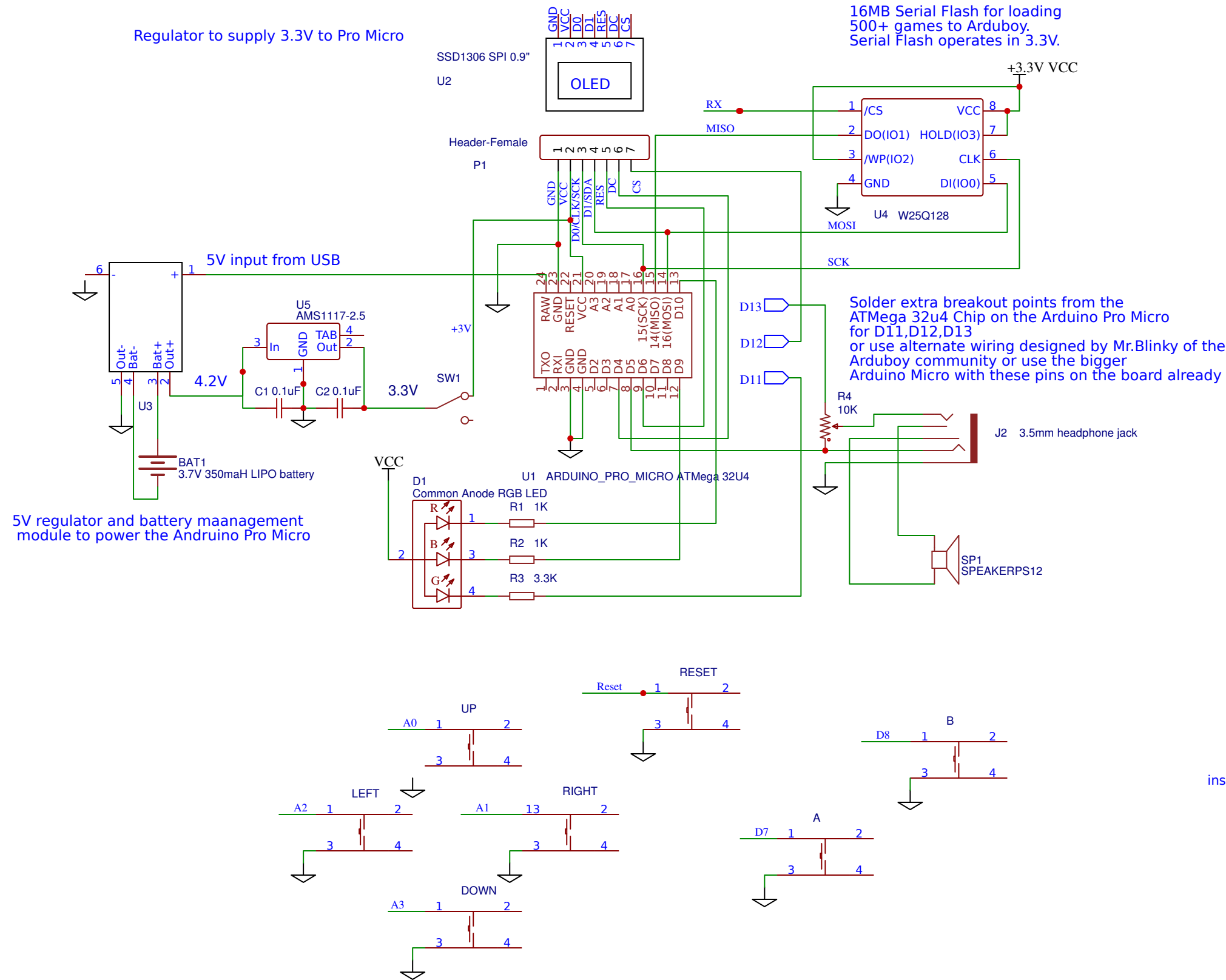Ardubaby with flashcart
by : chuengbx   2019/01/21

This is a tiny arduboy that is smaller than half of a credit card.
 In order to shrink everything into a small foot print, I have to avoid the voltage level shifter for the 3.3V flash cart by converting the
5V Pro Micro to run in 3.3V.

Parts:
Arduino Pro Micro (or Arduino Micro)
0.9" mono OLED with SPI interface on SSD1306 controller. The 7 pin male header of the OLED is plugged into the female header.
The OLED chosen must have the 7th pin for CS. Otherwise, it'll conflict with the Flahcart,
causing screen flickering and misalignment when loading games from flashcart or when playing video stored on the flashcart
16MB serial flash to load 500+ Arudboy games to be self-programmed to Arduino Micro anytime through the Cathy 3K bootloader
(original circuit, python scripts for game loading, and the Cathy 3K bootloader and homemade arduby package is designed by Mr.Blinky (inks below).
3.3V regulator and battery managemeent module - 5V is taken from the RAW pin of the Arduino Pro Micro (which is sourced from the USB port).
To allow the board to be powerd off during charging, the onboard regulator need to be removed.
3.7V LiPO Battery is charged by the battery management module that also convert 4.2V to 3.3V to supply to the VCC pin of the Arduino Pro Micro,
the VCC of the OLED and the 3V serial flash.
To use the serial flash for game loading, the Cathy 3K boot loader must be burnt to the Pro Micro using a modified version of USBasp that can burn flash to 3.3V MCU.
Warning: USBasp bought from the market worked on 5V. Though there is a jumper to select the VCC to work in 3V. Dendng on the board you got, the TTL signals
may still go up to 5V that may damage the serial flash during the bootloader flash.
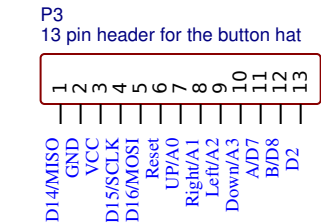
Credits and References to original authors of Arduboy and Flashcart:

1. Original Arduboy production schametics:
    https://community.arduboy.com/t/production-arduboy-schematic/702

2. MR.Blinky's original design of flashcart:
    https://github.com/MrBlinky/Arduboy/tree/master/flashcart

3. MR. Blinky;s GITHUB with python scripts and sample flash cart image binaries for sample games :
    https://github.com/MrBlinky/Arduboy-Python-Utilities

4. MR. Blinky's homemade package (required to operate the flash cart with alternate wiring and different types of OLED other than the SSD1306 used in original Arduboy:
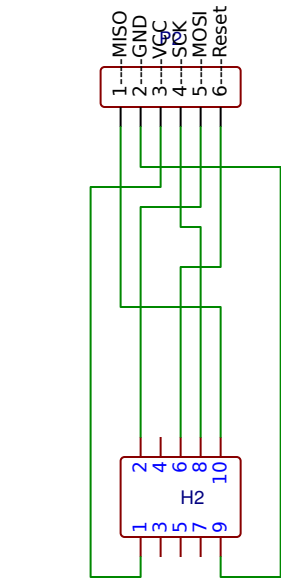   https://github.com/MrBlinky/Arduboy-homemade-package

ArduBaby by cheungbx 2019/01/21
==========================

Regulator to supply 3.3V to Pro Micro

SSD1306 SPI 0.9"

U2

OLED

Header-Female
P1

16MB Serial Flash for loading
500+ games to Arduboy.
Serial Flash operates in 3.3V.

+3.3V VCC

RX
MISO

1 /CS   VCC 8
2 DO(IO1) HOLD(IO3) 7
3 /WP(IO2)   CLK 6
4 GND   DI(IO0) 5

U4   W25Q128

MOSI

SCK

5V input from USB

U5
AMS1117-2.5

4.2V

C1 0.1uF   C2 0.1uF   3.3V

+3V

SW1

U3

BAT1
3.7V 350maH LIPO battery

5V regulator and battery maanagement
   module to power the Andruino Pro Micro

VCC

D1
Common Anode RGB LED
R   R1 1K
B   R2 1K
G   R3 3.3K

U1   ARDUINO_PRO_MICRO ATMega 32U4

D13
D12
D11

Solder extra breakout points from the
ATMega 32u4 Chip on the Arduino Pro Micro
for D11,D12,D13
or use alternate wiring designed by Mr.Blinky of the
Arduboy community or use the bigger
Arduino Micro with these pins on the board already

R4
10K

J2   3.5mm headphone jack

SP1
SPEAKERPS12

Female Header to connect to the button hat,
that can be swapped for other form of joysticks or anlog dials.
The first 6 pins doubles up as the port to connect to connect a
conversion cable to a USBasp to burn
the Cath 3K bootloader to the Pro Micro.
The USBasp conversion cable on the left can be used.

P3
13 pin header for the button hat

1x6 male header. Insert to the Arduboy Header

H2

View from bottom of female header_2x5
insert to the male header of the USBasp Programmer

RESET
Reset

UP
A0

LEFT
A2

RIGHT
A1

DOWN
A3

B
D8

A
D7