This board's job is to provide climate control for plants.
It has three main functions:
- lights: dimmable
- fans: move air throughout the enclosure
- mist: water the plants

Main microcontroller: esp32-c3

Info on auto-programming circuitry / strapping pins
https://dl.espressif.com/dl/schematics/esp32_devkitc_v4-sch-20180607a.pdf

strapping pins:
* io2, io8 should be pulled high
* io9 low = programming mode, high = normal boot
  * io9 has a weak internal pull-up

18v -> 3.3v for microcontroller

voltage converter circuit based on:
https://webench.ti.com/appinfo/webench/scripts/SDP.cgi?ID=A3B25FF3CB499236

datasheet page 27 shows layout

18v Power Input

J6
Barrel_Jack_MountingPin

barrel jack TODO
- polarity
- possible mounting-wise?

U6
LMR54406DBVR

+18V, +3.3V, L3 10uH, Cin1 1uF, Cin2 1uF, Cin3 1uF, Cinx1 100nF, Cboot1 100nF, Rfbt1 69.8k, Rfbb1 22.1k, Cout1 10uF, Cout2 10uF

note: barrel jack for power input is offboard,
connected to the board by through-hole wires soldered in.

LED Driver

powers 5 Cree XT-E LEDs and allows dimming
note: led driver contains internal caps to filter power input

PS1
LDD-700LS

+18V, led_ctl, R8 10k, led_P, led_N, lights1 Conn_01x02

TODO: polarity

i2c pullup resistors

+3.3V, R4 4.7k, R15 4.7k, R12 10k, R9 10k

i2c_header1
Conn_01x04
i2c_sda
i2c_scl

USB for programming

J2
USB_B_Micro
usb_dplus
usb_dminus

notes:
- this board design leaves the input voltage line from USB *disconnected*
- power input from the usb is not used for anything on the board
- to program the esp32, you must plug in usb to the computer *and* 18v wall power

U2
ESP32-C3-WROOM-02
C5 10uF, C6 .1uF
RXD, TXD
mist_ctl, fan1_ctl, led_ctl, usb_dminus, usb_dplus

J1
Conn_01x04
TXD, RXD

this is a prototype,
so I'm making unused pins accessible
for experimentation

470 R1, LED, status_led1
R11 10k
SW_Push, reset1
10k R10

H1
MountingHole

FET gate driver (2 channel)

U5
IX4427N
C2 .1uF
R3 10k, R7 10k

Fans

+18V, Conn_01x02 fan1, Conn_01x02 fan2

connector polarity:
pin 1 is Vcc

NOTE: fans are brushless,
so no freewheeling diode needed in parallel with FETs

Q1
Q_NMOS_GDS
R2 10k

Ultrasonic mister

Q3
Q_NMOS_GDS
L1 330uH
R6 10
R5 10k
C1 .1uF
mister1
Conn_01x02

mister1 connects to a
108kHz piezo water atomizer/mister

based on https://www.instructables.com/Make-Your-Own-Super-Simple-Ultrasonic-Mist-Maker/

Sheet: /
File: pcb.kicad_sch

Title: Terrarium Control Board

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