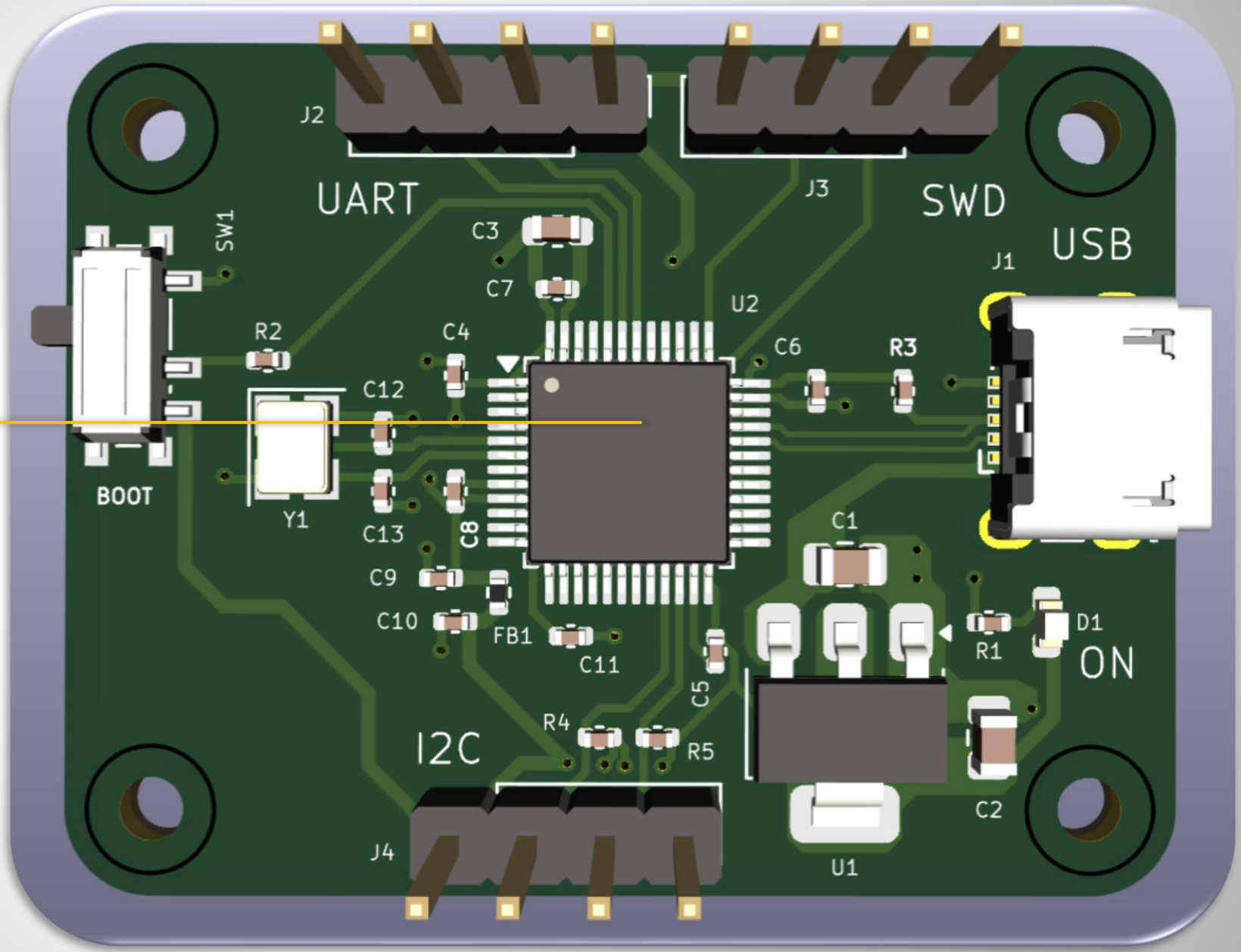
**STM32F103C8T6**
**Development Board**

*Custom PCB*
*Design & Layout*
*with*

**STM32F103C8T6**
microcontroller

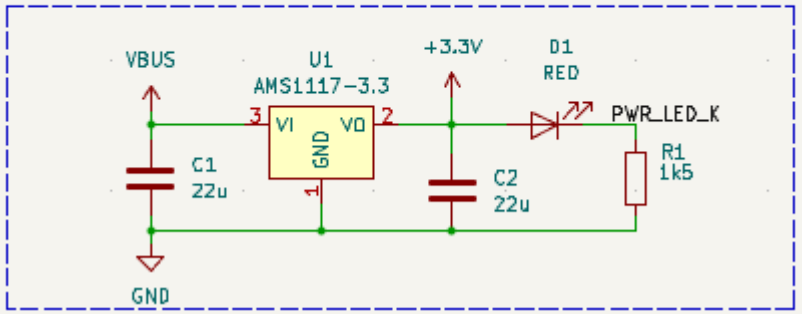
*A beginner-friendly dev board featuring USB, SWD, UART, and I2C interfaces. Designed and routed entirely in KiCad.*

**Designed by**
**Nithil A Rao**

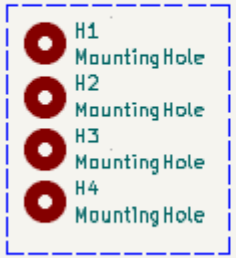


# Schematic

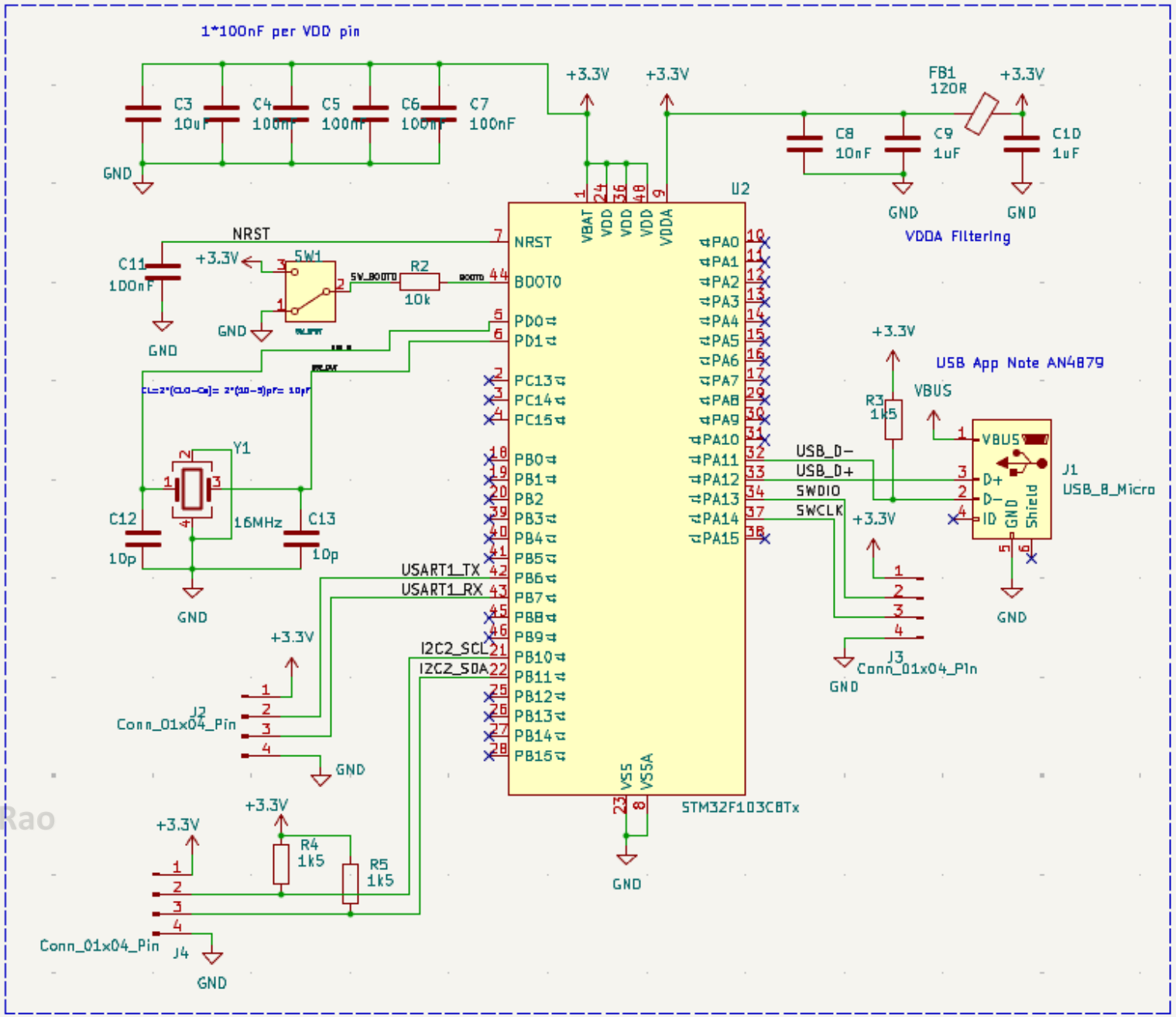
## Power Supply




VBUS from USB connector (normally +5V
Min 22uF I/O capacitors

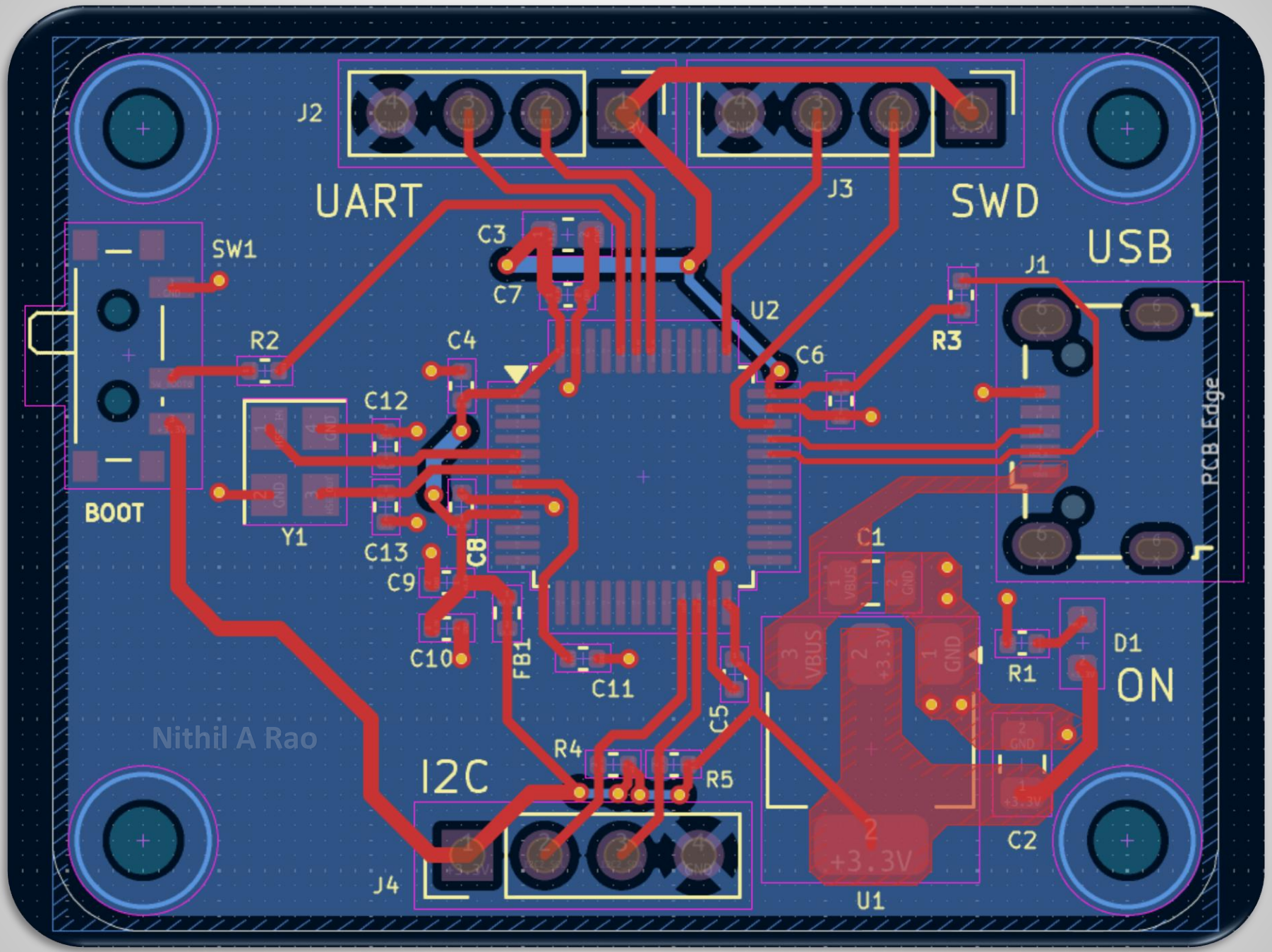


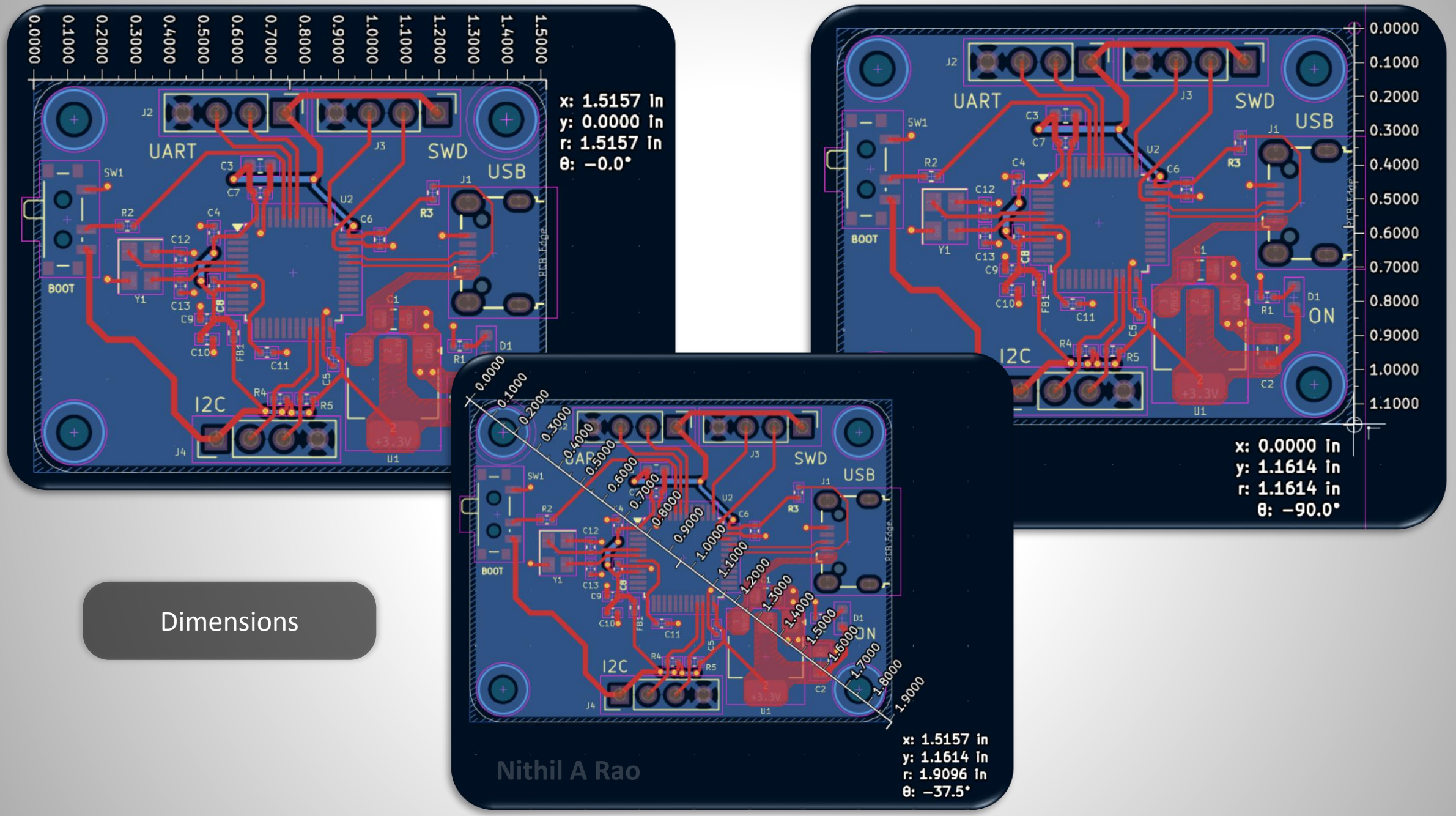

## Microcontroller(and USB)




PIN-out using STM32Cube IDE

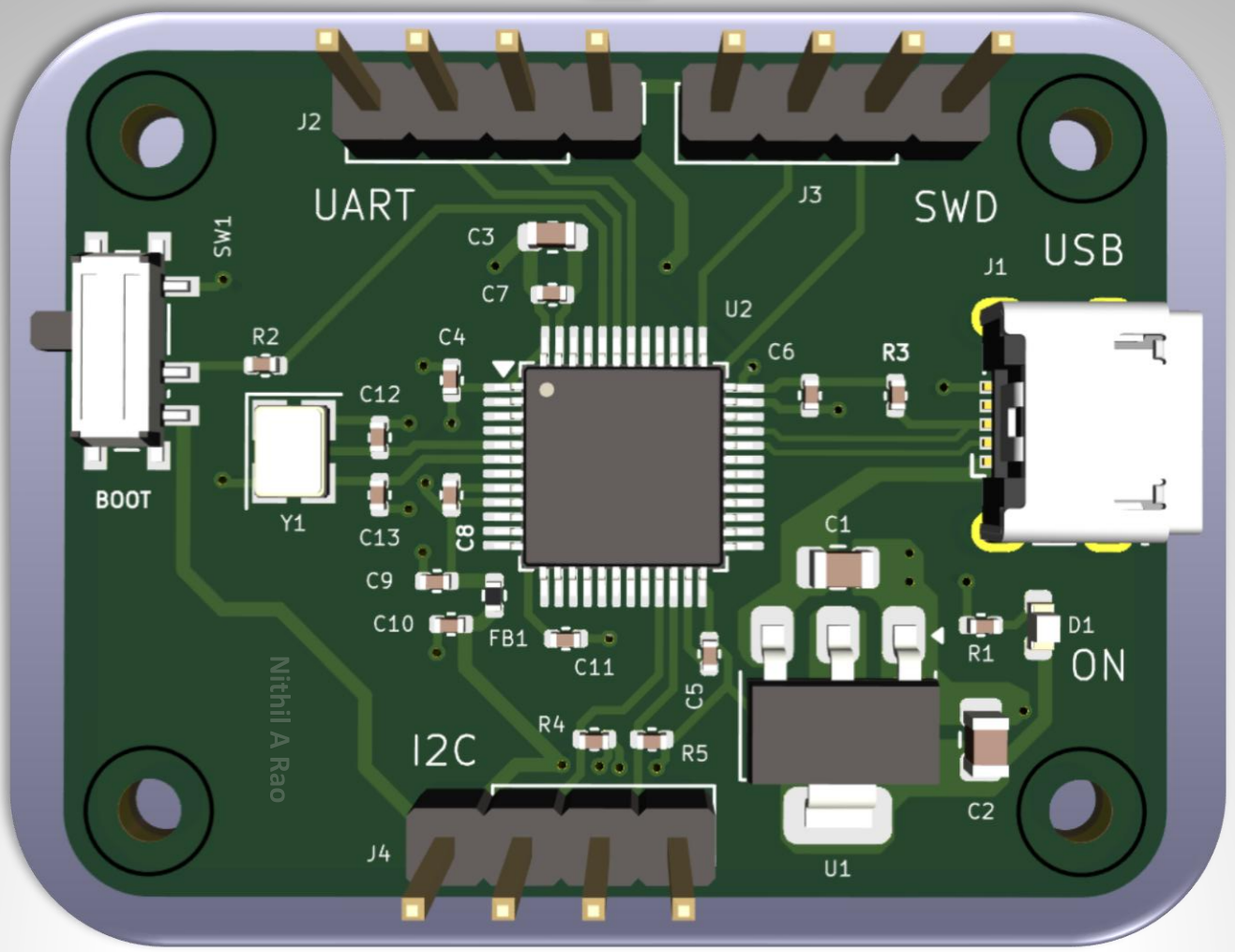
Layout

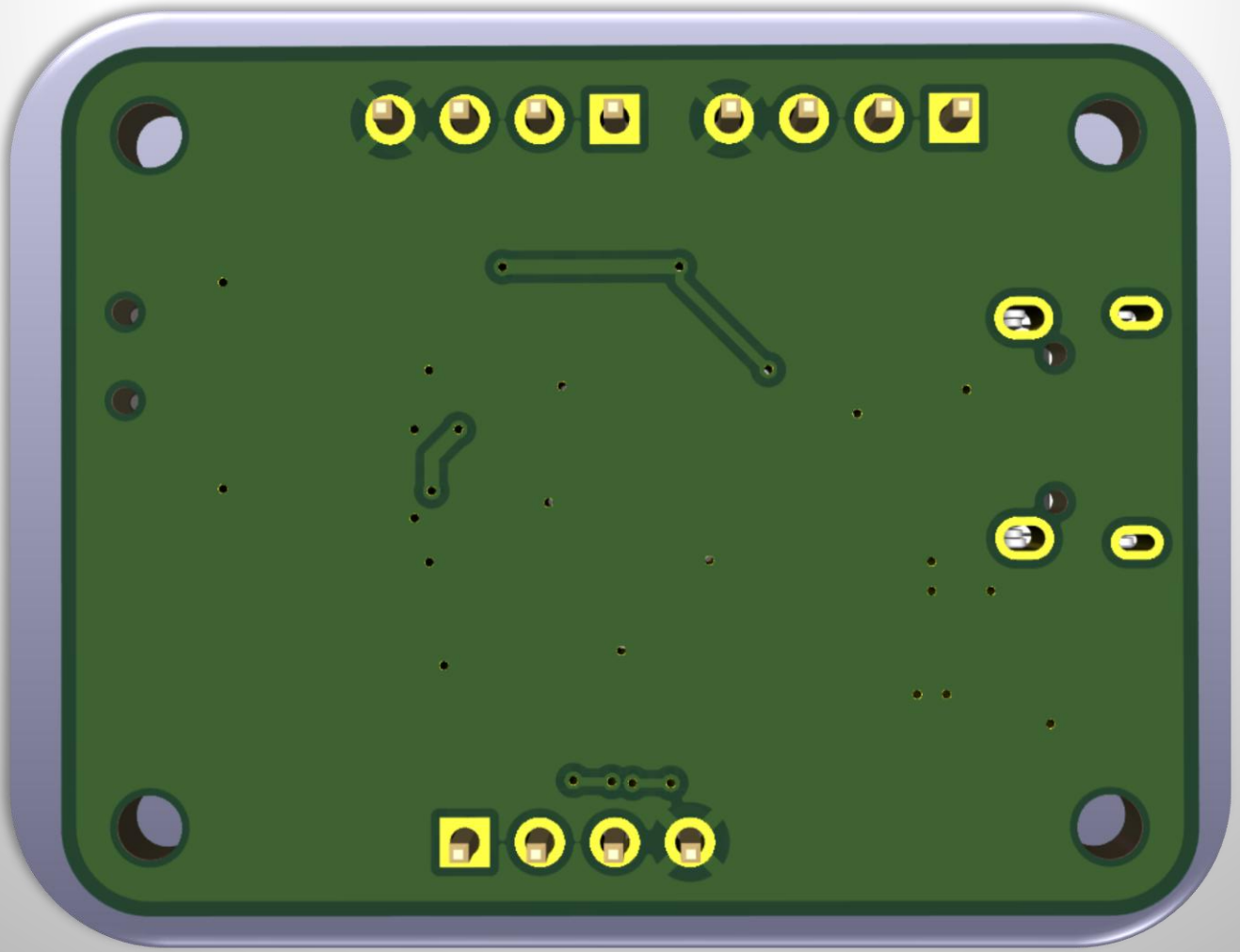

J2
UART
J3
SWD
USB
J1
SW1
C3
C7
U2
R2
C4
C6
R3
C12
BOOT
Y1
C13
C8
C9
C1
D1
ON
C10
FB1
C11
C5
R1
Nithil A Rao
R4
R5
I2C
C2
J4
U1
+3.3V
PCB Edge


x: 1.5157 in
y: 0.0000 in
r: 1.5157 in
θ: −0.0°
x: 0.0000 in
y: 1.1614 in
r: 1.1614 in
θ: −90.0°
x: 1.5157 in
y: 1.1614 in
r: 1.9096 in
θ: −37.5°
UART
SWD
USB
I2C
ON
BOOT
Nithil A Rao

Dimensions

Front

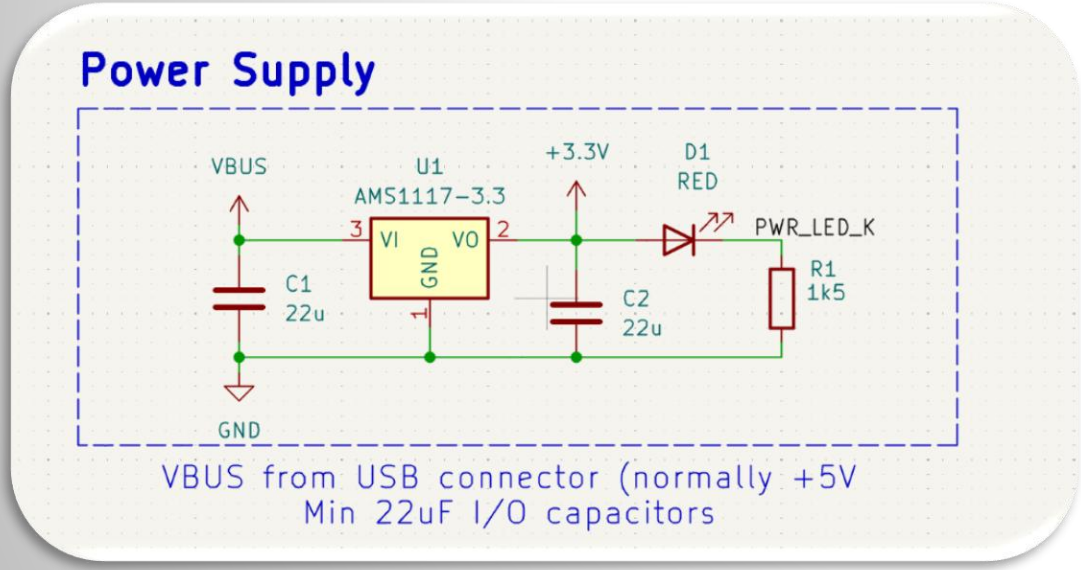

J2
UART
J3
SWD
USB
J1
SW1
C3
C7
U2
R2
C4
C6
R3
C12
BOOT
Y1
C13
C8
C1
C9
C10
FB1
C11
C5
R1
D1
ON
Nithil A Rao
I2C
R4
R5
C2
J4
U1

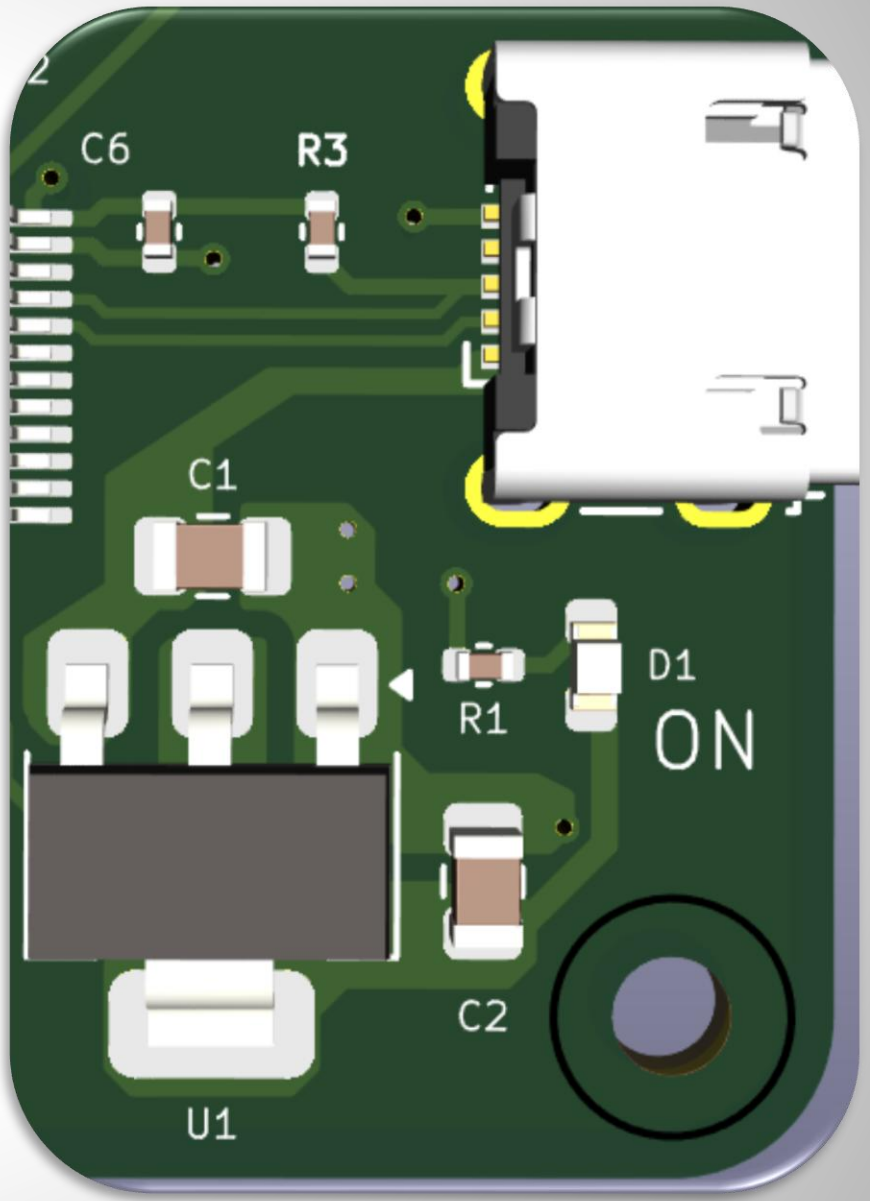


Back

## Power Supply Design

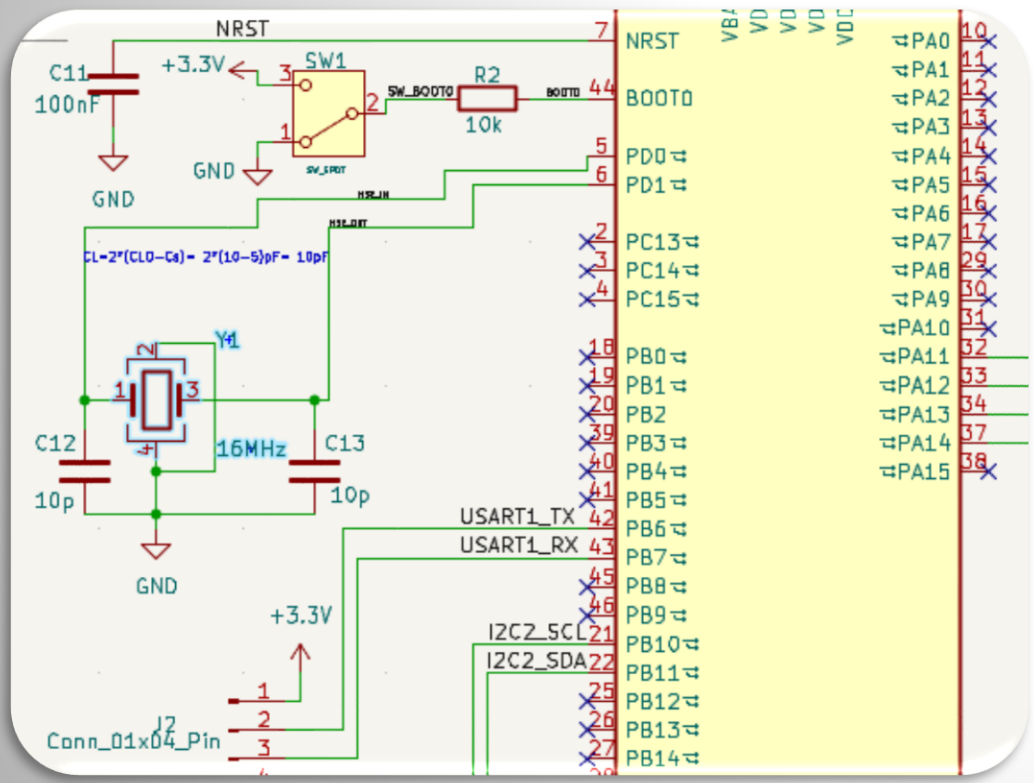
Used a **linear regulator** to convert input voltage (e.g., 5V) to 3.3V.

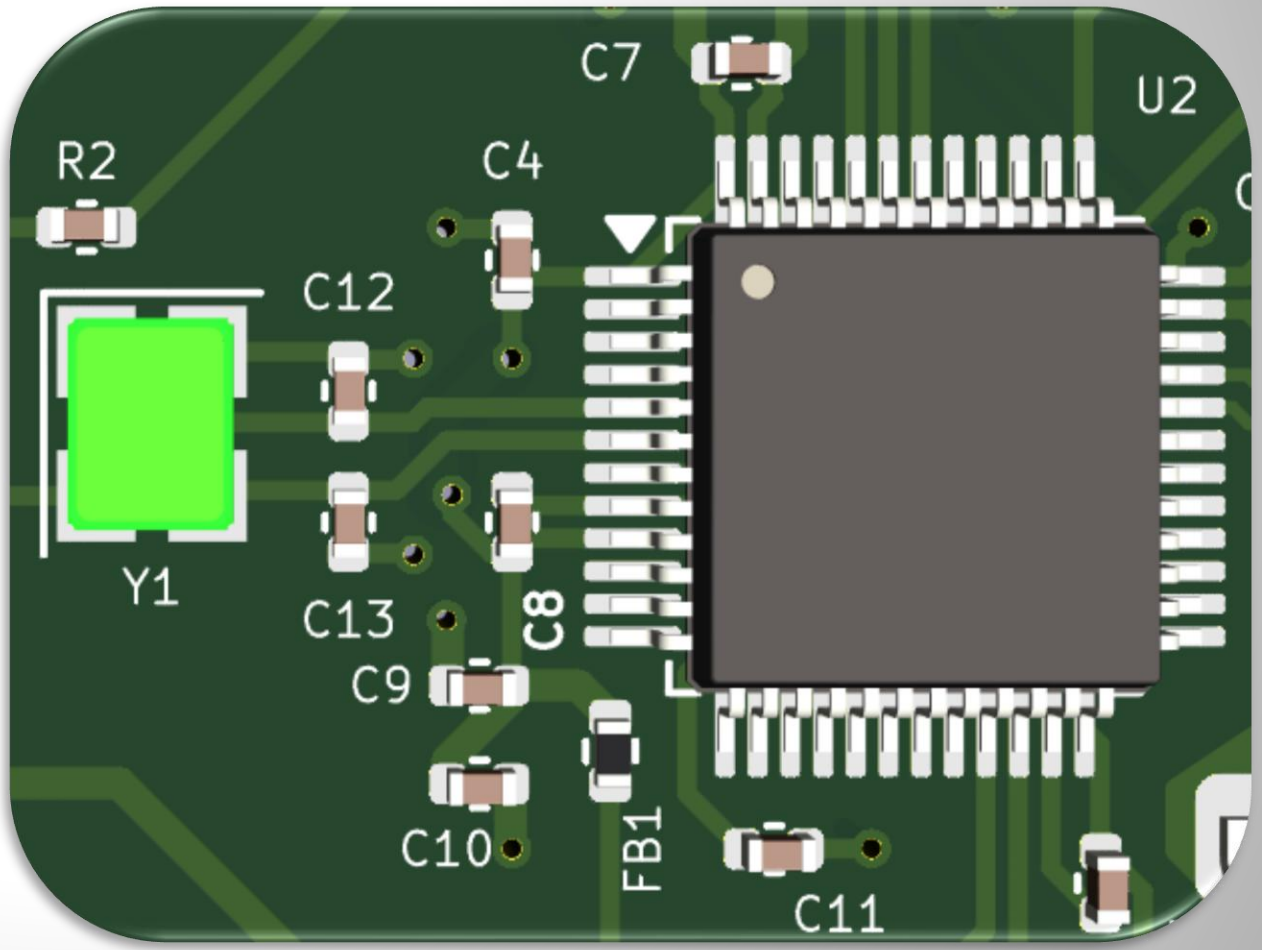


## Crystal Oscillator Circuit

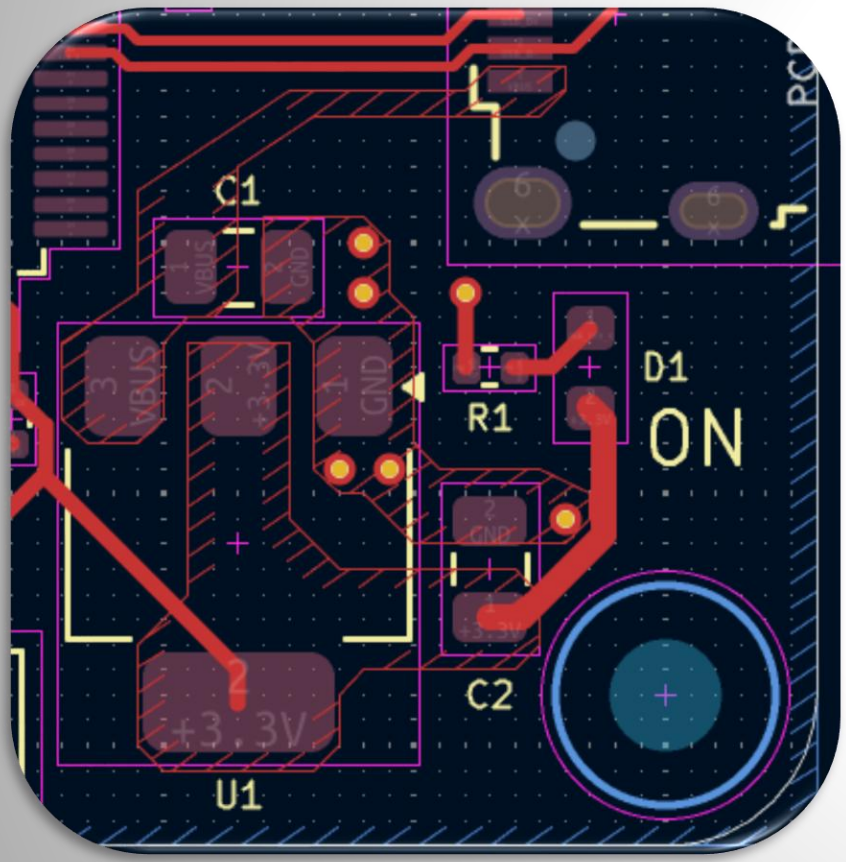
Provides a stable clock source for the microcontroller’s timing functions.

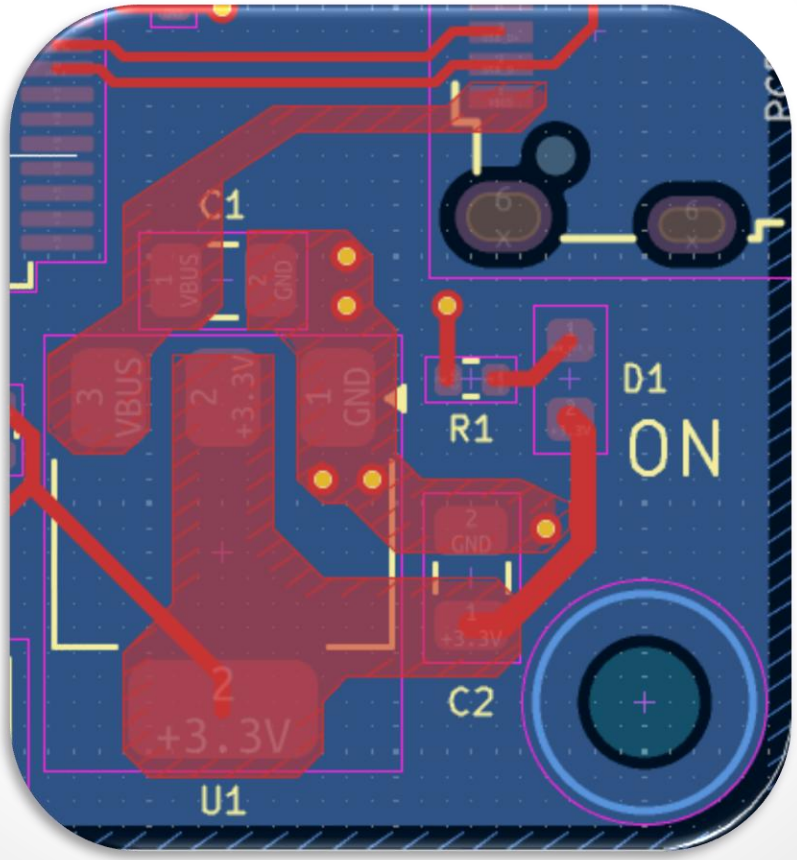


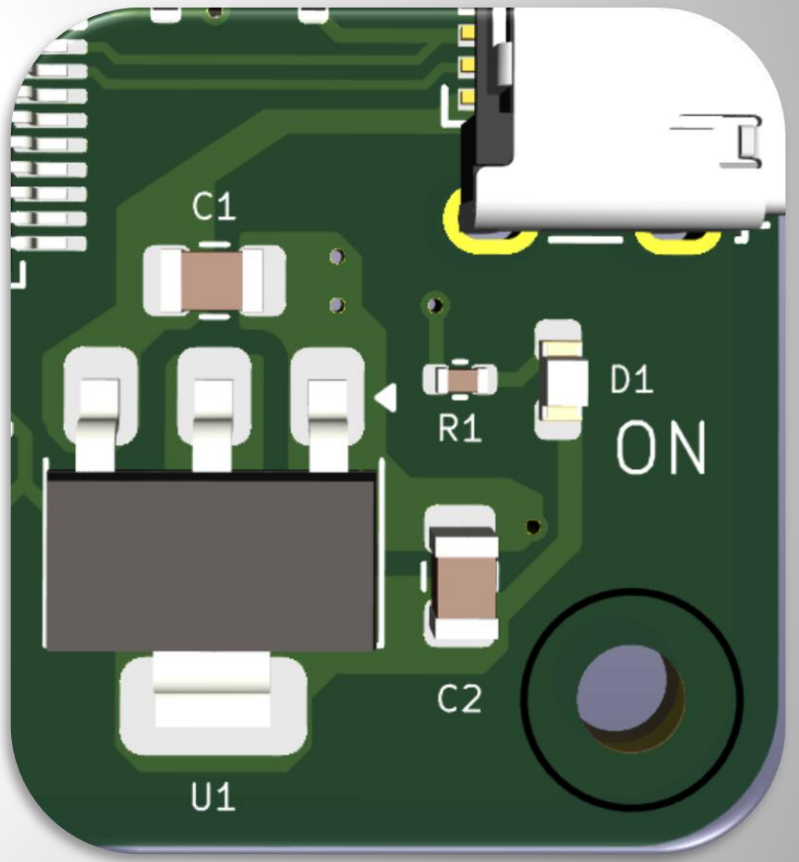



# Solid Pads

Used to bridge multiple signal lines/components with copper. Easier than routing separate traces.



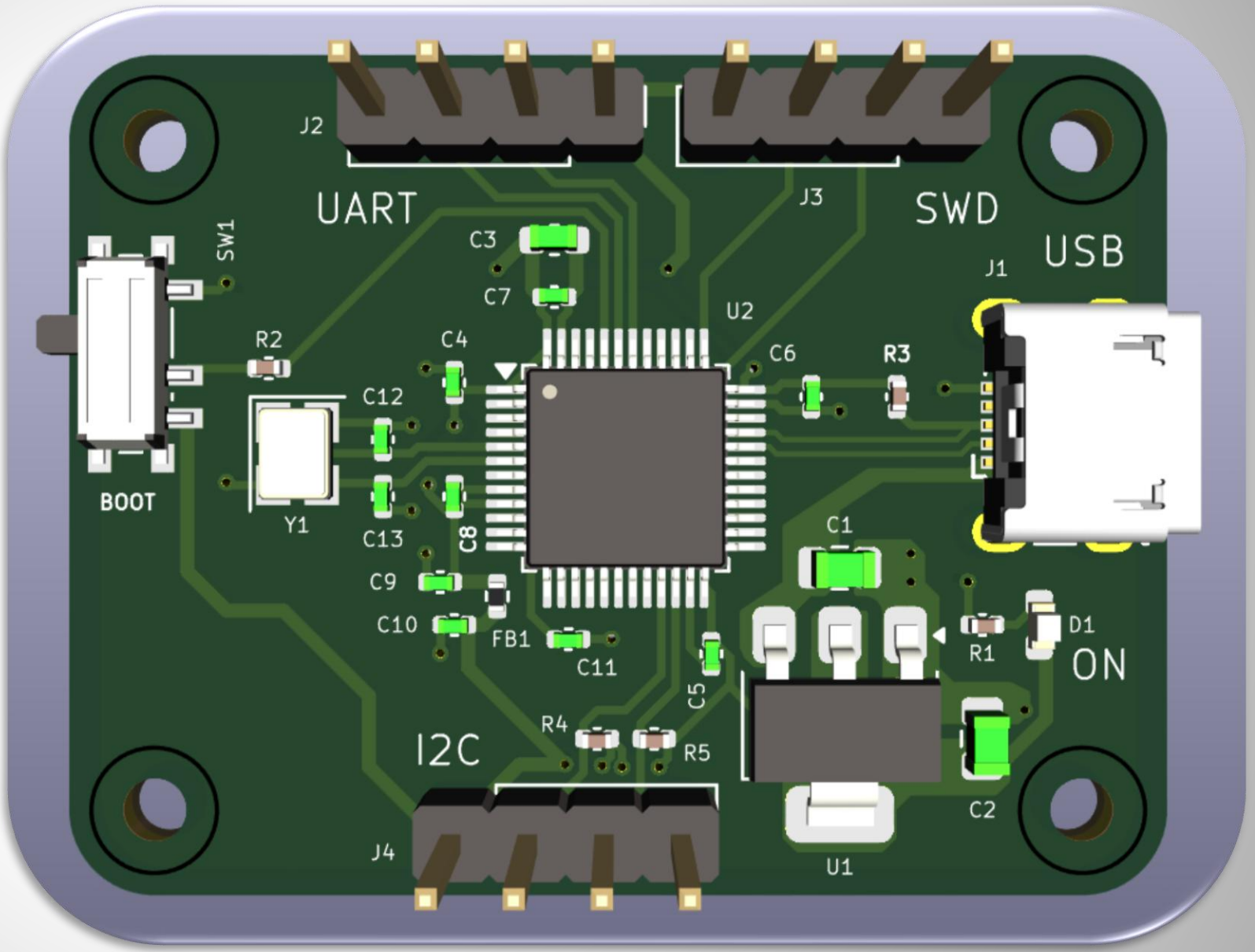



## Decoupling & Filtering

•**Decoupling capacitors** placed close to MCU pins reduce noise and stabilize voltage.

•**Ferrite beads** separate analog and digital power domains to reduce high-frequency noise.



## Project Learnings

- Decoupling capacitors placed close to the MCU to reduce voltage ripple and noise
- USB D+ and D− routed as a differential pair with equal length for signal integrity
- Solid copper pads used to bridge terminals cleanly and reduce routing clutter
- Unused MCU pins either grounded, pulled up/down, or marked as NC to avoid noise
- SWD interface added for debugging and flashing firmware
- BOOT0 switch included to enter USB bootloader mode
- UART header for serial communication
- I2C pins with pull-up resistors for sensor/module communication
- Crystal provides accurate clock; load caps stabilize oscillation