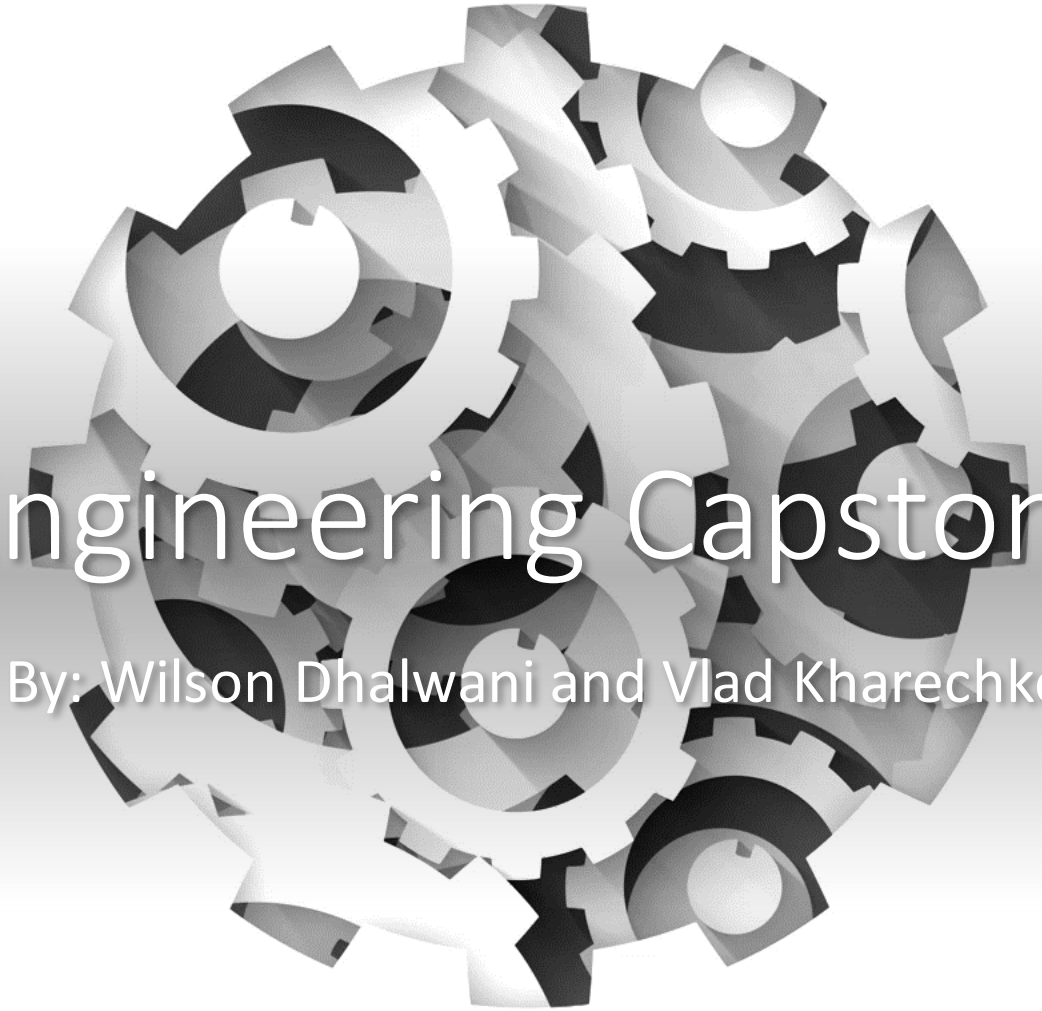
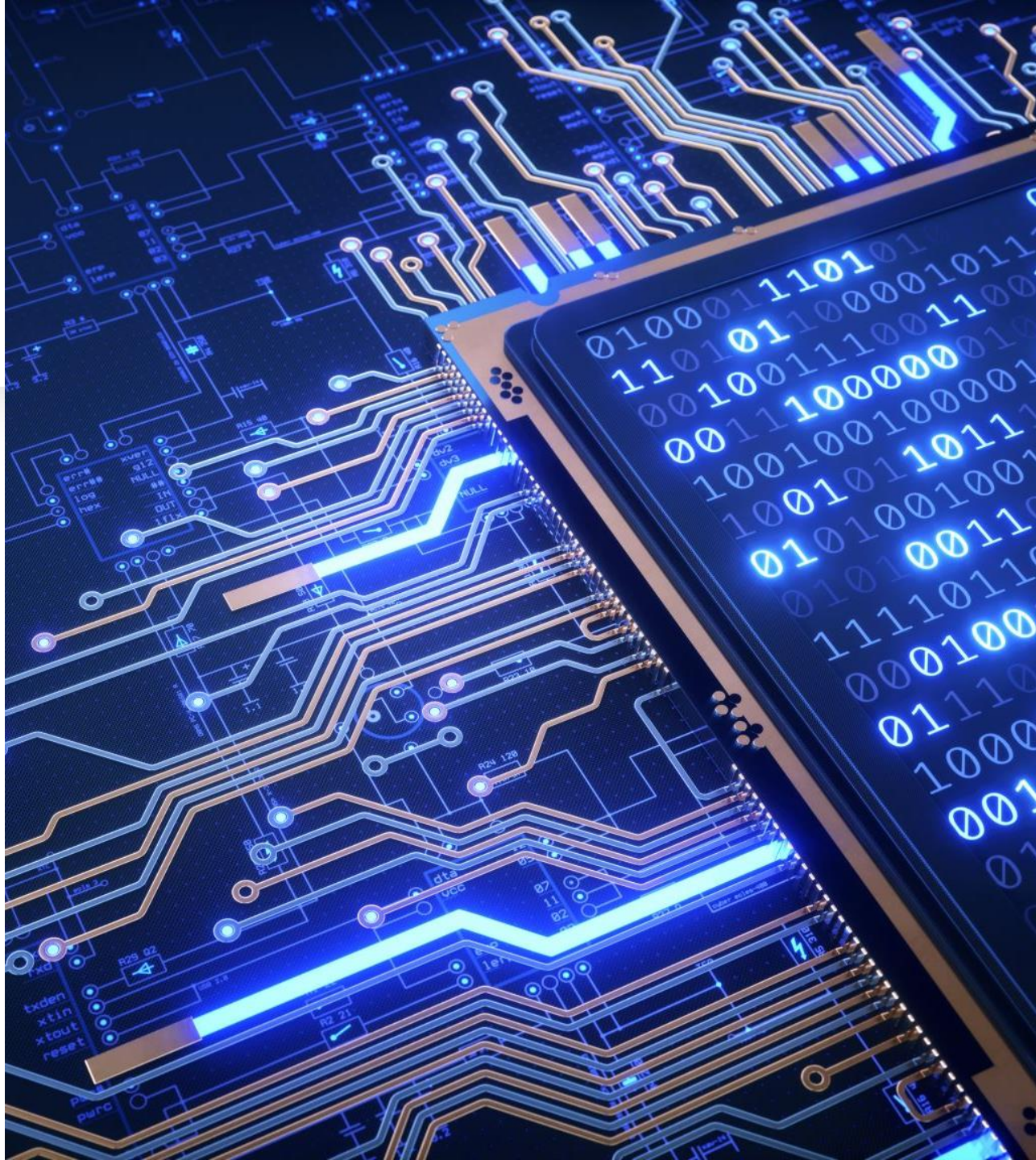


Engineering Capstone

By: Wilson Dhalwani and Vlad Kharechko

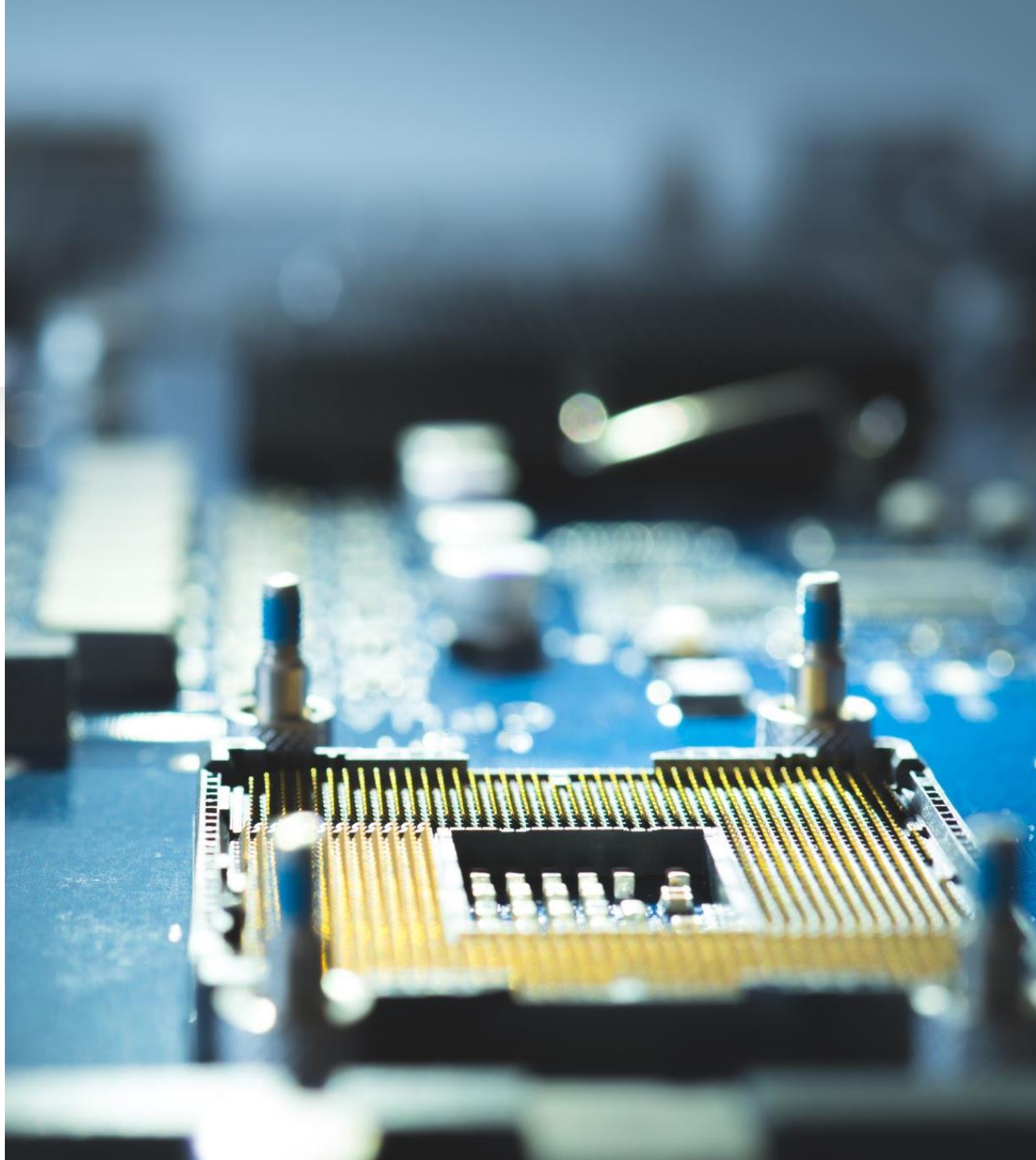
Idea

- Conceived out of a pressing need to address the limitations of traditional flight computers
  - Large sizes often hamper performance and technical functionality
  - Difficult to install into smaller sized rockets
- Focus was set on creating a printed circuit board capable of:
  - Being programmed for rockets, drones, and more
  - Numerous applications and functions with a populace of sensors
  - Having a size small enough to fit into your hand



Solution - *O.R.C.A*

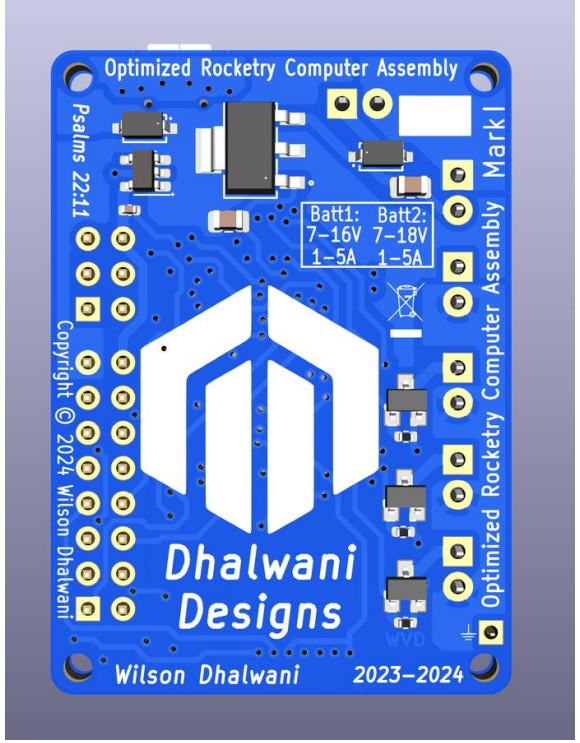
- Introducing ***O.R.C.A.***:
  - ***O****ptimized*
  - ***R****ocketry*
  - ***C****omputer*
  - ***A****ssembly*
- Guarantees compactness and power through its size and abundance of components
- When efficiency and precision are paramount, computers like ORCA emerge indispensable

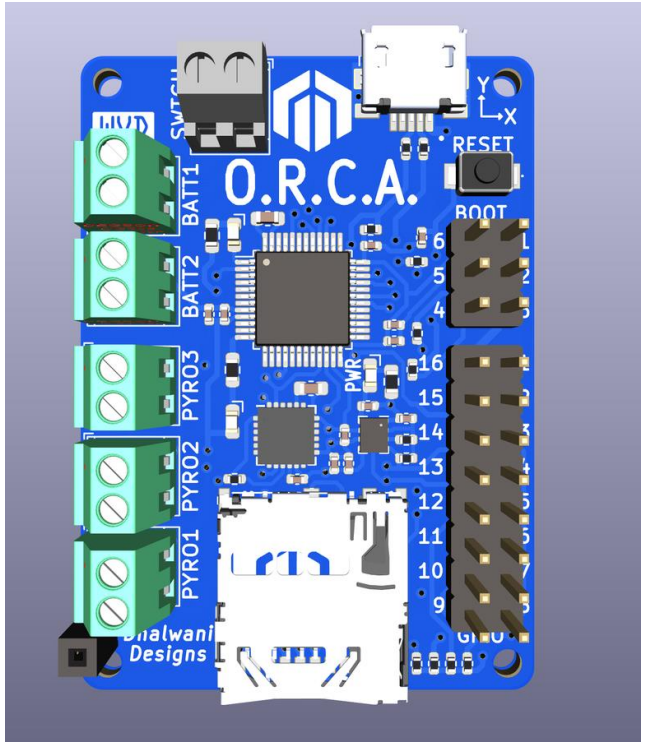


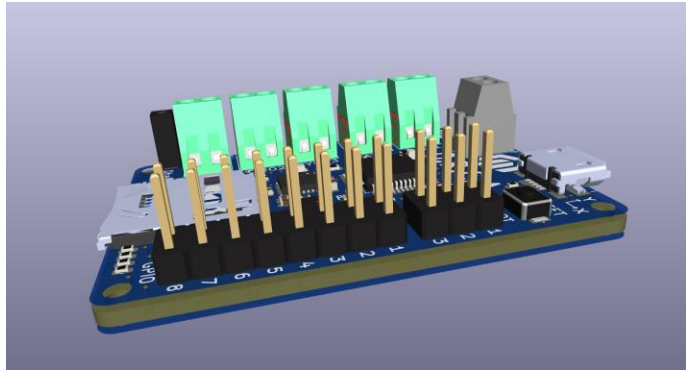
Bill of Materials

Order	References	Value	Footprint	Quantity
1	R1, R4, R5, R8, R9, R10, R11	4.7kÎ©	R_0402_1005Metric	7
2	R2, R3	22Î©	R_0402_1005Metric	2
3	R12, R13	10kÎ©	R_0402_1005Metric	2
4	R14	0Î©	R_0402_1005Metric	1
5	R15	1.5KÎ©	R_0402_1005Metric	1
6	D1	BLULED	LED_0603_1608Metric	1
7	D2	GREENLED	LED_0603_1608Metric	1
8	D3	REDLED	LED_0603_1608Metric	1
9	U1	BMP280	Bosch_LGA-8_2x2.5mm_P0.65mm_ClockwisePinNumbering	1
10	U2	MPU-6050	InvenSense_QFN-24_4x4mm_P0.5mm	1
11	U7	SPX3819M5-L-3-3/TR	SOT-23-5	1
12	CAP1, CAP3, CAP4, CAP5, CAP7, DCPLCl1, DCPLCl2, DCPLCl3, DCPLCl4, DCPLCl6, RSTCAP1	0.1uF	C_0402_1005Metric	11
13	Batt1, Batt2, Pyro1, Pyro2, Pyro3, Switch1	Screw_Terminal_01x02	TerminalBlock_TE_282834-2_1x02_P2.54mm_Horizontal	6
14	PULL-DWN-RS1, PULL-DWN-RS2, PULL-DWN-RS3	470Î©	R_0402_1005Metric	3
15	LEDRES2, LEDRES3	270Î©	R_0603_1608Metric	2
16	CAP2	10nF	C_0402_1005Metric	1
17	CAP6	2.2nF	C_0603_1608Metric	1
18	Cl8	22uF	C_0805_2012Metric	1
19	Cl9	1uF	C_0402_1005Metric	1
20	DCPLCl5	4.7uF	C_0603_1608Metric	1
21	LEDRES1	75Î©	R_0603_1608Metric	1
22	MCRO1	Micro_SD_Card	MOLEX_503398-1892	1
23	MICROCNTRL1	STM32F103C8T6	LQFP-48_7x7mm_P0.5mm	1
24	RSTSW1	TS-1088-AR02016	TS1088AR02016	1
25	USB1	MICROQTJ	SHOUHAN_MICROQTJ	1
26	J2	Conn_02x08	PinHeader_2x08_P2.54mm_Vertical	1
27	J3	Conn_02x03_Counter_Clockwise	PinHeader_2x03_P2.54mm_Vertical	1
28	J17	Conn_01x01_Pin	PinSocket_1x01_P2.54mm_Vertical	1

Visuals


Optimized Rocketry Computer Assembly
Psalms 22:11
Batt1: 7–16V 1–5A
Batt2: 7–18V 1–5A
Mark I
Optimized Rocketry Computer Assembly
Copyright © 2024 Wilson Dhalwani
Dhalwani Designs
Wilson Dhalwani
2023–2024


O.R.C.A.
BATT1
BATT2
PYRO3
PYRO2
PYRO1
RESET
BOOT
PWR
Dhalwani Designs



Tools Used

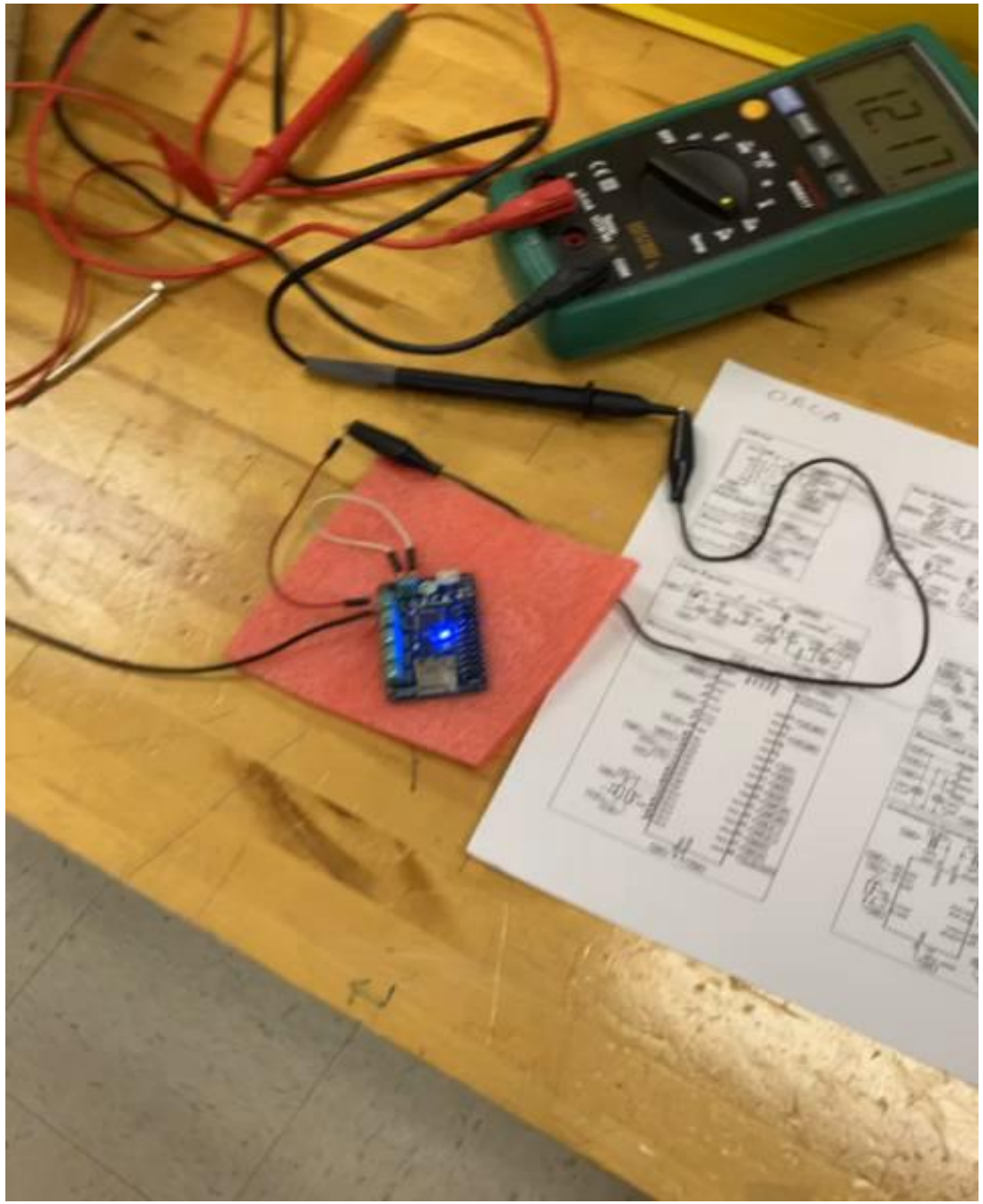
- Delving into the realm of avionics embarked on a journey through some useful software platforms
  - KiCAD
  - EAGLE
  - JLCPCB Assembly Libraries
- Most of the hours were spent on KiCAD with the goal of:
  - Decreasing dimensions to the absolute minimum
  - Placing the components in the most efficient locations
  - Optimizing routing and vias placement
  - Refining, refining and ***refining***

Sponsorship

- Upon hearing about the quality of JLCPCB's products and sponsorship opportunities, we chose to partner with JLCPCB
  - Operations in over 180 countries
  - Helps millions of enterprises, research institutes, and engineers with electronic/mechanical services
  - EDA software, PCB manufacturing, PCB Assembly, 3D Printing, and CNC Machining
- Our board was manufactured in just a few weeks in Hong Kong with the entire cost being covered by the sponsorship

Physical board

Testing



HUUUUUUUUUUUUUUUUGE THANKS to Mr. Barbetta and Mr. Liva for helping us


Thank you