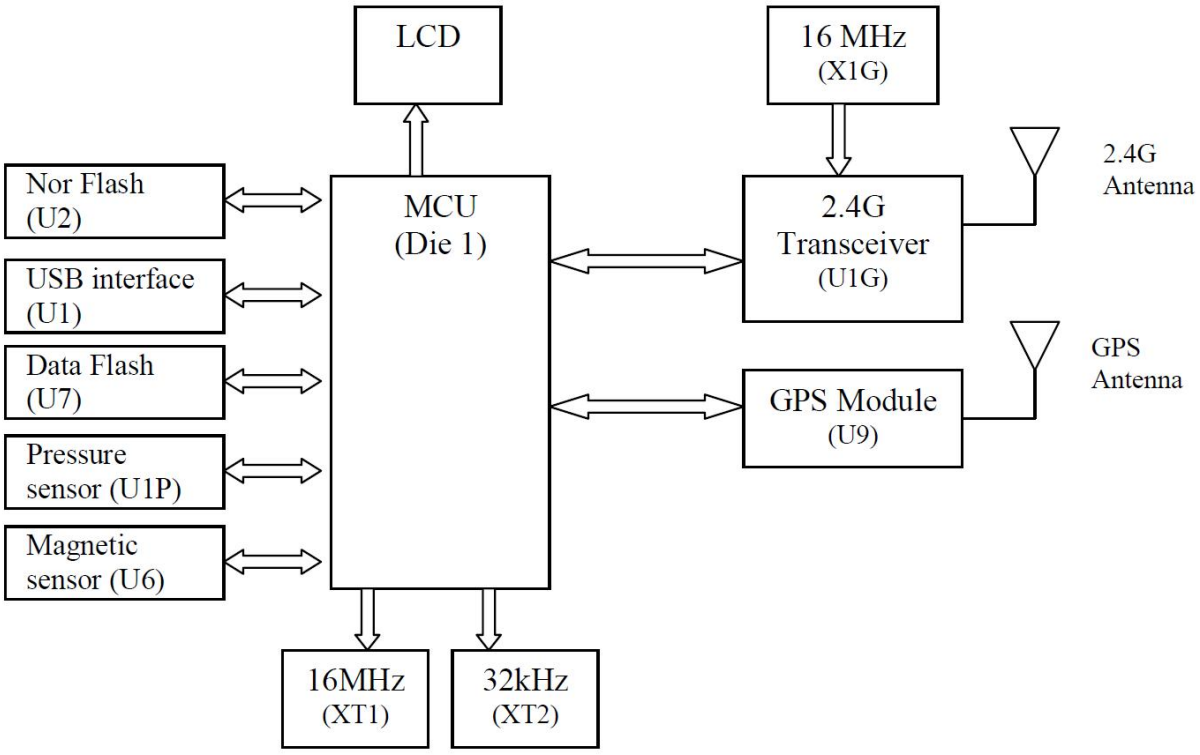
Block diagram of Joule 2.0



Circuit description

The MCU (Die 1) is for controlling the 2.4G Receiver (U1G). The 32kHz (XT2) is for slow clock operation, while the fast clock is generated by 16MHz resonator (XT1). It also communicates with the GPS modules (U9) to get the current GPS data. The 16MHz (X1G) crystal drives the U1G to provide the carrier frequency. The modulation is provided by U1G. The output of the U1G has the matching network consisting of L1G, L2G,L3G, C20G while L14G, C5G, C6G are used to limit harmonic content and effect the proper coupling of the antenna to the output stage.

Antenna, Ground

The copper plate that assembled on the top of the LCD acts as the antenna for receiving 2.4G RF signal. The patch antenna of 13mm x 13mm is for receiving GPS signal. There is no external ground connection, the ground is only on the printed circuit board.

Power Source

Electric current is supplied by a 3V (1 piece of CR2032) coin cell primary battery.

HR Belt searching (same protocol apply to Bike speed, cadence, power sensor)

When the wireless connection between the HR belt and the watch is lost, Receiver (U1G) will inform MCU (Die 1) and MCU (Die 1) will request the receiver (U1G) to start search the HR belt. When HR belt is found, HR will be displayed, otherwise, the channel will be closed until next request of HR belt searching from the MCU (Die 1).

Data Upload

The training data is saved in the memory of the bike computer. The user can upload the data to the PC through USB communication by selecting the data upload mode in the bike computer and start up the PC program.

Frequency Channel

Channel 1	2403	MHz	Channel 36	2438	MHz	Channel 71	2473	MHz
Channel 2	2404	MHz	Channel 37	2439	MHz	Channel 72	2474	MHz
Channel 3	2405	MHz	Channel 38	2440	MHz	Channel 73	2475	MHz
Channel 4	2406	MHz	Channel 39	2441	MHz	Channel 74	2476	MHz
Channel 5	2407	MHz	Channel 40	2442	MHz	Channel 75	2477	MHz
Channel 6	2408	MHz	Channel 41	2443	MHz	Channel 76	2478	MHz
Channel 7	2409	MHz	Channel 42	2444	MHz	Channel 77	2479	MHz
Channel 8	2410	MHz	Channel 43	2445	MHz	Channel 78	2480	MHz
Channel 9	2411	MHz	Channel 44	2446	MHz			
Channel 10	2412	MHz	Channel 45	2447	MHz			
Channel 11	2413	MHz	Channel 46	2448	MHz			
Channel 12	2414	MHz	Channel 47	2449	MHz			
Channel 13	2415	MHz	Channel 48	2450	MHz			
Channel 14	2416	MHz	Channel 49	2451	MHz			
Channel 15	2417	MHz	Channel 50	2452	MHz			
Channel 16	2418	MHz	Channel 51	2453	MHz			
Channel 17	2419	MHz	Channel 52	2454	MHz			
Channel 18	2420	MHz	Channel 53	2455	MHz			
Channel 19	2421	MHz	Channel 54	2456	MHz			
Channel 20	2422	MHz	Channel 55	2457	MHz			
Channel 21	2423	MHz	Channel 56	2458	MHz			
Channel 22	2424	MHz	Channel 57	2459	MHz			
Channel 23	2425	MHz	Channel 58	2460	MHz			
Channel 24	2426	MHz	Channel 59	2461	MHz			
Channel 25	2427	MHz	Channel 60	2462	MHz			
Channel 26	2428	MHz	Channel 61	2463	MHz			
Channel 27	2429	MHz	Channel 62	2464	MHz			
Channel 28	2430	MHz	Channel 63	2465	MHz			
Channel 29	2431	MHz	Channel 64	2466	MHz			
Channel 30	2432	MHz	Channel 65	2467	MHz			
Channel 31	2433	MHz	Channel 66	2468	MHz			
Channel 32	2434	MHz	Channel 67	2469	MHz			
Channel 33	2435	MHz	Channel 68	2470	MHz			
Channel 34	2436	MHz	Channel 69	2471	MHz			
Channel 35	2437	MHz	Channel 70	2472	MHz			