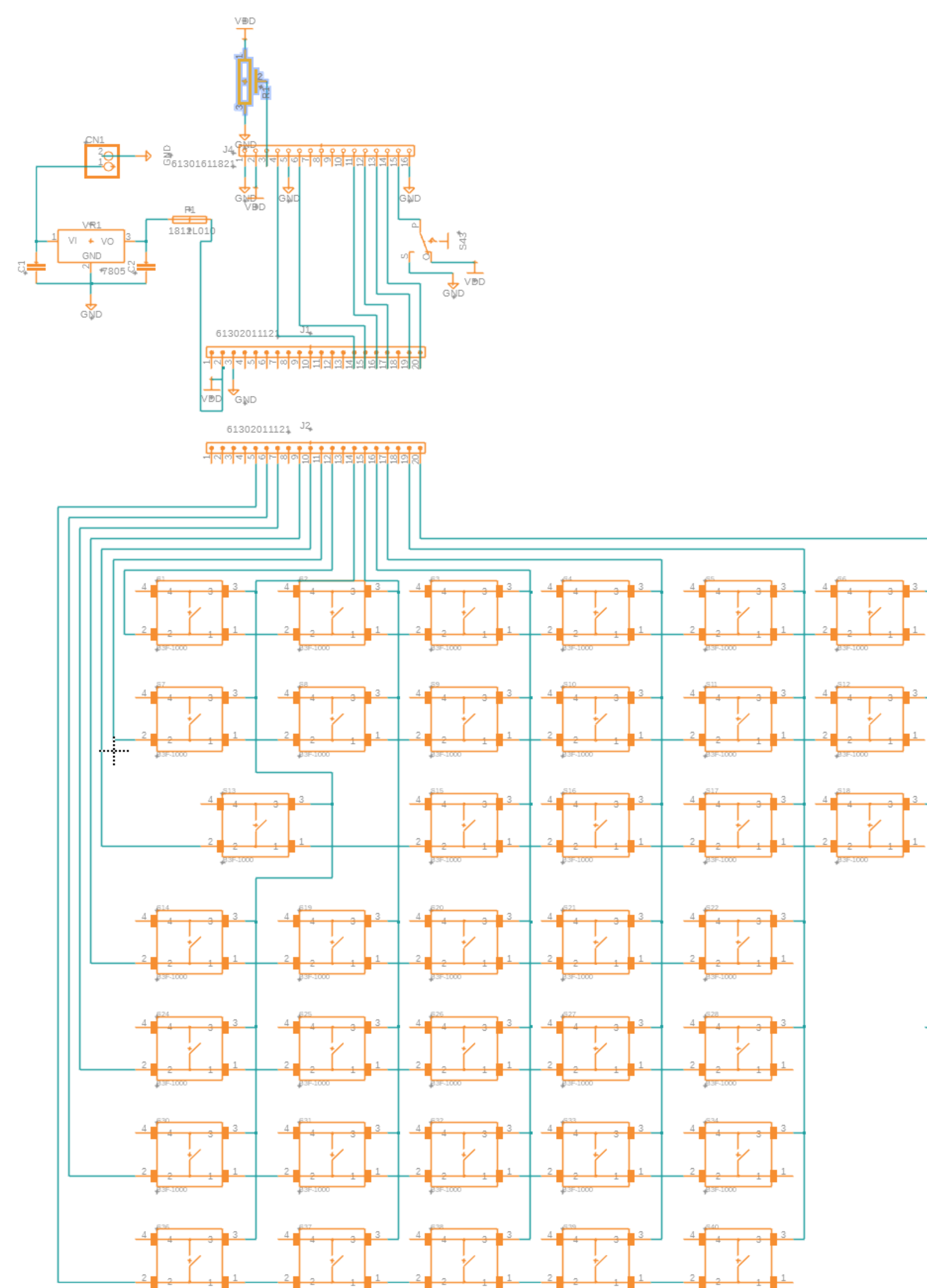


Description and Requirements

- Reverse-Polish notation calculator similar to HP42S
- Double precision accurate to 16 decimal places
- Large stack – greater than 100 numbers
- Complex numbers supported
- Exponential numbers supported
- Degrees/Radians, Rectangular/Polar modes
- Hexadecimal number mode and conversion
- Portable – Battery-powered or USB-powered
- Low cost

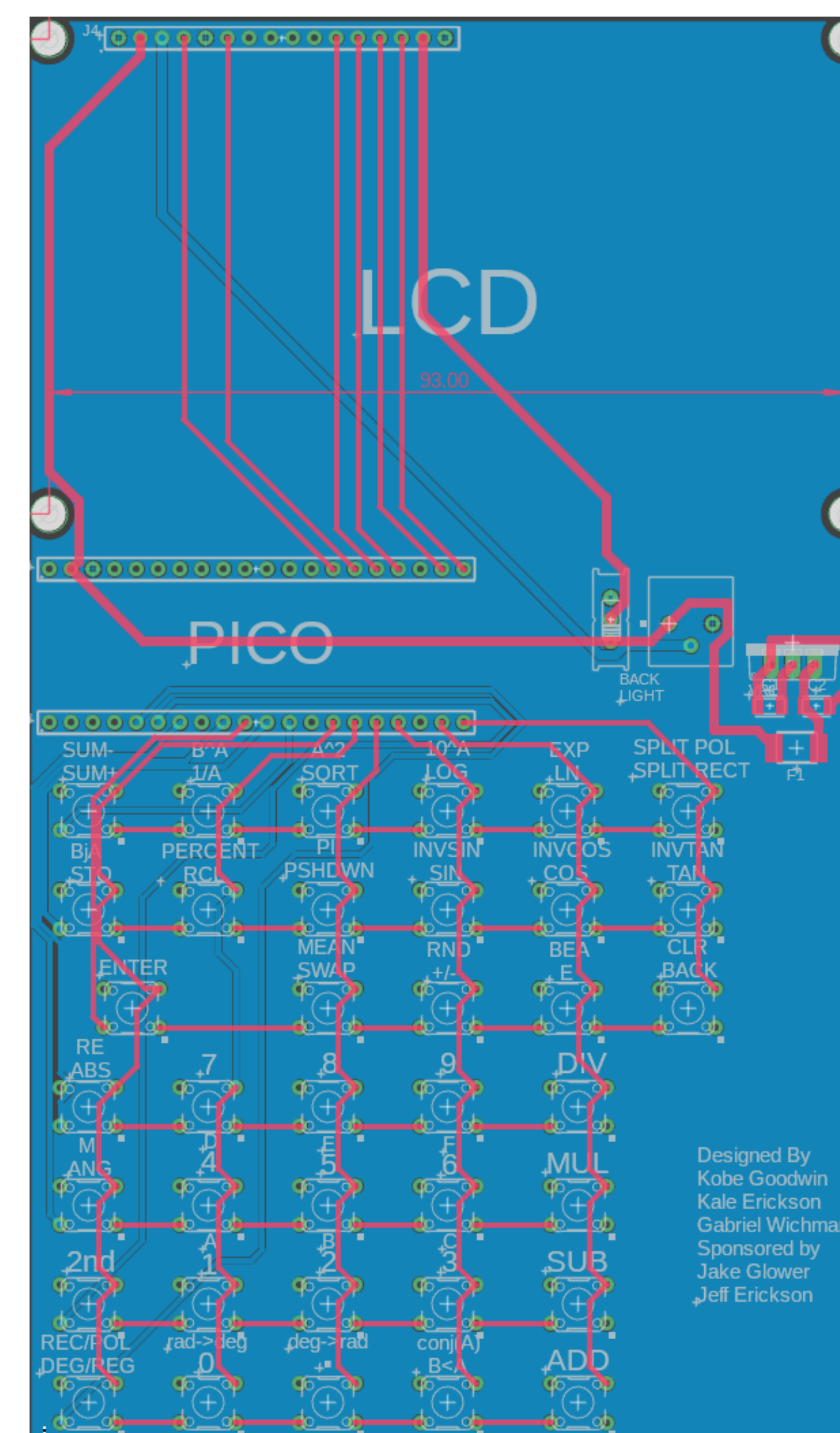
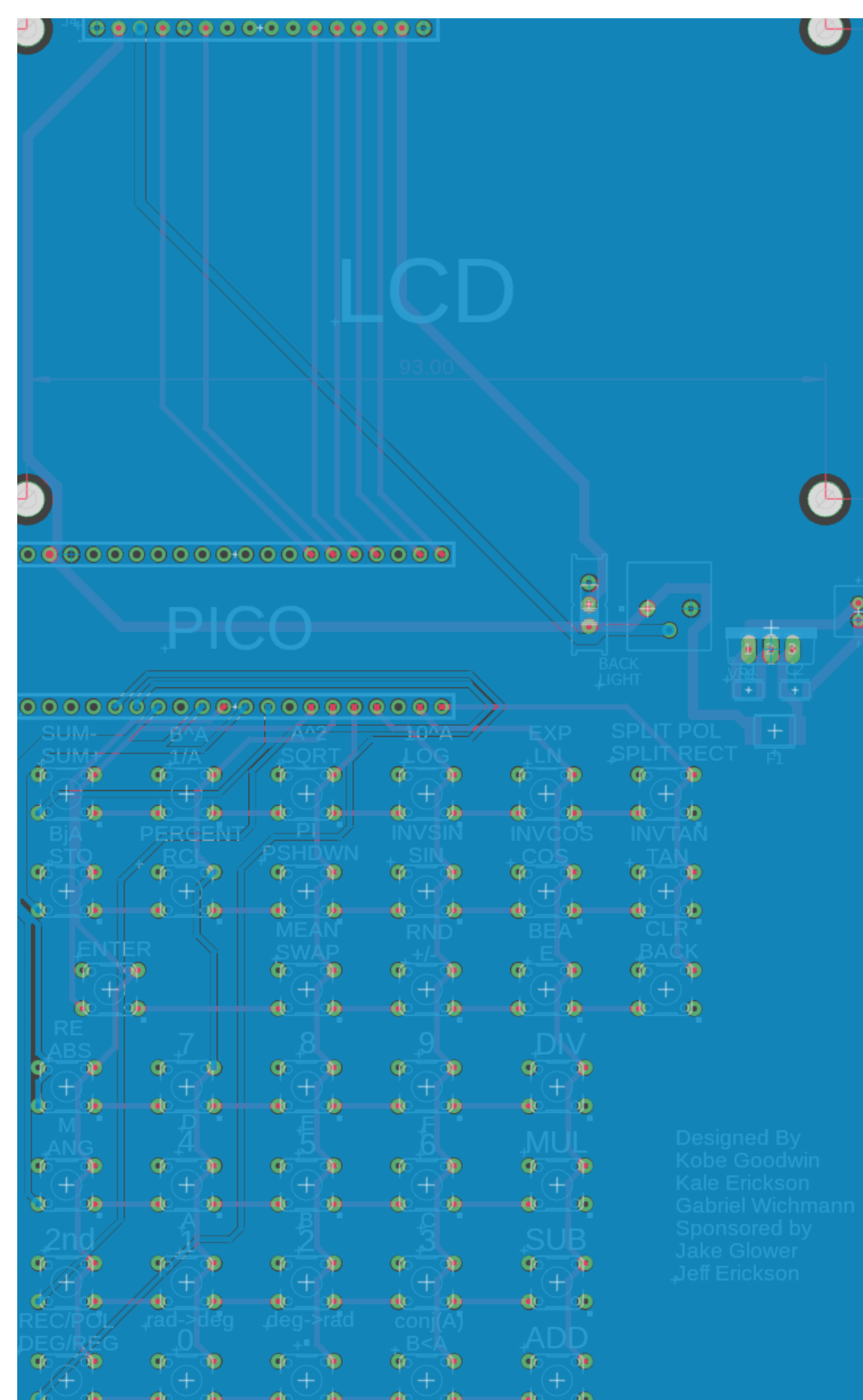
Schematic



Component List

-20 column x 4 row display	(1)
-Raspberry Pi Pico	(1)
-1 x 16 0.1" pin header	(1)
-6mm momentary tactile buttons	(37)
-1 x 20 0.1" socket header	(2)
-LM7805 5V voltage regulator	(1)
-330 nF capacitor	(1)
-100 nF capacitor	(1)
-10 kΩ potentiometer	(1)
-1Ω resistor	(2)
-1 x 3 0.1" pin header	(1)
-0.1" jumper cap	(1)
-9V battery snap	(1)
-9V battery	(1)

PCB Design

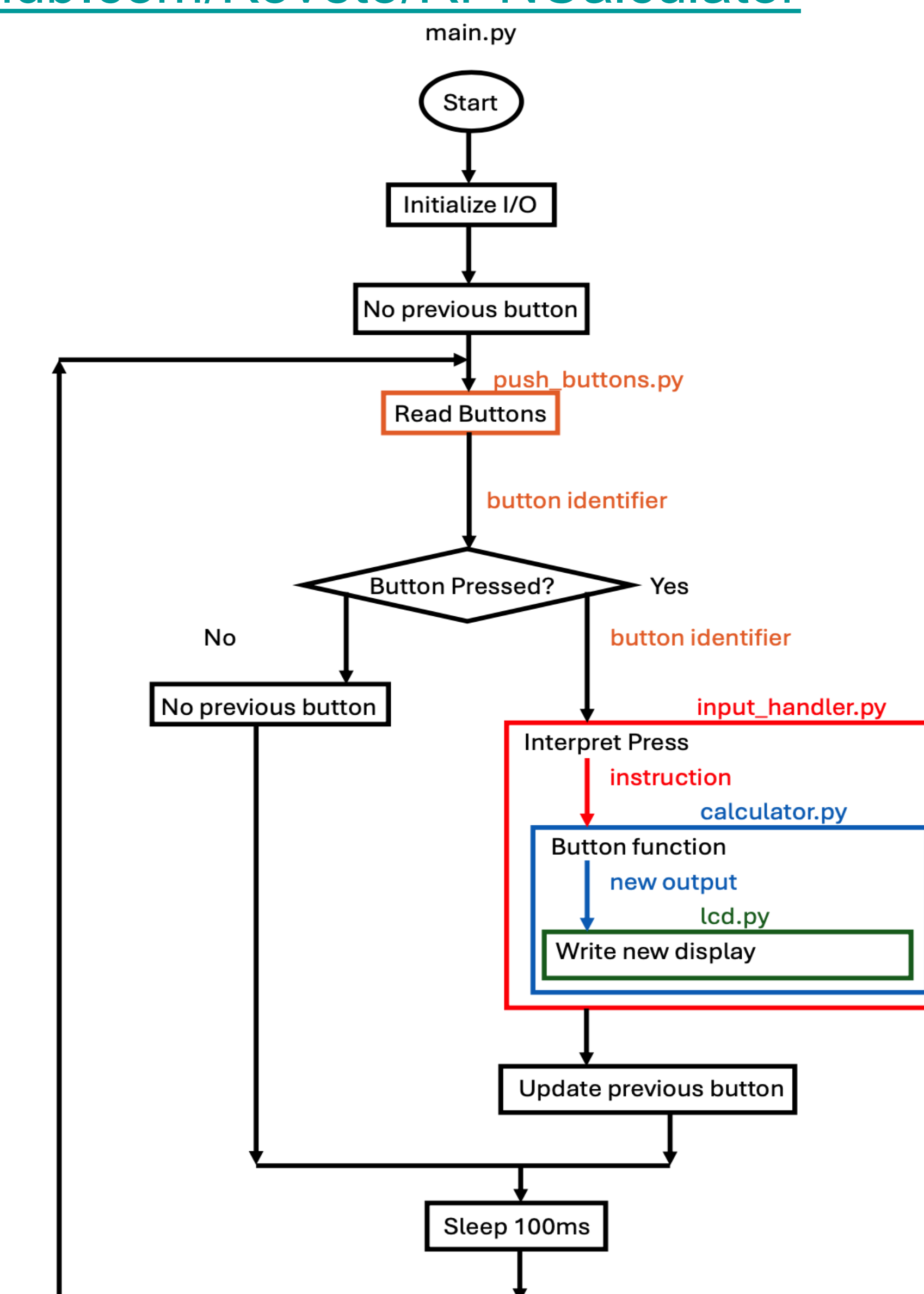


Applications

- Exam-tested calculator
- ECE 111 introductory soldering project
- Accessible embedded systems project
- Educational tool for Python programming
- Reprogram to make a portable game system

Program Flow

<https://github.com/Koveto/RPNCalculator>



Formulas

$$\sin^{-1}(a+jb) = -j * \ln(\sqrt{1-(a+jb)^2} + j(a+jb))$$

$$\cos^{-1}(a+jb) = -j * \ln(j\sqrt{1-(a+jb)^2} + a+jb)$$

$$\tan^{-1}(a+jb) = \frac{j(\ln(1-j(a+jb)) - \ln(1+j(a+jb)))}{2}$$

$$\tan \theta = \frac{\text{Im}(z)}{\text{Re}(z)} \quad |z| = \sqrt{a^2 + b^2}$$