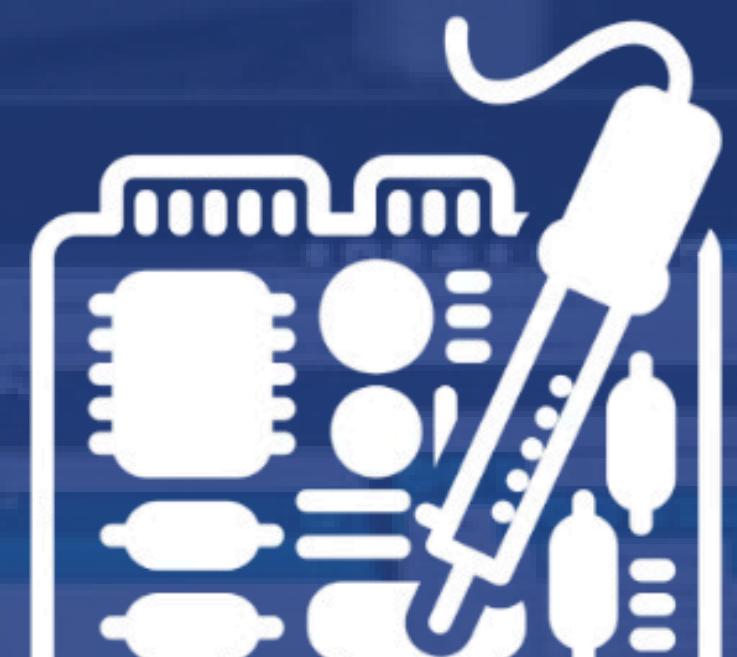




ece

Electrical and
Computer
Engineering

JY-85 Reconfigurable Electrical Probing System for Thin Film Devices



OrcaProbe

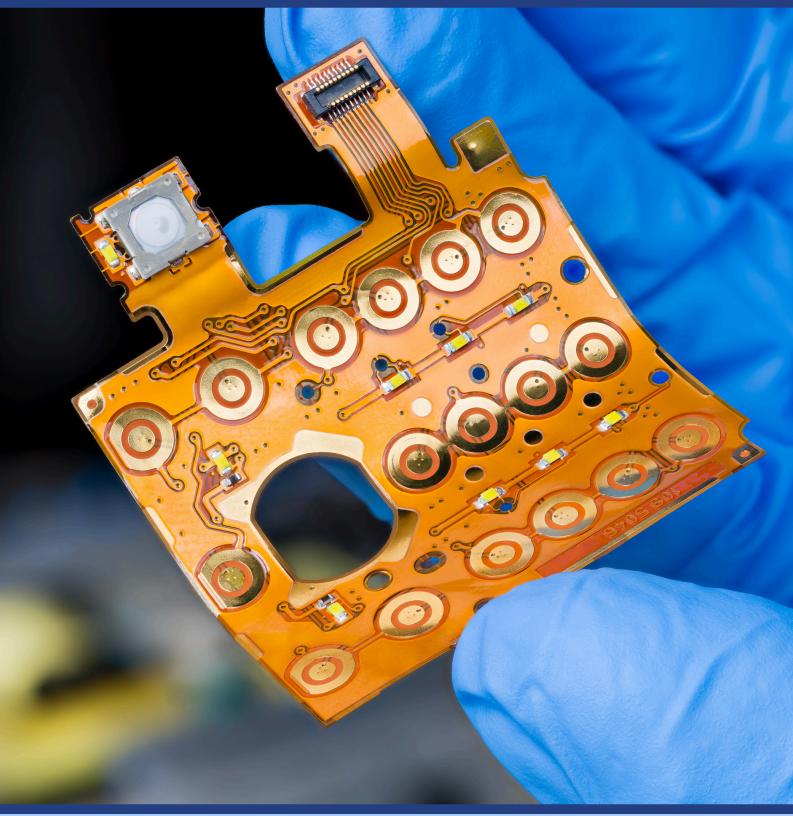
Group Members
 Dipak Shrestha
 Idil Bil
 Peggy Yuan
 Aaron Loh
 Kerem Oktay

The Client



- Orca Advanced Materials is a startup based in Vancouver, BC, specializing in functional thin film devices and their applications.

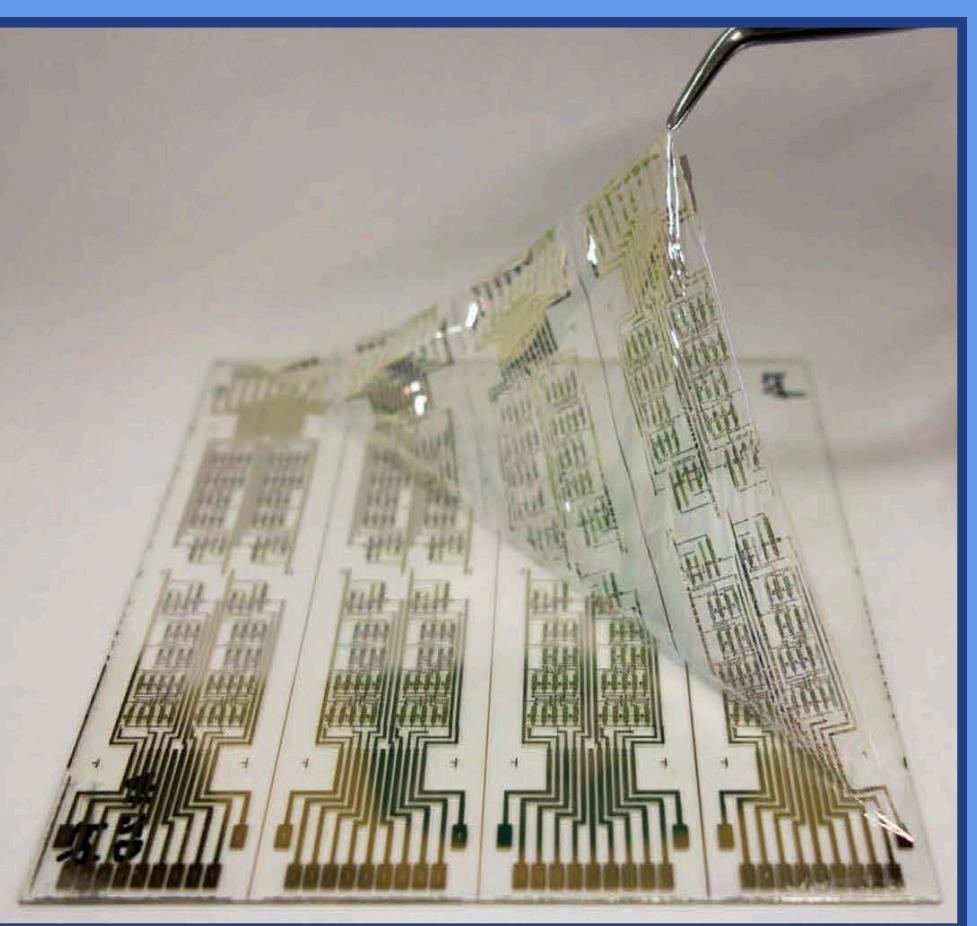
The Problem



- Measuring various electrical characteristics of thin films is crucial in characterizing them.
- Process is labour-intensive and inefficient due to manual setup of each tool and material.

What are Thin Films?

- Layers of material ranging from a few nanometers to several micrometers in thickness, typically deposited on a substrate.
- Used in flexible electronics and optical coatings, such as solar cells.



Why OrcaProbe?



5 to 10 times
process
speedup



Far below
off-the-shelf
pricing



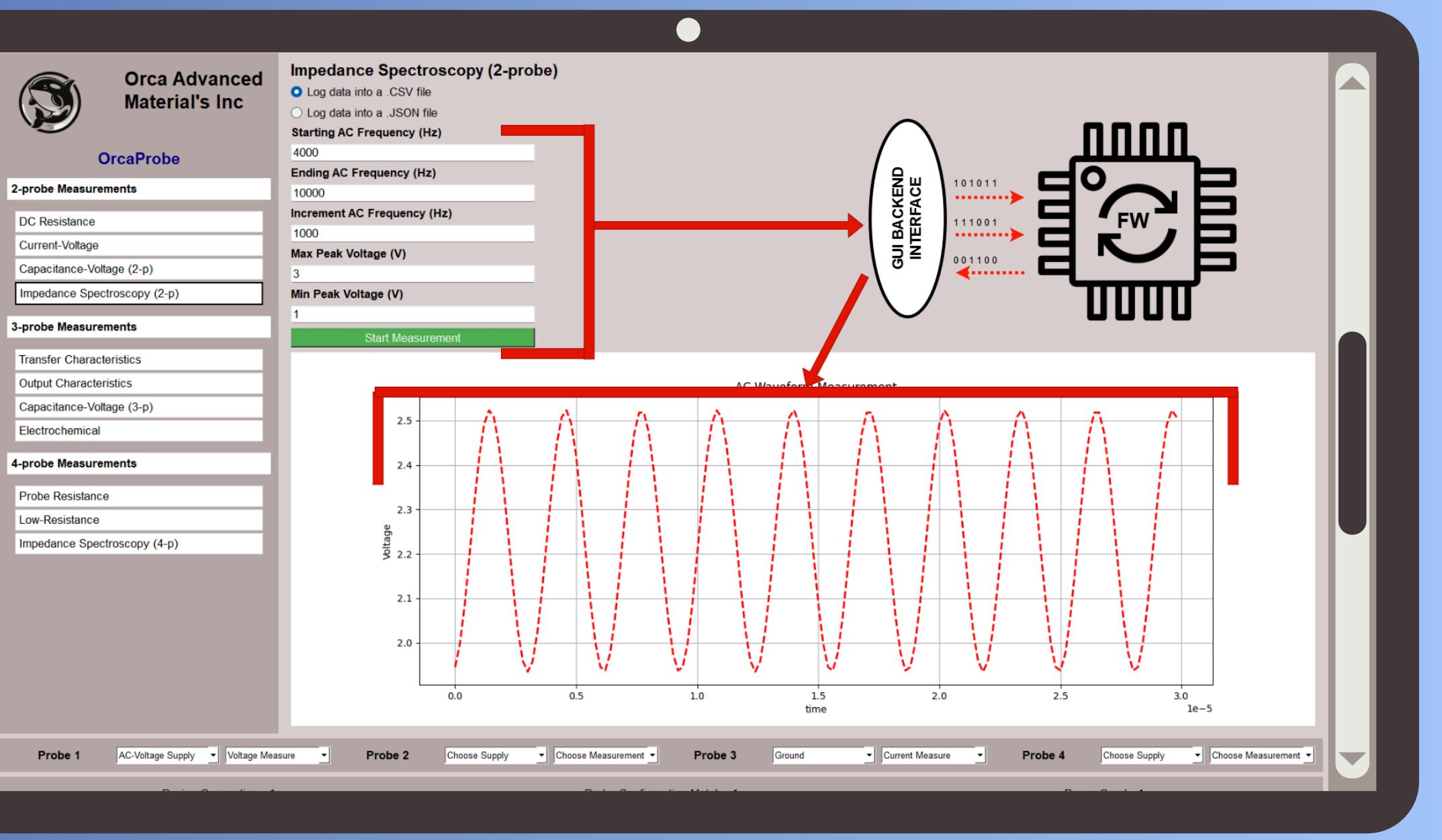
Full ownership
with a modular
design



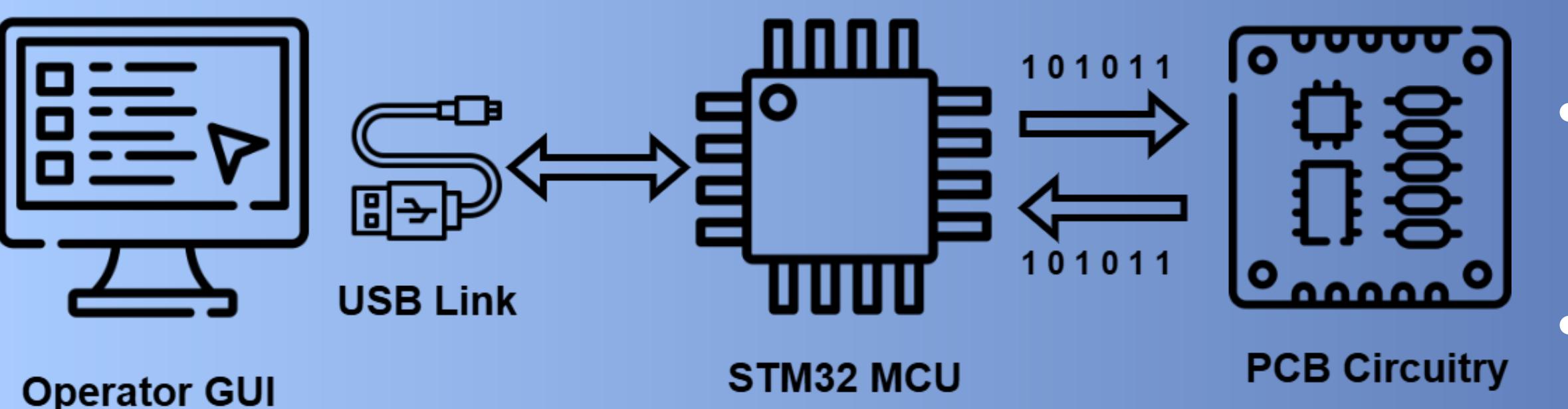
Less than
5% total
error

User Interface

- Built with open-source Python libraries
- Intuitive and easy to use
- Scalable design that supports adding or modifying measurement types



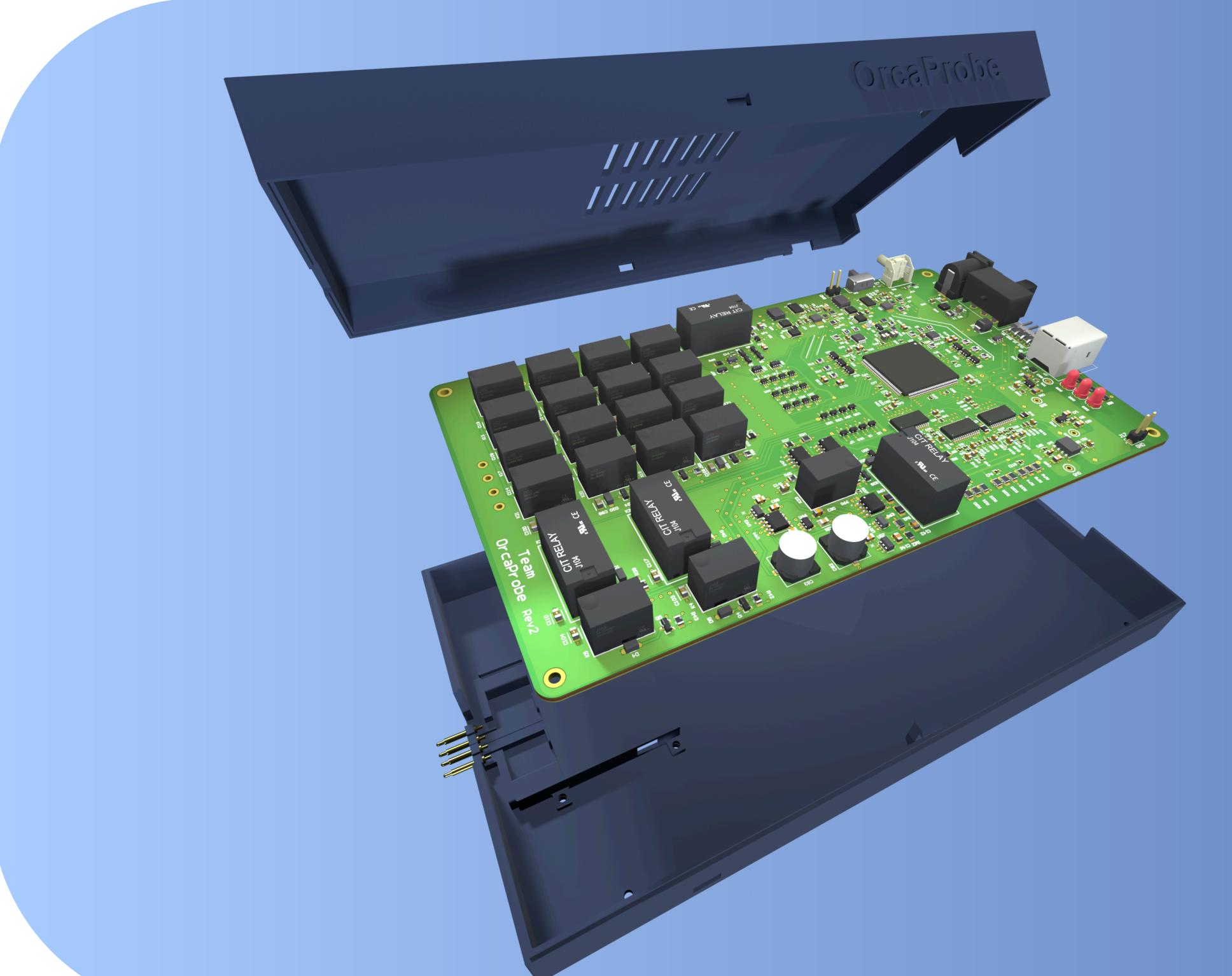
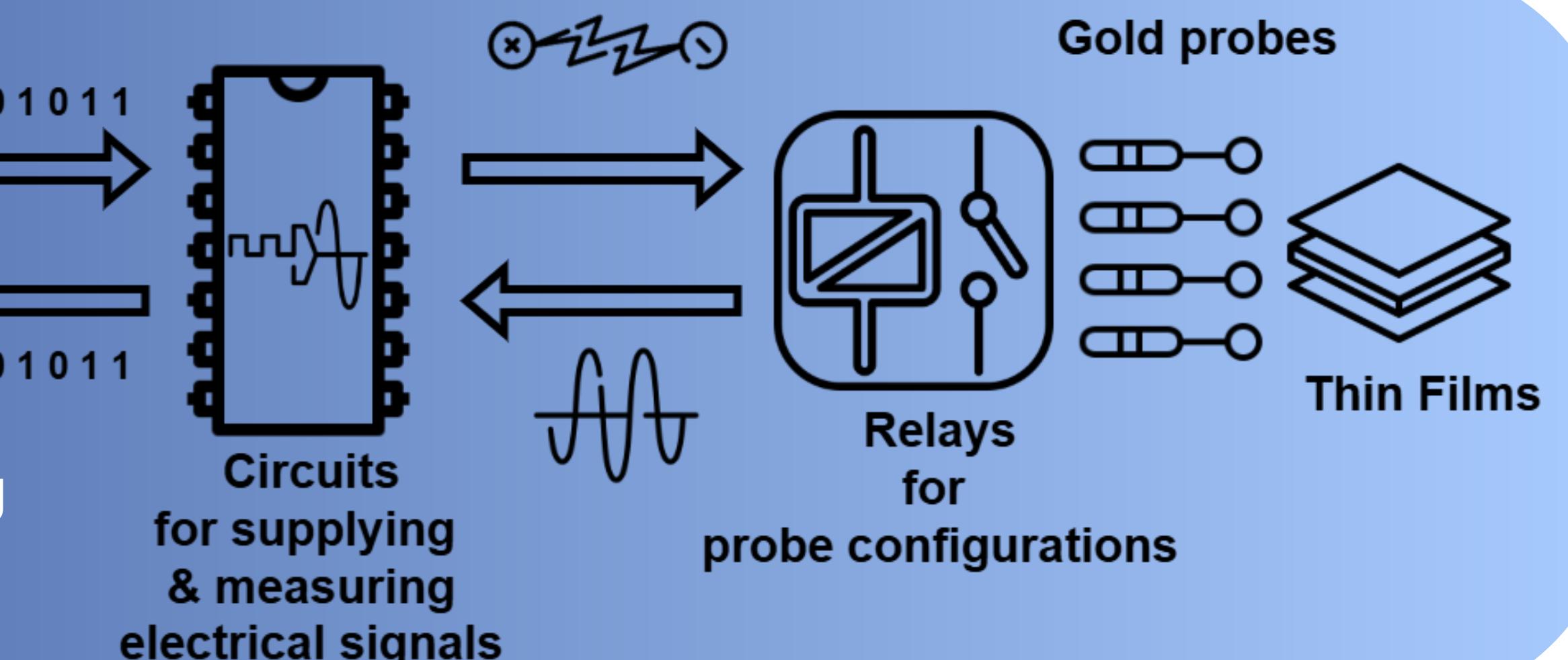
Microcontroller



- USB interface for receiving measurement requests from the PC and sending sampled data back to it
- Digital signal control for precise PCB operations
- Hardware timer and DMA-based architecture for synchronized execution

Custom Circuit

- Dedicated signal supply and measurement circuits integrated on a single PCB
- Optimized relay-based switch network enabling each probe with 5 configurable modes



Chassis

- Lightweight, 3D-printed enclosure housing the custom PCB
- Slider switches for individual probe deployment
- User-accessible ports for USB, optional power, and status LEDs

Features of OrcaProbe

- 11 different measurement types
- USB-powered with optional jack for high-power use
- Up to 2 supply signals and 3 measure signals
- 4 individually configurable probes
- 0-5V & 0-1mA range up to 1 MHz frequency

Measurement Types



- STATIC MEASUREMENTS**
 - DC Resistance
 - Probe Resistance
 - Low Resistance



- DYNAMIC MEASUREMENTS**
 - Current - Voltage
 - Capacitance - Voltage
 - Impedance Spectroscopy
 - Transfer Characteristics
 - Output Characteristics
 - Electrochemical Measurement