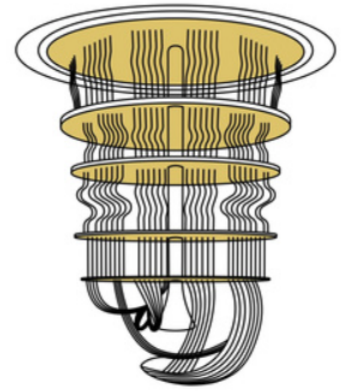




Wireless Thermal Sensor Array for Quantum Fabrication Monitoring

[Google Quantum AI](#) | [UCSB ECE Capstone](#) | 2024 - 2025

Problem Statement

Within a fault tolerant quantum computer, there are thousands of individual components that must work with high yield and reliability.

In the Google Quantum AI (QAI) cleanroom, many wafer processes are run through automated tools to achieve high levels of reproducibility and control. Because of this, certain parts of tools are not easily accessible by humans while the tool is operational, and instead require loading of a wafer with a robot arm. This means a wafer cannot be wired to any other controls as it is placed inside the tool. [This music video](#) is a fun look at how wafers are moved in automated fabrication tools.

Temperature stability of hot plates is a critical part of the fabrication process, but the market does not have many wireless monitoring options. Wireless thermal measurements enable regular monitoring of hard to reach hot plates without impacting standard operation.

Key Deliverables

The goal of this project is to deliver a wafer with **thermal sensors and wireless electronics control** on the front surface to measure the temperature of robot-only accessible hot plates.

[Hardware Deliverables]

- Full circuit mounted to a 100mm wafer that is heat tolerant up to 200°C
- At least 5 thermal sensor locations with temperature readout accuracy within $\pm 0.1^\circ\text{C}$
- Height of entire device on wafer does not exceed 5mm

[Software Deliverables]

- Wireless transmission of data
- Real time display of temperature
- (nice to have) Log and save data for each run

About Google Quantum AI

Google Quantum AI is working to build scalable quantum computers that enable humankind to solve problems that would otherwise be impossible.

Fleets of cryostats, dedicated workshops, and a superconducting qubit fab bring together engineers and researchers to implement and deliver NISQ-era processors with increasing quantum computational volumes—stepping stones to our error-corrected quantum computer. Our quantum processor fabrication facility in Goleta/Santa Barbara will bring the next generation of even more capable quantum processors to the world. [More Info](#)