

Background

Google Quantum AI develops advanced quantum devices, which require highly precise fabrication processes. One critical step in this process is photolithography, where the uniform heating of a wafer is essential for achieving accurate pattern transfer. Within the Google QAI cleanroom, this heating is performed inside a hotplate oven, which is enclosed within a larger fabrication tool. To enhance the efficiency and monitoring capabilities of this process, we have created a wireless solution for measuring and recording the wafer's temperature gradient.

Design Specs

7mm height	Tempe
100° C operating temp.	Accura
Real time transmission	Low Ou

Hardware Block Diagram



Acknowledgements: We would like to thank our amazing sponsors, mentors, advisors, and UCSB faculty: Ilan Ben-Yaacov, Jenna Bovaird, Frank Arute, Forrest Brewer, Trevor Marks, Ted Bennett, Eliana Petreikis, Matthew Tom, Chris Wimmel, Chris Gregory Paul-Tijeras

Final Design / PCB

rature $acy \pm 0.1^{\circ}C$ utgassing



Hardware / Key Components





Microcontroller Bluetooth low energy data transmission, 125°C Operating Temperature, Low Power Consumption

Interface

Wireless Wafer-Based Thermal Sensor Array Mert Bilge | Asli Cebeci | Reese Hobson | Alexander Lenkin | Vem Noubarentz

Analog to Digital Converter Integrated, 15-Bit Δ - Σ ADC, Bias current source, SPI - Compatible

Resistance Temperature Detector Class A accuracy 4-wire RTD

Thermal Insulation Testing



Aerogel is widely regarded as one of the most effective thermal insulators. In our project, we evaluated two different types of aerogel to determine their suitability. We settled on the aerogel felt from Stanford Advanced Materials.

Data Receiving Application



iveai	
Temp	pera
RTD	
RTD	hea
Data	log



Google

Quantum Al

gging as CSV file

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atmap visualization

Real-time data tracking rature graphing over time for each