Presenting

CirQus Cryogenic Wiring

Team Overview

Mitchell Lee
Team Lead, Lead Developer
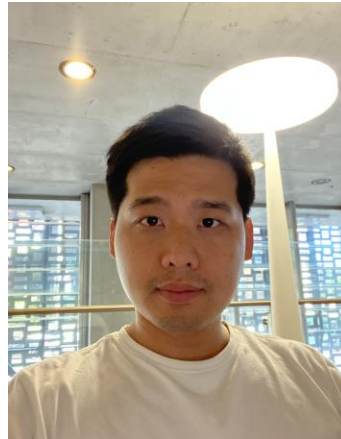
Calvin Nguyen
Co-Lead, Technical Expert

Bhavya Khemlani
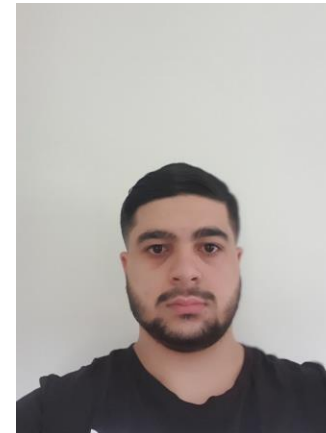Business Analyst & Tester

Luke Herron
Head Business Analyst

Sanghyeon Park
Frontend Developer

Husam Ajaj
Quality Assurance

Our Client

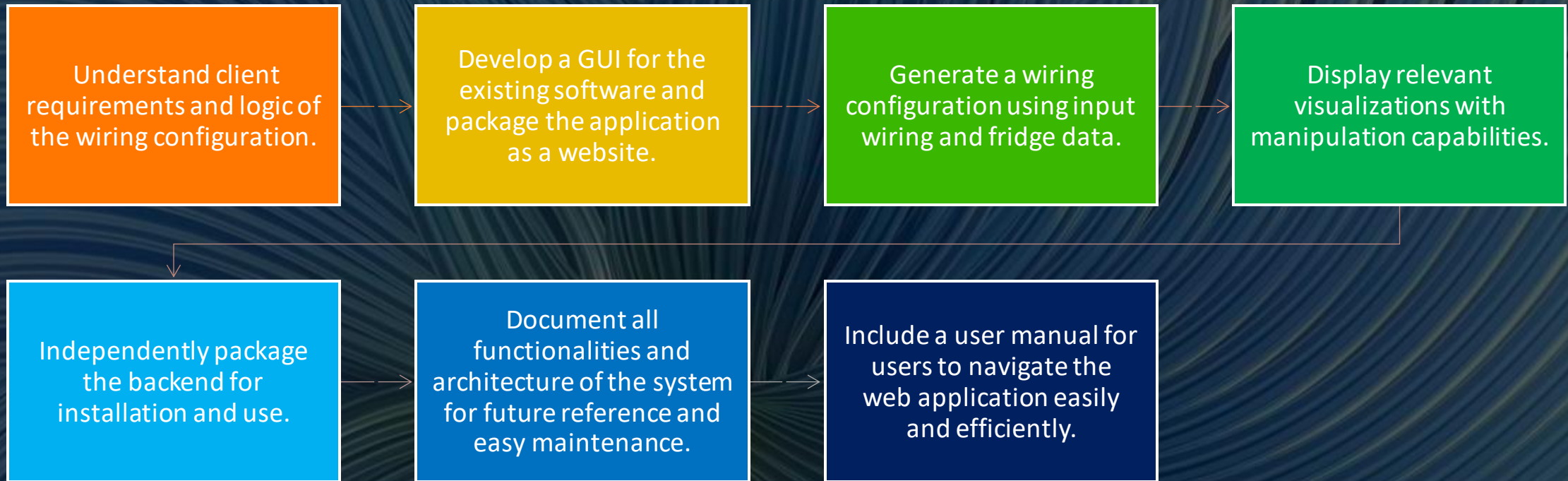Adr i en Di
Lonar do

Dr. Nathan Langford

- Both Adrien and Nathan work in the UTS CirQuS group
- Their research is unique and focuses primarily on Quantum Computing
- They've been pivotal in the success of our project and in collaborating on the GUI

Understand client requirements and logic of the wiring configuration.

Develop a GUI for the existing software and package the application as a website.

Generate a wiring configuration using input wiring and fridge data.

Display relevant visualizations with manipulation capabilities.

Independently package the backend for installation and use.

Document all functionalities and architecture of the system for future reference and easy maintenance.

Include a user manual for users to navigate the web application easily and efficiently.

Stretch Goal 1

- Enable users to export visualizations as images.

Stretch Goal 2

- Allow users to backfill the model based on measurements of a configured fridge.

Project Scope

- Overview: Produce an interactive web application for CirQus.
- Timeline: Finished app to be delivered 2-3 months since start of project.
- Deliverables: Final web-based GUI tool with appropriate independent software backend.
- Reports: Project leader to provide weekly updates to client
- Exclusions: Server Deployment.

- Out of Scope:
- Project made as publishable package.
- Use of novel visualization methods.
- Integrating with UTS IT services to develop the network/off-site access compliance.

Functional Requirements

- **Cooling Power Measurement Input:**
  - The system must provide a feature for cryostat users to enter cooling power measurements for their own fridge to view a custom heat load model via data fitting.

- **Heat Load Data Export:**
  - Power users should be able to export heat load data generated within the project for external viewing and reference.

- **Custom Cable Material Function Input:**
  - The system should allow power users to input their own cable material function to specify how the cable material is considered in the heat load model calculation.

- **Intuitive GUI Data Fitting:**
  - The GUI must perform intuitive data fitting for best practice to generate a custom wiring configuration.
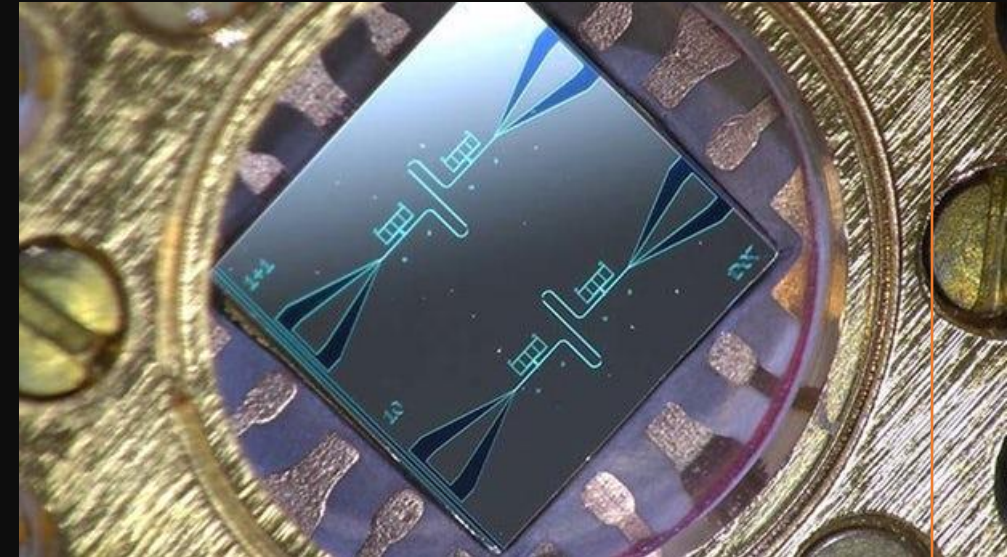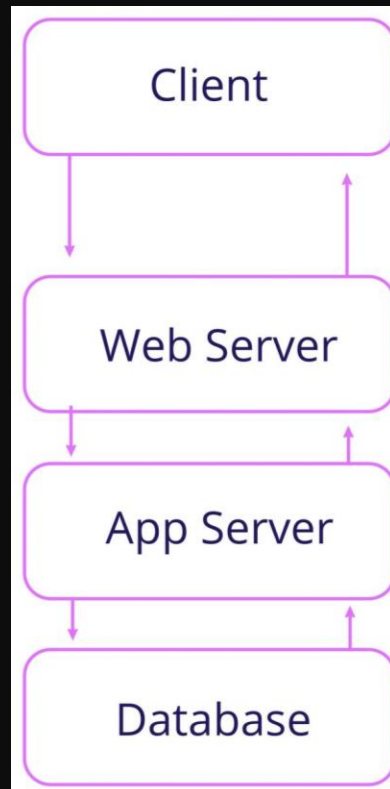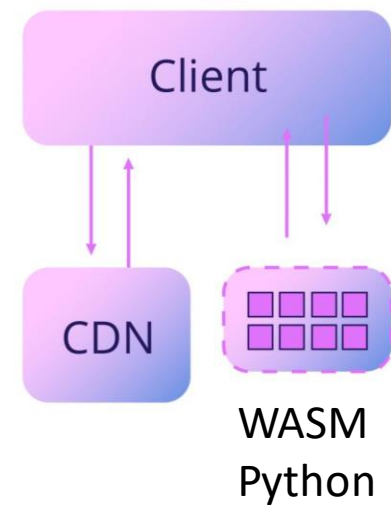
Non-Functional Requirements

- **Interoperability**
  - The software must allow the backend to operate independently of the GUI.
- **Usability**
  - The GUI should be designed to be user-friendly and intuitive to allow cryostat users to easily confirm wiring alignment.

- **Data Persistence and Retrieval**
  - The software should support reliable storage and retrieval of heat load model data to ensure that power users can easily access this data for analysis and comparisons.

- **Dynamic Updates**
  - The visual demonstration of generated heat loads should update dynamically and in real-time, enabling power users to manipulate associated graphs and highlight relevant data as parameters change.

Software Architecture

Previous Architecture

New Architecture

Client

Web Server

App Server

Database

Client

CDN

WASM
Python

Development Workflow
From Source-Code to Production

Serverside

Clientside

Gitlab Repos

Clients's python code

Our project

depends

Git submodule

Main Repo

clone with submodules

VS Code IDE

docker engine

Typescript

Visx

server environment

React framework

Tailwind CSS

python API

service provider

AWS

UTS

docker container

send build

website

serve

serve

build

User machine

docker container