QVFT

VERTICAL FARMING TEAM

HIRING PACKAGE

APPLICATIONS DUE FRIDAY, JANUARY 17th, 2020

"GROWING THE FOOD OF THE FUTURE AT QUEEN'S UNIVERSITY"

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ABOUT US

INTRODUCTION

Founded in Sep. 2019, QVFT is Canada's first student-led university vertical farming design team. Vertical farming is a hyper-efficient, sustainable food cultivation method which is projected to become a major contributor to global food production in the coming decades.

We are currently seeking four passionate, conscientious, creative thinkers to join our team for Winter 2020. We are hiring two mechanical designers, and two software engineers. Please see Section 5 for further details. **Applications close Friday, January 17th at 11:59 PM.**

OUR MISSION

"The Queen's Vertical Farming Team's mission is to develop a functional, small scale vertical farm. Drawing inspiration from the best current commercial practices, our goal is to gain a foothold as an innovator in a rapidly expanding industry"

QVFT

TIMELINE

November 2019

Hire 2019-20 Executive Members

December 2019

Begin Sponsorship Outreach

Research and Design Phase I

- Complete technical overview of Controlled-Environment Agriculture (CEA) system
- Complete technical overview of mechanical system

Set Goals and Develop Implementation Strategies

January 2020

Hire 2020 General Members

Participate in Commerce & Engineering Environmental Conference Trade Show

Research and Design Phase II

- Initiate CEA hardware and software development
- Research plant germination strategies, nutritional requirements, lighting cycles, and water consumption
- Develop a step-by-step plant cultivation protocol

February 2020

Research and Design Phase III

- CEA system is in beta
- Finalize all CAD drawings for custom parts
- Finalize plant cultivation protocol and complete research report

Prototyping and Experimentation Phase I

- Manufacture custom parts
- Order non-custom parts

March 2020

Hire 2020-21 Executive Members

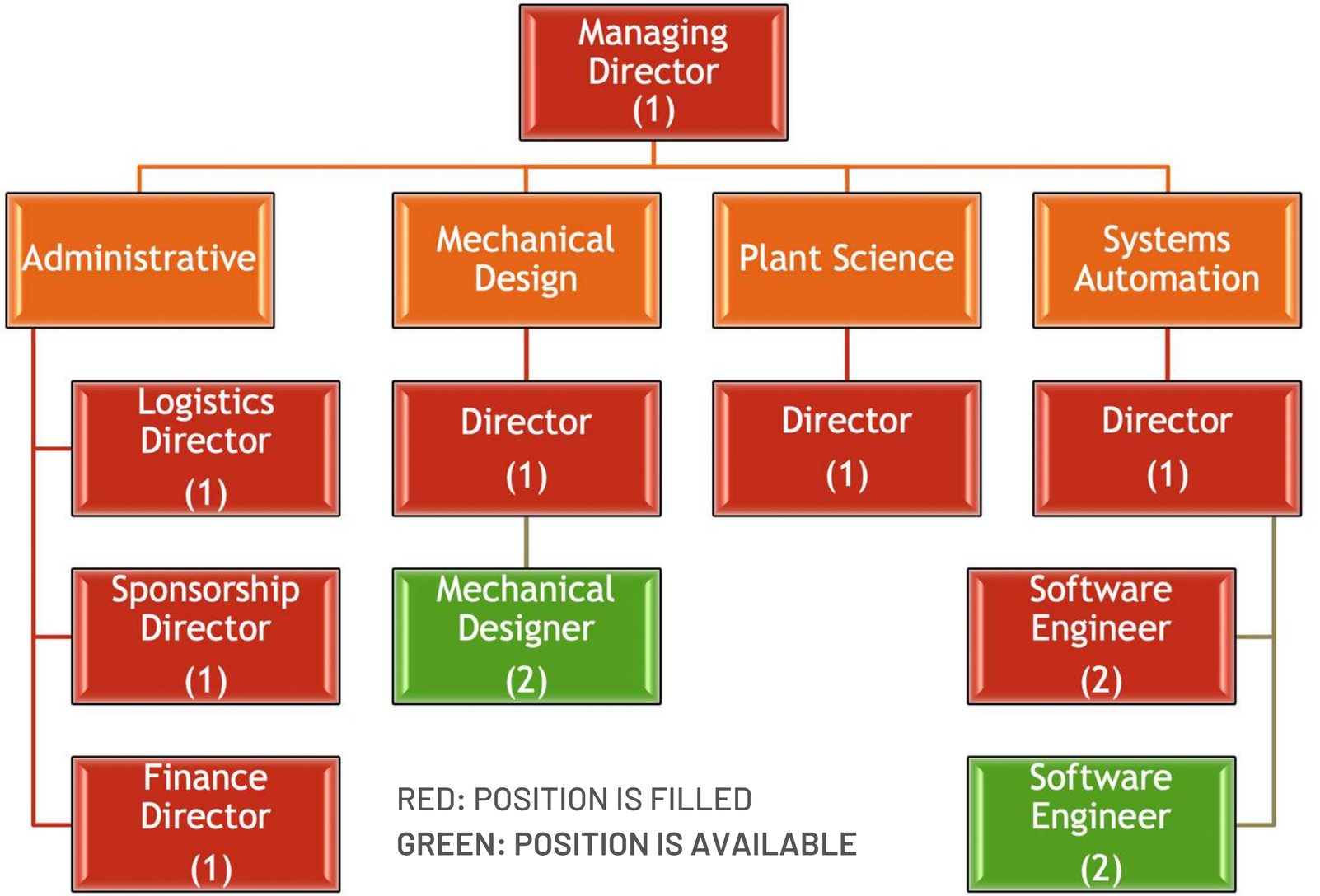
Prototyping and Experimentation Phase II

- Begin plant germination process

April 2020

Wrap Up Efforts and Prepare to Resume in September 2020

ORGANIZATIONAL STRUCTURE



CURRENT MEMBERS

PATRICK SINGAL

Managing Director | Mechanical Eng.

ROSS HILL

Systems Automation Direct. | Computing

LIAM STRACHAN

Sponsorship Director | Economics

MICHAEL MILLS

Logistics Director | Engineering Physics

LUKE EMBLEM

Finance Director | Economics

ZWETLANA RAJESH

Plant Science Director | Health Studies

DAVID ALTROWS

Software Engineer | Mechanical Eng.

ABDUL ELAH RIZAN

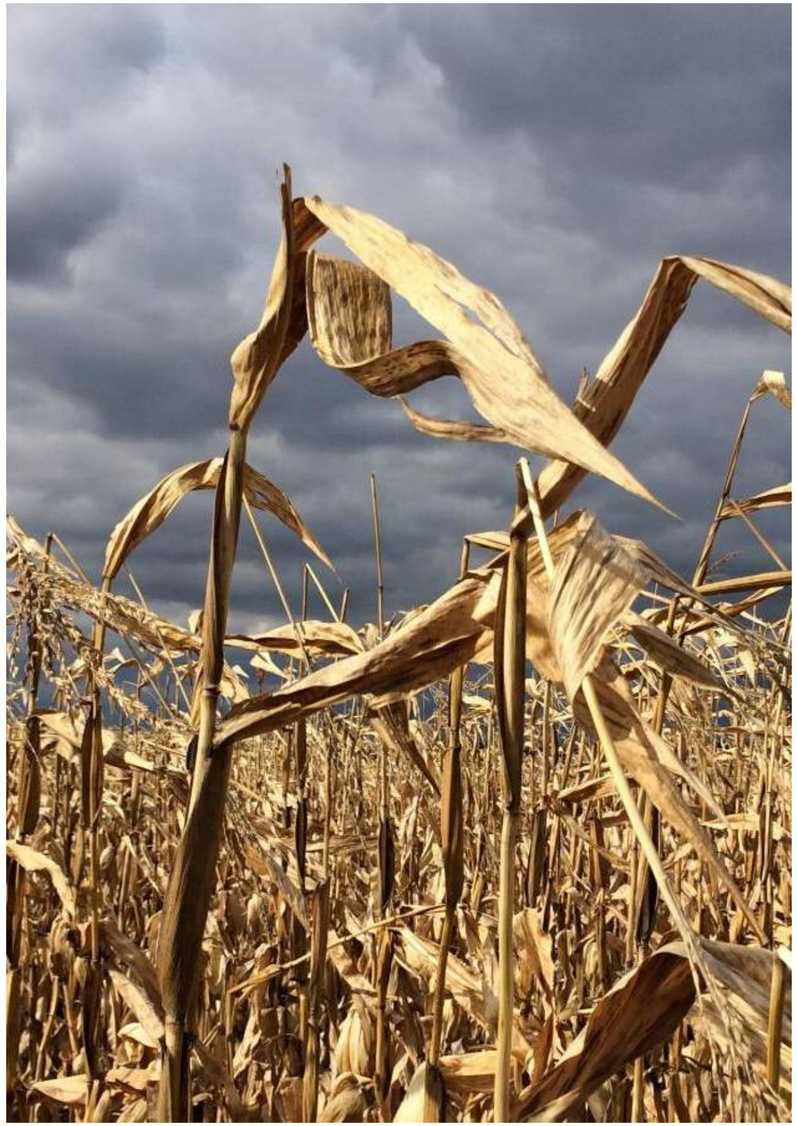
Software Engineer | Mechanical Eng.

WHY VERTICAL FARMING?

THE PROBLEM

A global trend of increasing concern is the diminishing supply of arable land per capita. Given climate change, urbanization, and soil degradation, the United Nations Food and Agriculture Organization (FAO) projects that by 2050, arable land per capita will fall to one third of the amount available in 1970. A 2018 report by the Intergovernmental Panel on Climate Change (IPCC) raised further alarm, predicting that humanity will reach an environmental "point of no return" within the next two decades.

Given the existential threat of climate change, and the enormous toll taken by unsustainable agriculture on the environment, global food security in the coming decades will largely depend on our ability to adapt and overhaul existing cultivation practices.



THE SOLUTION

Vertical farming is a cultivation practice in which crops grow in an indoor, urban, climate-controlled facility. This approach is associated with dramatically reduced water consumption, slashed transportation costs, organic produce, massive improvements in per-acre land productivity, increased plant productivity, and the freedom to cultivate crops in any location, year-round. These benefits are made possible through controlled-environment agriculture (CEA) , which allows for the artificial optimization of environmental inputs such as lighting, temperature, moisture, and nutritional availability.

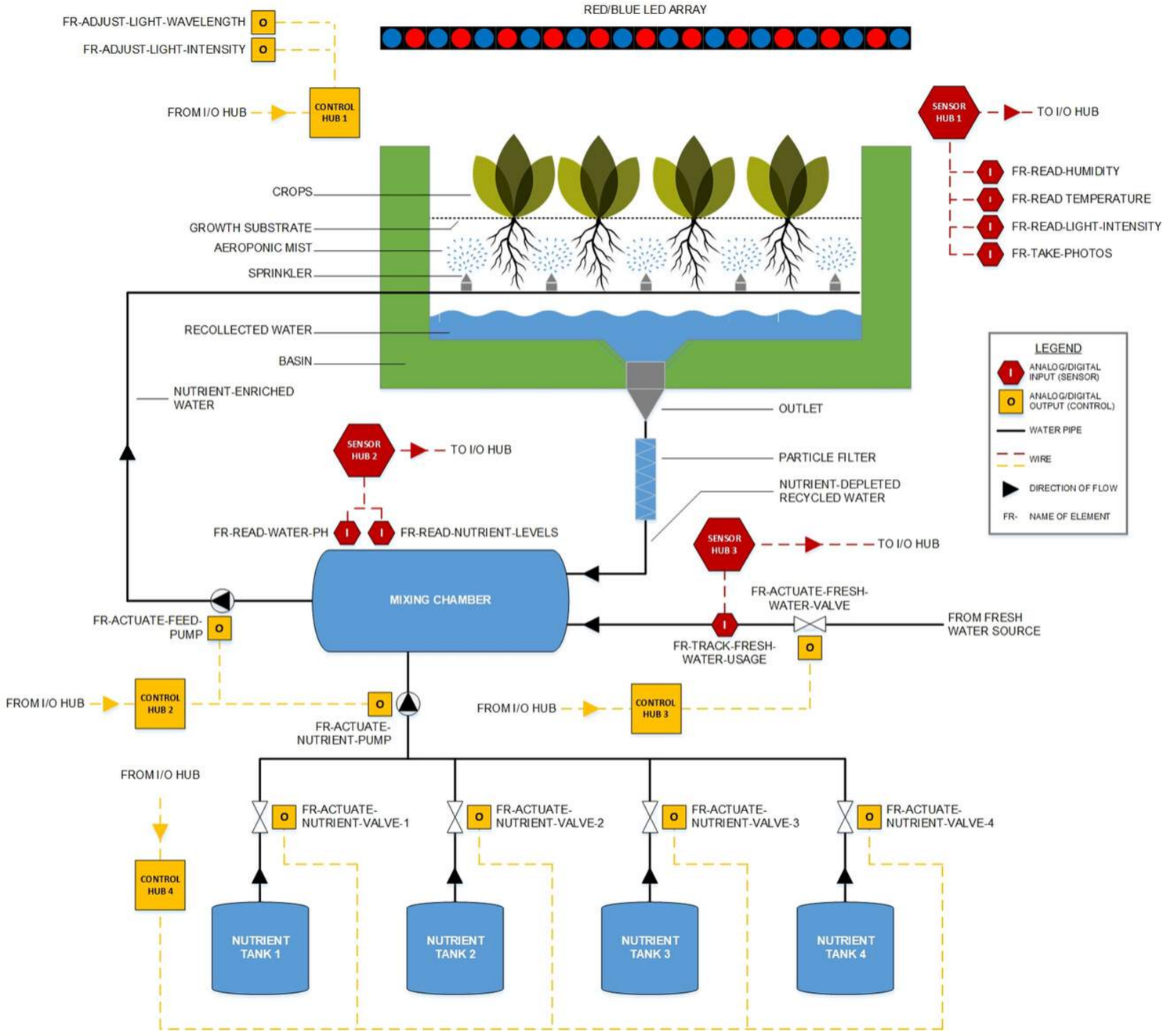
WHAT WE DO

CROP SELECTION METHODOLOGY

As vertical farming is a cost-intensive cultivation method, current industry practices focus on small, premium crops that have short growth cycles and high automation potential. Examples include leafy greens such as baby lettuce, spinach, and kale, which have a brief growth cycle of roughly 50–65 days. QVFT will focus exclusively on the cultivation of leafy greens, as the commercial farming systems from which we draw inspiration are designed specifically for such purposes. Starting in February 2020, we will cultivate a small batch of baby lettuce as a litmus test for our prototype. This will provide feedback regarding the efficacy of our system and identify areas of improvement for when we scale our model in the following school year.

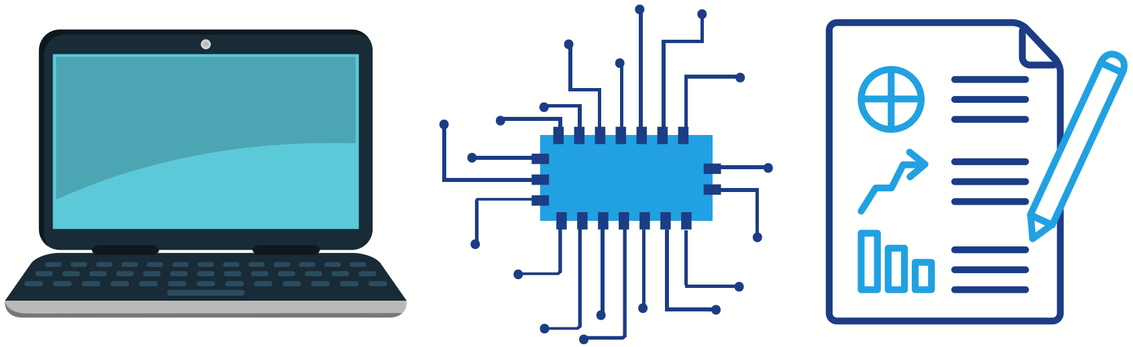
AEROPONIC SYSTEM

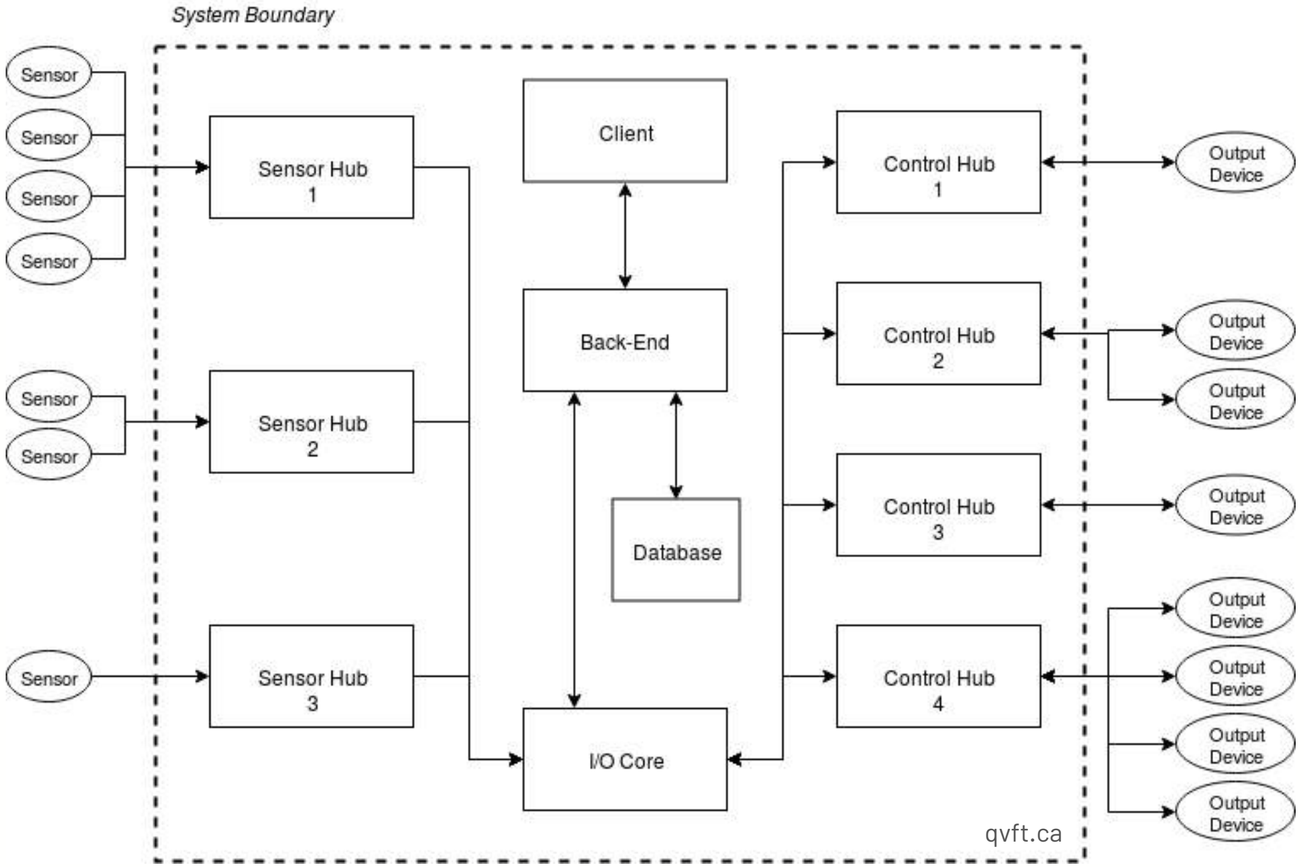
QVFT employs an aeroponic cultivation method, in which nutrients are dissolved in water (fertigation) and misted directly onto roots via spray nozzles. Crops rest on a thin, porous substrate, through which their roots dangle in a basin below. Requiring no soil, this approach allows the grower near-complete control over the specific nutrient mix a plant receives. Shown at right is an early-stage schematic of our proposed design.



CONTROLLED-ENVIRONMENT AGRICULTURE (CEA) SYSTEM

CEA is a method of optimizing plant growth conditions by means of an integrated, software-controlled sensory network. Our proposed system (see right) aims to control, monitor, and maximize farming yield by comparing realtime environmental data to pre-set environmental targets, and adjusting the internal growing environment accordingly. The CEA system will serve as the central control hub for the lighting, irrigation, fertigation, ventilation, and climate control systems.





OUR SPONSORS

SAS INSTITUTE

www.sas.com

SIMBL BUSINESS ENABLEMENT

www.simbl.ca

HIRING INFORMATION

MECHANICAL DESIGNER

POSITIONS AVAILABLE

2

WEEKLY COMMITMENT

2–5 HRS

TARGET PROGRAMS:

MECHANICAL ENGINEERING

ROLES AND RESPONSIBILITIES

- Attending regular sub-team meetings and contributing to decision-making process
- Conducting research into best practices and technical standards
- Finalizing schematic design of mechanical (aeroponic) system, communicating design decisions to other sub-teams
- Developing custom parts via CAD and manufacturing methods
- Determining inventory required to build mechanical system
- Assisting with prototype manufacturing and assembly

KEY SKILLS AND ATTRIBUTES

- Ability to work constructively within a team
- Ability to manage time and meet expectations
- Willingness to learn new concepts and improve skillset
- Required prior experience:
  - Firm conceptual grasp of core mechanical engineering concepts
- Optional prior experience:
  - Design teams
  - CAD (SolidWorks or Solid Edge)
  - Manufacturing methods (MECH 213)
  - Mechatronics
  - MATLAB
  - Microsoft Visio
  - Familiarity with practical electrical or fluid systems
  - General familiarity with software development

SOFTWARE ENGINEER

POSITIONS AVAILABLE

2

WEEKLY COMMITMENT

4–5 HRS

TARGET PROGRAMS:
COMPUTING, COMPUTER ENG., ELECTRICAL ENG., OTHER STEM

ROLES AND RESPONSIBILITIES

GENERAL

- Design and implement the software and hardware components of the CEA System
- Attend weekly work sessions with the Systems Automation team
- Attend weekly QVFT meetings
- New hires will work within one of the sub-teams listed below

DATA VISUALIZATION/UI SUB-TEAM

- Use web technologies to build a web application for visualizing environmental readings
- The web application will accept user input and transmit it to the Back-End sub-system

BACK END SUB-TEAM

- Build a RESTful web service for tracking environmental readings and targets over time
- The web service will transmit new environmental targets to the I/O sub-system

INPUT/OUTPUT DEVICES SUB-TEAM

- Use microcontrollers, sensors, and output devices, to create a system that moderates a vertical farm's internal environment to achieve given environmental targets
- Receive new environmental readings from sensors and transmit the data to the Back-End sub-system

KEY SKILLS AND ATTRIBUTES

- Interest in system design or software architecture
- Interest in vertical farming and sustainability
- Willingness to learn new technologies
- Ability to work collaboratively as part of a team
- Optional prior experience:
  - HTML/CSS/Javascript
  - RESTful/web APIs
  - Arduino, Raspberry Pi, or another board/micro-controller
  - A front-end framework (React, Angular, Vue, etc.)
  - A back-end framework (Express, Flask, Django, etc.)
  - SAS (data analytics software)
  - Mechatronics

APPLY NOW

NEXT STEPS

Please apply through our website, at qvft.ca/hiring

QVFT

CONTACT US

qvft.ca

linkedin.com/company/qvft

facebook.com/qvftqueens

Patrick Singal | p.singal@queensu.ca