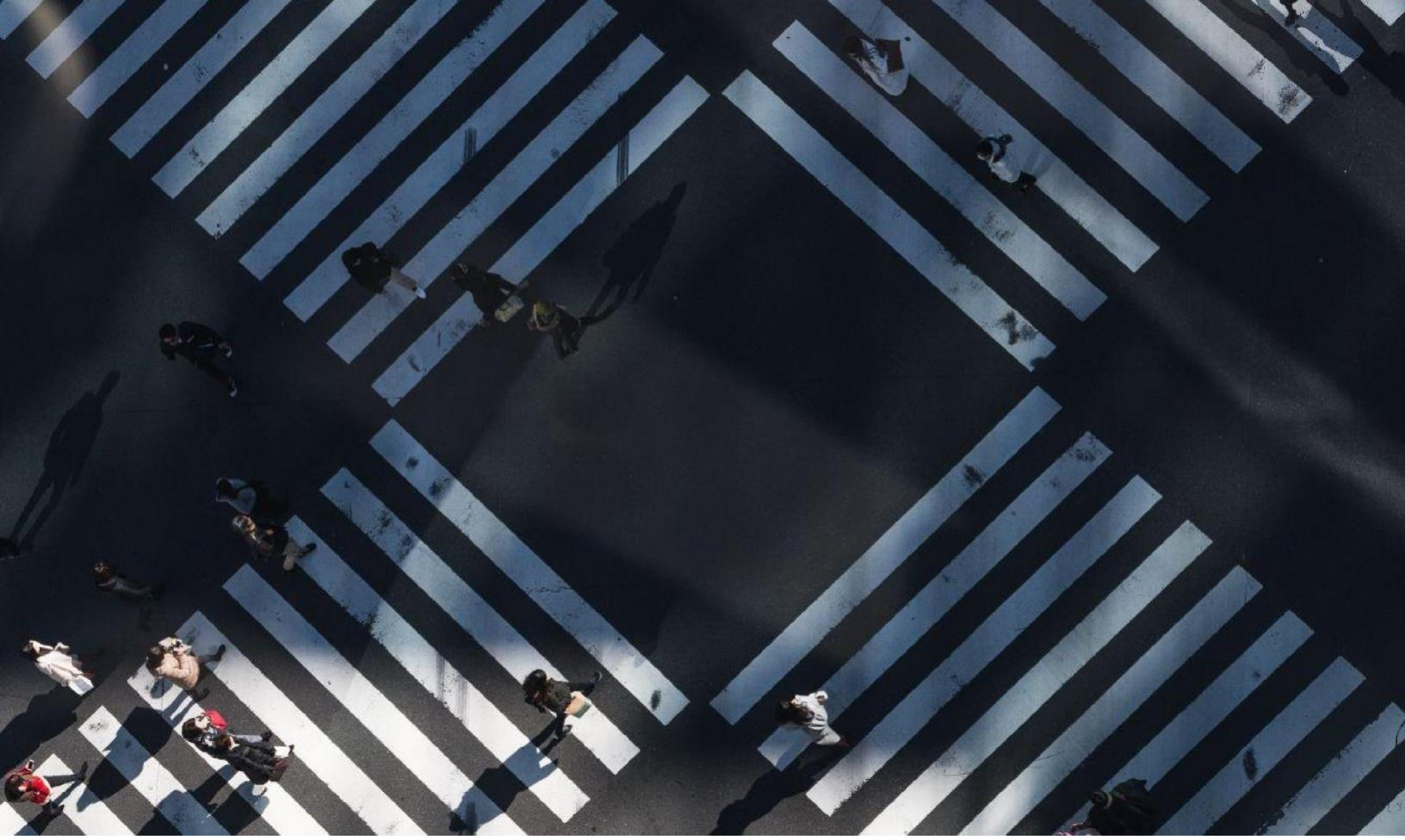

UBC

Smart City

Recruitment 2024-25

UBC Smart City
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UBC Smart City Application Package

2024-2025

Energy

Projects & Competitions

The past years we have had some projects including a geothermal feasibility paper and energy harvesting and storage system review. This year some of our future project considerations are:

Carbon Capture in Concrete production

Canada has a target of net zero emission by 2050. One of the ways to reduce carbon emission is to develop carbon capture and storage technologies. In this project we are proposing to dive deep into a carbon capture in concrete production. The growing population in Vancouver increases the demand for concrete infrastructure. In this project, a study will be conducted to assess the viability of the concrete production in Vancouver infrastructure, with a possibility to look into more at UBC campus expansion plans.

District Heating and Cooling Systems

In 2022, more than 80 Mtonnes of CO_2eq is emitted from the building sector in Canada. Establishing a smart city requires an effective power usage from its building, which most goes to the space heating system. This system can be further improved by turning the wasted heat into a useful energy source.

One of the projects will be chosen to be executed by the team. The possible deliverables for the chosen project are:

- Energy model, optimizing heat energy for buildings
- Economic analysis
- Life cycle assessment

Ideas to improve the project and the deliverables are encouraged and appreciated!

Competitions

TBD

Open Positions

General Member

There are no specific roles in the energy team, members will be expected to be flexible, having to conduct research, analyze data, implement and present practical solutions to problems, depending on what stage of the project the team is at.

General Responsibilities:

- Conducting feasibility studies of the project
- Researching innovative solutions to different aspects of the project
- Developing and optimizing models for energy production and storage
- Analyzing data from energy systems to identify potential faults and improve efficiency
- Preparing technical reports and presentations

Qualifications and Skills:

- Previous research experience
- Experience with CAD (SOLIDWORKS, AutoCAD, Fusion 360)
- Experience with data analysis and visualization
- Enthusiasm to show up and participate in team discussions
- Ability to work collaboratively in a cross-functional team environment

Transportation

Projects & Competitions

Smart Parking System (ParkSmart) - Continuation from previous year

The project aims to enhance the parking experience and optimize the utilization of urban parking spaces through a Smart Parking System. This system seeks to provide live availability updates, simplify reservation processes, and ensure efficient space management using state-of-the-art technology. Our approach combines React Native, Expo, and Firebase for a seamless mobile application experience and sensor technology for real-time space monitoring to offer a comprehensive solution that revolutionizes the conventional parking process.

Action Plan:

- Live Availability Monitoring: Implement sensors (such as ultrasonic or infrared sensors) in each parking slot to detect the presence or absence of a vehicle. This data will then be transmitted in real-time to a central server.
- Mobile Application Development: Design and develop a user-friendly mobile application using React Native Expo. This application will display live parking slot availability, allowing users to quickly find and navigate to open spaces.
- Reservation System: Integrate a reservation feature within the mobile app, enabling users to book parking slots ahead of time. This system should include secure payment gateways and timely notifications to remind users of their reservations.
- Security and User Safety: Equip the parking area with security cameras and introduce features within the app, such as 'find my car', to enhance safety and security for users.
- Sustainability Considerations: Evaluate opportunities to include EV charging stations within the parking premises. Moreover, use data analytics to guide sustainable practices, such as optimizing energy usage in the parking area.
- Physical Prototype: Construct a physical model of the Smart Parking System to demonstrate its practicality, efficiency, and user-friendliness.

By fusing advanced software development with innovative sensor technology, our project aims to reshape the urban parking landscape. Our holistic approach not only simplifies the parking process for users but also offers valuable insights for city planners, ensuring more sustainable and user-centric urban development.

Competition

TBD

Open Positions

Software Developer

As a Software Developer at UBC SmartCity you will encompass a wide array of tasks aimed at building a robust, user-friendly, and efficient smart parking system, with a special emphasis on mobile application development, sensor integration, and data analysis. Depending on the project's phase and requirements, you may be assigned to specific sectors within the team, utilizing your expertise in software development, data analytics, and system optimization to realize our vision.

Qualifications and Skills:

- **Willingness to learn and participate in group meetings and discussions.**
- Experience in React Native, Expo for mobile application development is preferred but not required.
- Familiarity with integrating various sensors and handling real-time data in applications.
- Strong communication skills, ensuring clear articulation of ideas and feedback.
- Demonstrated ability to collaborate effectively in multi-disciplinary teams, contributing actively to project success.
- Familiarity with parking management systems or urban planning is a plus.

User Interface Designer

We are seeking a talented UI Designer to join our team in developing an innovative Smart Parking System aimed at enhancing the urban parking experience and optimizing space utilization. The project focuses on providing live availability updates, simplifying reservation processes, and ensuring efficient space management using cutting-edge technologies like React Native, Expo, and Firebase. Additionally, the system integrates real-time space monitoring through sensor technology to revolutionize the traditional parking process.

Qualifications and Skills:

- **Willingness to learn and participate in group meetings and discussions.**
- Experience in UI design for mobile applications, preferably using Figma.
- Strong portfolio demonstrating a range of design styles and a focus on user-centered design principles.
- Ability to translate complex data and functionalities into simple, intuitive, and engaging user interfaces.
- Excellent collaboration skills and the ability to work closely with a cross-functional team.

Smart Living

Projects & Competitions

Smart Streetlight

Streetlights are an essential part of urban infrastructure, providing safety and security for citizens. However, these streetlights present several challenges that must be addressed to ensure they continue to provide value to cities around the world.

One of the most pressing challenges is energy consumption. Streetlights are a significant consumer of electricity, accounting for a significant portion of a city's energy budget. With the inefficient nature of the high-pressure sodium bulbs, unoptimized operation, and the lack of green energy involvement, all lead to unsustainable, high cost, and increased carbon emission that needs to be addressed. Given the urgency in which the citizens are facing the consequences of climate change, cities must find ways to reduce their energy consumption and carbon footprint while still ensuring that streets remain well-lit and sage for citizens.

Another challenge related to streetlights is maintenance. The sheer number of streetlights across urban areas makes it difficult for municipalities to monitor and maintain them all efficiently. Moreover, the current process of monitoring streetlights is typically reactive, with repair crews dispatched only after a light has been reported as out. This approach can be time-consuming and costly, leading to long periods of darkness on city streets and reduced safety for citizens.
In addition to energy consumption and maintenance, traditional street lights also contribute to light pollution, which can negatively impact the environment and human health. Light pollution occurs when artificial light is used inappropriately, leading to excessive brightness and glare that obscures the natural night sky. This phenomenon can disrupt the behavior of wildlife, including migrating birds and nesting sea turtles, and interfere with natural processes, such as the growth and reproduction of plants.

The Smart Streetlight project aims to modernize streetlights by integrating hardware and software solutions. Whether applied to new or existing streetlights, this project seeks to automatically adjust brightness and color temperature, enhance maintenance control, and gather valuable data on traffic patterns and weather conditions, among other features. Participants will have the opportunity to design and implement these solutions, addressing the needs of multiple stakeholders. [Papilio: Wind Powered Street Lamp]

Competition - NA

Open Positions

Designer

In this role, you will be responsible for developing product designs, creating detailed models, and building functional prototypes. You will work closely with our engineering team to ensure that our products are both aesthetically pleasing and functional.

General Responsibilities:

- Develop and conceptualize innovative and product designs that align with the target market.
- Create detailed 3D models of product designs using CAD software to visualize and refine concepts.
- Build and test prototypes to evaluate design feasibility, functionality, and user experience.
- Work closely with engineers to ensure that designs are practical, cost-effective, and manufacturable.
- Prepare detailed design documentation, including sketches, technical drawings, and specifications, to guide the production process.
- Ensure that designs comply with relevant industry standards and regulatory requirements.

Qualifications and Skills:
These qualifications are a plus, but not required. Our priority is finding great people who are eager to learn and enjoyable to work with, regardless of specific skills.

- Proficiency in CAD software (e.g., SolidWorks, Rhino, AutoCAD) and 3D modeling tools. Experience with prototyping tools and techniques.
- A portfolio showcasing previous product designs, models, and prototypes.

Developer

In this role, you will be responsible for designing and developing the electronic and software systems that power our products. You will write code, work with hardware components, and collaborate with other team members to ensure that our products are functional, reliable, and market-ready.

General Responsibilities:

- Research and select appropriate electronic components, considering factors such as cost, availability, and performance.
- Write and debug code for embedded systems, ensuring seamless integration between software and hardware components.
- Build and test prototypes of electronic systems, iterating on designs to achieve optimal performance.

- collaborate with industrial designers and mechanical engineers to integrate electronic systems into the overall product design.
- Develop and maintain firmware for microcontrollers and other embedded devices, ensuring reliable operation of the product.
- Create detailed technical documentation, including schematics, block diagrams, and code comments, to support manufacturing and maintenance.
- Ensure that designs comply with relevant industry standards and regulatory requirements.

Qualifications and Skills:
These qualifications are a plus, but not required. Our priority is finding great people who are eager to learn and enjoyable to work with, regardless of specific skills.

- Proficiency in circuit design, PCB layout, and embedded programming (e.g., C/C++, Python). Experience with microcontrollers, sensors, and communication protocols (e.g., I2C, SPI, UART).
- A portfolio or examples of previous projects demonstrating proficiency in electronics design and embedded systems development.

GIS

Projects

The GIS team will focus on advancing initiatives aligned with the Smart City vision, emphasizing the integration of geospatial data to enhance urban environments. This year, the team's primary goal is to create a comprehensive data analytics dashboard for efficient collection, analysis, and visualization of geospatial information. This tool will serve as a valuable resource for ongoing and future projects, ensuring that the insights gained are readily accessible. Potential opportunities for cross-functional collaboration with other subteams may become available as the design cycle progresses.

Seismic Hazard Assessment

The seismic hazard assessment project aims to enhance the understanding of seismic risks to improve building safety and design. By analyzing seismic activity data, the team will assess risks in various regions, creating detailed geospatial maps to visualize seismic hazards. These maps will provide valuable insights into the frequency and intensity of seismic events, which are crucial for informing building design and safety measures. Integrating this seismic data into the design workflow will help engineers and architects to anticipate and mitigate potential hazards, ultimately leading to more resilient structures and safer urban environments.

Mineral Prospectivity Mapping

The mineral prospectivity mapping project supports the transition to zero carbon emissions by identifying and visualizing critical mineral resources essential for future technologies. The team will develop a comprehensive mapping system to track the distribution of key minerals such as copper, gold, silver, and lithium, which are vital for electrification and renewable energy technologies. By creating a data management system to visualize these mineral resources, the project aims to streamline the identification of potential mining sites and ensure a sustainable supply chain. This proactive approach will not only support the development of clean energy technologies but also contribute to the long-term goal of reducing carbon emissions.

Open Positions

General Member - Research (1-2 positions, 1st and 2nd years)

Qualifications and Skills:

- Basic proficiency in Python with experience in libraries such as Pandas, NumPy, and Scikit-Learn.
- Familiarity with data visualization and spatial analysis tools, including Matplotlib, Seaborn, and GeoPandas.
- Strong interest in seismic hazards, mineral distribution, and geospatial research.
- Ability to prepare clear and comprehensive reports and presentations.
- Strong attention to detail and excellent communication skills.
- Eagerness to collaborate and learn within a student team environment.

GIS Specialist (1-2 positions, completed 2nd year)

Qualifications and Skills:

- Proficiency in Python for data processing and ArcGIS for geospatial analysis.
- Experience in creating interactive maps and dashboards to support urban planning and resource mapping.
- Strong interest in smart cities, mineral mapping, and geospatial data analysis.
- Effective communication skills for presenting data insights.
- Collaborative spirit and eagerness to contribute to a diverse student team.

Data Analyst (1-2 positions, completed 2nd year)

Qualifications and Skills:

- Proficiency in Python for analyzing seismic data and ArcGIS for creating geospatial maps.
- Strong understanding of seismic data with a focus on enhancing building safety and urban resilience.
- Keen interest in seismic hazard assessment, smart cities, and integrating geospatial data for better planning.
- Strong analytical skills and ability to work effectively in a student team environment.
- Experience and/or interest in developing BI dashboards/web frameworks (Django, Flask, etc.)