Summer Research Scholarships 2013/14
School of Architecture

Purpose of the Scholarships is to recruit top students into postgraduate study through a summer research experience that introduces them to and excites them about research.

Closing date for applications is 1st October 2013. Students may apply for maximum of three projects. Late applications WILL NOT be considered. For full information and the online application form see:
http://www.victoria.ac.nz/study/student-finance/scholarships/summer-scholarships
Applications **must** be submitted through the online application and not through the supervisor.

Summer Scheme Time Period: Students will be expected to conduct a research project of approximately 10 weeks duration. Awards are expected to be taken up no later than 1 December.

General Conditions:

- Applications are sought from Scholars currently enrolled in an undergraduate, honours or first-year master's degree at any NZ or Australian university, and who are interested in pursuing postgraduate study (Students with experience in the area of research may apply at the end of their second year if supported by an academic staff member)
- Each scholarship will have a value of $6000.00
- The scholar is expected to contribute 400 hours to the project. Faculties may request that time sheets are kept.
- Scholars are assessed on the following criteria: academic merit; expertise in the research area; recommendations from staff associated with the research project.

Successful students will be notified by the Scholarships Office on **23 October 2013.**

The Projects

Project Code: IJM01 - Robot Buildings Stage 1: coding kinetic facades

Buildings are increasingly automated and can be conceived as a form of robotics. This summer scholar will develop the control system for Roboscreen- an autonomous kinetic sun shade system. The larger project of which this is a key technical module, explores how kinetic environmental screens can also operate as large scale / low resolution media displays. With medium to large scale facades there is the potential for the sun-screening system to, in effect, act as a low resolution display system. When not required for environmental performance, individual screens can be conceived as a physical 'pixel'. The same control system that moves the screen to track the sun, can theoretically also enable graphics and text to be displayed as a dynamic physical relief. Extensive animation studies have been undertaken and software developed in Python to enable a range of inputs (graphics, text, parametric patterns) to output to a 400 panel screen. The summer scholar will port the control code to national Instruments help develop a prototype scale model.
1. Review existing python code written for MAYA (Existing python code has arithmetic and geometric progression logic, image sampling and accesses flocking and cellular automata libraries)
2. Translate functionality using National Instruments platform.
3. Test functionality through a physical scale model.
This will involve mechatronics.

Supervisor/Contact Person for more information: Jules.Moloney@vuw.ac.nz

Project Code: 35 - Review of the Bluff healthy homes project

The Bluff Healthy Homes was a collaboration between NZAS (the Aluminium Smelter) and EECA. The project was developed with the view of improving the health of the recipients and provision of educational and employment opportunities for Southland youth. The project retrofitted all Bluff dwellings with high quality floor and ceiling insulation, hot water cylinder wraps and efficient showerheads. Low income families had the entire retrofit cost covered by the grants from NZAS and EECA. This project will scope what information sources exist, and what further work will need to be done to complete a review of this programme.

Skills required of the Candidate:

- Understanding of the drivers of energy performance in buildings.
- Ability to communicate well with stakeholders.
- Preferably, an understanding of the basics of survey development.
- Technical report writing skills equivalent to year 3 BBSc.

External partner: The Energy Efficiency and Conservation Authority (EECA)

Supervisor/Contact Person for more information: Michael.Donn@vuw.ac.nz

Project Code: 36 - Identifying demand for social housing for people with disabilities in NZ

This project seeks to gain a better understanding of the scale of demand and requirements for appropriate and affordable housing by people with disabilities in New Zealand. The successful applicant would source existing data held within various agencies in NZ, analyse and summarise the findings in a report to be presented to the General Manager, Accessible Properties to provide a best estimate of housing demand for this particularly vulnerable sector of the population.

Skills required of the applicant: Statistical, demographic and building analysis skills. Good reading and writing skills. Communication skills. Coursework in Building Economics would be an asset.

External partner: Accessible Properties New Zealand Ltd

Supervisor/Contact Person for more information: Jacqueline.McIntosh@vuw.ac.nz

Project Code: 39 - Dhanushkodi (Tamil Nadu), India: Resilient Housing for Coastal Communities of India

In Tamil Nadu, Dhanushkodi lies near the southern tip of India. Dhanushkodi was completely destroyed in 1964 by a super cyclone. Twenty-foot high tidal waves killed over 1800 people. This research project is to design innovative approaches to architectural housing for Indian coastal communities strategically conceived to mitigate severe climate dynamism, as well as harness environmental conditions leading to sustainable design. The architecture student will build Sketchup/3DSMax models of Dhanushkodi, digitally test design solutions, produce Revit drawings and 3DSMax renders of the designs, and complete a literature review.

Skills required of the applicant: Experience in journal article searches, skills in Sketchup, 3DSMax, Revit, digital rendering, Photoshop, high achievement in studio design.

External partner: Sekhar Bandyopadhyay, NZ India Research Institute

Supervisor/Contact Person for more information: daniel.brown@vuw.ac.nz

Project Code: 40 - Nellore (Andhra Pradesh), India, Resilient Housing for Coastal Communities of India

In Andhra Pradesh, Nellore lies in the delta where the Penneru River enters the Bay of Bengal. 25 people died and 80,000 were evacuated after Cyclone Nilam flooded the region in November 2012. This research project is to design innovative approaches to architectural housing for Indian coastal communities strategically conceived to mitigate severe climate dynamism, as well as harness environmental conditions leading to sustainable design. The architecture student will build Sketchup/3DSMax models of Nellore, digitally test design solutions, produce Revit drawings and 3DSMax renders of the designs, and complete a literature review.

Skills required of the applicant: Experience in journal article searches, skills in Sketchup, 3DSMax, Revit, digital rendering, Photoshop, high achievement in studio design.

External partner: Sekhar Bandyopadhyay, NZ India Research Institute

Supervisor/Contact Person for more information: daniel.brown@vuw.ac.nz

Project Code: 42 - Alappad (Kerala). India, Resilient Housing for Coastal Communities of India

In Kerala, Alappad lies between the Arabian Sea and TS Canal. During the tsunami of 2004, waves from 4-7 meters inundated the land, with loss of many lives and homes. This research project is to design innovative approaches to architectural housing for Indian coastal communities strategically conceived to mitigate severe climate dynamism, as well as harness environmental conditions leading to sustainable design. The architecture student will build Sketchup/3DSMax models of Alappad, digitally test design solutions, produce Revit drawings and 3DSMax renders of the designs, and complete a literature review.

Skills required of the applicant: Experience in journal article searches, skills in Sketchup, 3DSMax, Revit, digital rendering, Photoshop, high achievement in studio design.

External partner: Sekhar Bandyopadhyay, NZ India Research Institute

Supervisor/Contact Person for more information: daniel.brown@vuw.ac.nz

Project Code: 43 - Yanam (Puducherry), India, Resilient Housing for Coastal Communities of India

In Puducherry, Yanam lies in the Godavari River delta on the Bay of Bengal. In 2005, fierce floods struck, resulting in greater losses than even from the tsunami exactly one year before. This research project is to design innovative approaches to architectural housing for Indian coastal communities strategically conceived to mitigate severe climate

dynamism, as well as harness environmental conditions leading to sustainable design. The architecture student will build Sketchup/3DSMax models of Yanam, digitally test design solutions, produce Revit drawings and 3DSMax renders of the designs, and complete a literature review.
Skills required of the applicant: Experience in journal article searches, skills in Sketchup, 3DSMax, Revit, digital rendering, Photoshop, high achievement in studio design.
External partner: Sekhar Bandyopadhyay, NZ India Research Institute
Supervisor/Contact Person for more information: daniel.brown@vuw.ac.nz

Project Code: 45 - Relocating Tokelau: The re-creation of a Tokelauan village as a community facility in the Hutt Valley

This research seeks to explore opportunities for the design and development of collective use facilities using participatory design processes. Researching through design, it will develop a 'Tokelauan Village' in the Hutt Valley which will provide a number of public and private facilities, potentially including but not limited to; a hall and meeting area, meeting rooms, workshops, a community kitchen and garden, conjoined housing, facilities for the elders, a safe play area for children, an early childhood play centre and cultural/religious facilities. The research will explore ideas of collective memory, shared facilities, Tokelauan traditions and ways of community planning and building through the development of shared facilities.
Skills required of the applicant: Research skills preferably in the area of Pacific Island research, Revit and Photoshop computer skills, physical model building skills, architectural design skills. An architecture student of Tokelauan heritage would be an added bonus.
External partner: Te Umiumiga a Tokelau Hutt Valley Incorporated
Supervisor/Contact Person for more information: Jacqueline.McIntosh@vuw.ac.nz

Project Code: 46 - Clean Technology Park Eco-Village Concept (1) Re-locatable Architecture

The newly formed Environment Solution Group is planning to build architecturally designed, pre-fabricated dwellings that work in different New Zealand site contexts (e.g. Auckland, Christchurch, Kapiti Coast). It is of high importance to the company that houses are aesthetically pleasing and can be customised as well as flexibly individualised. This project offers a unique opportunity to work collaboratively on applied, cutting edge building technologies and systems. The project will include a feasibility study and design testing and optimisations for different sites.
Skills required of the applicant:
- Excellent 3D visualisation capabilities
- Design analysis of different design systems
- Development of design alternatives and variations
- Capability to work in a team environment

External partner: The Environment Solution Group.
Regular meetings with the stakeholder will be part of the design and development process.
Supervisor/Contact Person for more information: Tobias.Danielmeier@vuw.ac.nz

Project Code: 47 - Clean Technology Park Eco-Village Concept (2) Sustainable Building and Systems Design

The newly formed Environment Solution Group is planning to build architecturally designed, pre-fabricated dwellings that work in different New Zealand site contexts (e.g. Auckland, Christchurch, Kapiti Coast). It is of high importance to the company that houses are aesthetically pleasing and can be customised as well as flexibly individualised. This project offers a unique opportunity to work collaboratively on applied, cutting edge building technologies and systems. The project will include a feasibility study and design testing and optimisations for different sites.
Skills required of the applicant:
- Ability to conduct thermal performance modelling independently
- Ability to conduct lighting studies independently
- Design analysis of different design systems
- Excellent 3D understanding
- Design optimisation
- Capability to work in a team environment
- MEP software skills are of advantage

External partner: The Environment Solution Group.
Regular meetings with the stakeholder will be part of the design and development process.
Supervisor/Contact Person for more information: Tobias.Danielmeier@vuw.ac.nz

Project Code: 49 - Performance of Wellington's Green Buildings

The project builds on a previous research project "The Attributes of Wellington's Green Buildings" which focused on the collection of information on 12 Greenstar rated buildings in Wellington and then summarising the information and outlining key details and features about the buildings. Phase 2 of our research on Wellington's Greenstar rated buildings

will involve understanding the actual performance of the buildings in terms of energy and water consumption, indoor air quality and other metrics. The summer scholar would be expected to work with the same building owners profiled in Phase 1 to gather information on:
- energy consumption and renewable energy production
- water consumption (including rainwater harvesting and grey-water recycling)
- occupancy comfort
- waste to landfill and recycling/composting statistics
- commuting habits
- indoor air quality (if measurable)
- occupancy numbers, PC numbers and occupancy square metres
- other information necessary for performance measurement and benchmarking.

The summer scholar would then need to produce calculations and qualified information on how the building is actually performing.

Skills Required of the Applicant:
- people skills (student will be having to get information off of building owners)
- survey questionnaire and research
- analytical skills
- self-starter and persistent

Supervisor/Contact Person for more information: George.Baird@vuw.ac.nz

Project Code: 50 - Shade Canopies for Outdoor Learning Spaces

For over 10 years, CSNZ Sunsmart Schools have been promoting sun-shading for NZ Schools as a means of preventing skin cancer. However, there is still a lack of outdoor shaded spaces in schools or any detailed guidelines. The researcher will seek out precedent examples of communal shade canopies (capable of accommodating a class of at least 30 students) and develop design guidelines for creating UV protective and thermally comfortable outside spaces in different climatic regions in New Zealand. Finally, the project will involve identifying alternative structural and construction and screening materials. The research will prepare a research report, conference paper and poster on the research findings. The report will be used by CSNZ to formulate guidelines.

Skills required of the applicant: This year, the applicant should be completing a BAS (Bachelor of Architectural Studies) or a 1st year of a MArch (Prof), MBSc, MIA or MLA. Skills in 3D CAD software are required. An interest in the design and environment of outdoor living space is important.

External partner: Louise Sandford, Sunsmart Schools Programme Co-ordinator, Cancer Society of New Zealand (CSNZ).

Supervisor/Contact Person for more information: Christina.Mackay@vuw.ac.nz

Project Code: 52 - Urban Agriculture in Wellington

The research aims to identify how the council can be most effective in supporting urban agriculture; defined as ' the sustainable practice of cultivating, processing and distributing food in and around a village, town or city. The benefits of these practices include, contact with the natural environment and developing local green economies. These factors are essential in order to accomplish Wellington's vision to 2040: Smart Capital. This embraces a People-Centred City resulting in a healthy and resilient city. This research will collaborate with investigations from other regions to discover what urban agriculture they currently have in place. It will also analyse how other councils (national/international) have supported this practice, and establish any possible barriers to the development of urban agriculture.

As an outcome the research will identify an achievable goal for Wellington in the next three years, along with resource requirements and potentially develop a plan and budget.

Skills required of the applicant:
- Strong research ability
- Diligence
- An interest in urban agriculture
- Great communication skills

External partner: Wellington City Council

Supervisor/Contact Person for more information: fabricio.chicca@vuw.ac.nz

Project Code: 55/135 - Creation of a representative and quality assured digital building model for Sustainability and Life Cycle analyses

BRANZ is developing a whole building whole of life (WBWL) framework for calculating environmental impacts of building designs compared to an appropriate building benchmark. This Life Cycle Assessment-based approach aligns with international standards on sustainability in building construction.

Aims of the research are:
- Definition of LCA-based indicators providing the reporting basis of the framework.
- Definition of building benchmarks.

- Establishment of default assumptions, data and scenarios for data gaps.

Skills Required:

- Ability to model buildings in 3D using Revit, SketchUp and Energy Plus.
- Ability to write technical reports to the standard expected of Year 3 BBSc.
- Knowledge of construction technology in office buildings.

External partner: BRANZ

Supervisor/Contact Person for more information: Michael.Donn@vuw.ac.nz

Project Code: 56 - Development of an operational analysis tool based upon a joint journal paper published by Opus and the CBPR: combining sun, wind and temperature into a comfort index

This project is concerned with creating a detailed contour map of wind speeds in Wellington's central business district using hot-wire speed measurements acquired as part of environmental wind tunnel studies of new building developments undertaken for consent purposes over the past three decades. These measurements pertain to the annual maximum gust speeds expected at pedestrian level. As such the contour map will have a variety of uses ranging from disaster planning through to refinement of existing Council ordinances.

Skills required of the Candidate:

- Collating data on the aerodynamic performance of buildings in a spreadsheet database.
- Manipulating location information using Google Earth and 3D models in SketchUp.

Supervisor/Contact Person for more information: Michael.Donn@vuw.ac.nz

Project Code: 57 - Evaluation and development of a dashboard for multi-dimensional analysis and priority setting with the goal of making Life Cycle Analysis of this type within a leading NZ Architecture firm

Analysis of the differences in operational energy consumption caused by changes in orientation and window percentage [both found to be key elements in increasing/decreasing energy consumption in our prior studies] for large groups of town houses in a variety of differing locations and situations. Our current master planning design work includes several large proposed developments in Auckland, and smaller scale works in Wellington, Wanaka and Queenstown. Additionally, we would relate the new work to work we have already completed with respect to embodied energy, the relationship to operational energy and cost in use.

Skills required of the Candidate:

- Modelling the energy performance of groups of buildings using thermal simulation software like EnergyPlus/Accurate/SuNREL.
- Technical report writing skills equivalent to year 3 BBSc.

Supervisor/Contact Person for more information: Michael.Donn@vuw.ac.nz

Project Code: 58 - Residential Solar Value Case

The research project is part of 'Our Living City', a Wellington City Council initiative and will look at tangible and intangible aspects of solar technologies for residential use. This project investigates factors that influence the decision making process for households that have invested in solar PV technology, as well as it looks at types of financing models that could enable higher growth in the residential solar market.

Overall, the project aims to get a better understanding of end-user decision making processes and looks at how the market and government (national and local) can help to increase solar instalment numbers.

The successful applicant will be expected to:

- perform questionnaires of households that have installed solar PV
- perform questionnaires of a suitable population sample who have not installed solar PV.

Furthermore, the research includes an analysis of questionnaire data and production of a report containing:

- conclusions as to key drivers that influenced decision making of those households that have installed PV
- conclusions as to what type of "product" (or products) might result in increased uptake in the residential solar market.

Skills required of the applicant:

- people skills
- survey questionnaire and research
- analytical skills
- self-starter and persistent

External partner: Wellington City Council.

Supervisor/Contact Person for more information: Michael.Donn@vuw.ac.nz or Tobias.Danielmeier@vuw.ac.nz