

# Summer Research Scholarships 2013/14

## School of Design

**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 **1<sup>st</sup> 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.

Detailed descriptions of all projects are also available on the Faculty website at:

<http://www.victoria.ac.nz/fad/about/news#a207485>

**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: IERKC01 - Software development for a wearable system for tracking patient movement (Part One)**

This project will create the foundation of a wearable system for tracking patient movement. The successful applicant will develop software that will decipher and process signals from wearable analog sensors. The sensors require a system that will allow for calibration for multiple users and to also bring together multiple signals into a single usable pressure signal to be sent via bluetooth. This will be run in collaboration with a Design summer scholar.

#### Skills required:

1. Software that can automatically calibrate analog sensors. No preference on language. Current prototype uses Processing.
2. Code for sending a signal from an analog sensor to a computing device (smartphone, tablet, computer) via Bluetooth transmitters.
3. In collaboration with the design scholar, necessary code for a digital interface/front end.
4. Arduino electronic prototyping skills.
5. Wearable items prototyping skills.

**Supervisor/Contact Person for more information:** [Edgar.Rodriguez-Ramirez@vuw.ac.nz](mailto:Edgar.Rodriguez-Ramirez@vuw.ac.nz) or [Kah.Chan@vuw.ac.nz](mailto:Kah.Chan@vuw.ac.nz)

### **Project Code: IERKC02- A wearable system-based exer-game for aiding rehabilitation (Part Two)**

This project will develop an exergame that interacts with analog signals from wearable sensors in a physical rehabilitation setting. The game encourages the patient to carry out their exercise programme, it provides near-instant feedback on how well they are doing and whether they are doing the exercises correctly. This will be run in collaboration with an Engineering summer scholar.

#### Skills required:

1. Game design skills to design a game that utilises analog sensors
2. Knowledge of 3D programmes (currently we are working on Maya, but we are open to alternatives)
3. 3D gaming engine Unity
4. Arduino electronic prototyping skills.
5. Wearable items prototyping skills.

**Supervisor/Contact Person for more information:** [Edgar.Rodriguez-Ramirez@vuw.ac.nz](mailto:Edgar.Rodriguez-Ramirez@vuw.ac.nz) or [Kah.Chan@vuw.ac.nz](mailto:Kah.Chan@vuw.ac.nz)

## **Project Code: ILGRS01 - Visual Effects Migration Database (Part One)**

This project will involve the creation of a database of visual effects professionals (VFX) by harvesting data taken from IMDB Pro. The outcome of this project will be the generation of data to facilitate the construction of a visualization tool that will show the migration patterns of professionals both coming to, and leaving, New Zealand. An initial data set of 10 - 15 movies will be selected and all professionals to be analysed will be anonymised. Following this, a comparative analysis of the data will be run to identify and remove all professionals who have remained within New Zealand based upon the continuity of their employment within the local visual effects industry. The remaining dataset of professionals who have left the local industry and/or returned will then be individually analysed and processed for additional insights. Ultimately, this project will construct a working database of the migration patterns of professional visual effects roles across the world. This database will then feed into a broader project to both create data-visualizations of migration patterns, and to map out potential policy implications for New Zealand's creative industries. This research will employ custom software to mine, curate and analyse a dataset extracted from the IMDB Pro database and will require the successful scholar to lodge a research ethics application to the Victoria University Ethics committee. Provided the desired outcome of this project is achieved it is likely to lead to both academic and media interest that will be of value to the scholar involved for future research or job applications.

**Skills required:** This project requires programming proficiency. The programming in this project will largely consist of writing scripts to pull, clean, organize and summarize the dataset. The successful applicant will have:

- A desire to learn new technologies such as graph databases (e.g. Neo4J), the database technology used by social networking sites like Facebook and Twitter.
- Coding experience and proficiency in a major language (example languages include C, C++, Java, Javascript, Ruby, Python, PHP, Perl, C#).
- The ability to develop a working knowledge of a new language as needed. There are several open source applications that can access the IMDB APIs. If you do not have experience in the application's specific language (e.g. Python, PHP) you should be able to demonstrate your programming skills in your native coding language and feel comfortable with picking up new languages as needed.

Additional skills that are considered desirable, but not critical include:

- Experience with interfacing with databases. For instance PHP/MySQL.
- Experience with database languages and tools. This can be relational databases (e.g. MySQL, sqlite, Oracle), SQL, NOSQL or other database technologies.

**Supervisor/Contact Person for more information:** [Leon.Gurevitch@vuw.ac.nz](mailto:Leon.Gurevitch@vuw.ac.nz) or [Rhazes.Spell@vuw.ac.nz](mailto:Rhazes.Spell@vuw.ac.nz)

## **Project Code: ILGRS02 - VFX Industry Google Earth Visualisation (Part Two)**

This project will create a Google Earth based data-visualisation tool with which the migration routes of visual effects (VFX) industry professionals can be analysed. The successful scholar for this project will take initial data on migration patterns and create a Google Earth plugin to visualize the relative routes taken by industrial skills across global geography. Working initially to familiarize themselves with the specifics of Keyhole Markup Language (KML) programming, this summer scholar will develop an Application Programming Interface (API) that will allow customized data-visualisations to be developed. This platform will initially be used to visualize a dataset of geographical migratory patterns of VFX industry professionals and the global (re)distribution of VFX knowledge capital. This data-visualization tool will be available on the Google Earth gallery and will demonstrate comparable anonymised patterns of movement for VFX industry roles such as pre-visualization artists, lighters, textures artists, composers and more. The scholar will then be supervised in the process of creating further data-visualizations using the Neo4J database tool. Provided the desired outcome of this project is achieved it is likely to lead to both academic and media interest that will be of value to the scholar involved for future research or job applications.

**Skills required:**

1. The successful summer scholar will have experience with at least 1 of the following programming languages or a suitable substitute:

- Processing (working with files and data, not just visuals),
- Python,
- Ruby,
- PHP,
- Javascript,
- or other major programming language.

2. The successful scholar will not be expected to be familiar with KML or Neo4J but they will have sufficient coding skills to be capable of familiarizing themselves with the language. KML is an XML variant and experience with XML, HTML or Javascript will be sufficient to quickly begin developing in KML.

**Supervisor/Contact Person for more information:** [Leon.Gurevitch@vuw.ac.nz](mailto:Leon.Gurevitch@vuw.ac.nz) or [Rhazes.Spell@vuw.ac.nz](mailto:Rhazes.Spell@vuw.ac.nz)

## **Project Code: IAGSB01 - Tracing the Great NZ Cat Controversy**

The Great NZ Cat Controversy project aims to investigate how cultural studies and design research can contribute novel approaches to explaining wildlife conservation issues and mediating public controversies. The research will begin with an

analysis of local and international responses to Gareth Morgan's "Cats To Go" campaign (<http://garethsworld.com/catstogo/>), and the identification of a set of issues and stakeholders who might serve as future research participants for the design-based portion of the study.

**Role of the Summer Scholar:**

- 1) Identify and archive a set of media reports and public commentary that respond to the "Cats To Go" campaign;
- 2) Conduct a substantial written discourse and/or rhetorical analysis of the published materials;
- 3) Identify a set of issues, potential stakeholders, and possible research participants for further study.

**Application Requirements & Further Information:**

- 1) Applicants require a solid background in social, cultural and/or media studies, and have experience with methods and theories of discourse and/or rhetorical analysis.
- 2) Applicants must submit a written sample of their research in a compatible area of study. (A course paper would be suitable.)
- 3) Applicants with demonstrated analytical and written skills will be given preference, and invited to co-author a journal article with Dr Galloway and Dr Baker.

**Supervisor/Contact Person for more information:** [Anne.Galloway@vuw.ac.nz](mailto:Anne.Galloway@vuw.ac.nz)

### **Project Code: IJ001 - Design Materials and Digital Manufacturing**

This research is aimed at exploring opportunities of digital manufacturing for product development and creating product designs based on analysis and assessment of a wide range of products with an emphasis on materials. The participating scholar will analyse industrial and consumer products and identify design applications to be most benefited from introduction of digital manufacturing. The scholar will then develop reference designs and their 3D models of the prioritised applications. Upon successful completion of this research, the scholar may be invited to the following bigger project in 2014.

**Skills Required:**

1. A strong interest in design materials and design taxonomy
2. A fundamental understanding of manufacturing processes
3. Skills in 3D modelling and visualisation, preferably using SolidWorks

Participation in this project may be subject to signing a confidentiality agreement.

**Supervisor/Contact Person for more information:** [Jeongbin.Ok@vuw.ac.nz](mailto:Jeongbin.Ok@vuw.ac.nz)

### **Project Code: 37 - Design Retail Display System**

A Summer Scholarship is being offered to investigate display systems, understand the architecture elements, analyse component based assembly methods and propose new design incorporating methods of manufacture. The initial research also examines aesthetics, develops classification systems and considers the environments of use. Design proposals will be developed, prototyped and tested. Further refinement will be undertaken with consideration to manufacturing methods and materials. The project will be concluded with, full design documentation and communication material to explain the findings.

**Skills Required:**

1. A structured and systematic approach to design processes
2. Strong conceptual and sketching skills
3. Skill in using SolidWorks, Adobe Creative Suite and Sketch Up software
4. Good understanding of/or interest in manufacturing methods

**External Partner:** GDM Retail Systems

**Supervisor/Contact Person for more information:** [simon.fraser@vuw.ac.nz](mailto:simon.fraser@vuw.ac.nz) or [tim.miller@vuw.ac.nz](mailto:tim.miller@vuw.ac.nz).

### **Project Code: 44 - Variable Solids through Digital Materials**

A Summer Scholarship is being offered to investigate the feasibility and potential of 3D printing spatially varying OBJET Digital Materials™ for metamaterial and biomimetic engineering applications. The study involves the creation of a series of virtual 3D models of composite materials which will be printed and tested for a range of physical properties. This research considers how the geometry of the composite parts, adhesion, spatial distribution, print resolution and scale affects the physical properties of 3D prints.

**Skills Required:**

1. Able to generate complex 3D models, using SolidWorks software
2. Capable of producing files suitable for printing on the SOAD 'OBJET' printer
3. Some knowledge of mechanics of materials and dynamics/vibration an asset
4. Good writing skills and highly skilled at publication photography and video

**External Partner:** Callaghan Innovation Research Ltd (CIRL)

**Supervisor/Contact Person for more information:** [tim.miller@vuw.ac.nz](mailto:tim.miller@vuw.ac.nz)

### **Project Code: 51 - Green-urban approach to addressing social inequality**

The project undertakes a social design approach to using the green spaces in Wellington's communities to tackle the issue of social inequality. Inspired by Wellington City Council's 'Our Living City' project, this research will focus on education and

will investigate how design research and cultural studies can contribute innovative approaches to improving access to, and engagement with, the city's urban-nature connections. Ultimately the research aims to provide alternative approaches to help stimulate and support students to achieve their educational potential regardless of any perceived socio-economic disadvantage. This project will suit a creative student, who is interested in problem solving, cultural studies and contributing innovative and viable responses to social issues.

**The research will require the student to:**

1. Identify and analyse relevant projects and research that relate to relationships between green-urban space, community and educational disparity.
2. Identify communities and / or schools in Wellington as potential scenarios / case studies for design responses to the issue.
3. Establish a platform for future design-based research on this topic.

**Skills Required & Further Information:**

- 1) Applicants should have a background in cultural, education, environmental and/or development studies, and have experience with methods and theories of discourse.
- 2) Applicants should have an interest in and/or understanding of social design methods and theories of discourse.
- 3) Applicants must submit a written sample of their research in a compatible area of study. (A course paper would be suitable.)
- 4) Applicants with demonstrated creative, analytical and written skills will be given preference.

**External Partner:** Wellington City Council

**Supervisor/Contact Person for more information:** [Colin.Kennedy@vuw.ac.nz](mailto:Colin.Kennedy@vuw.ac.nz)

### **Project Code: 53 - 3D printing diagnostic devices**

When fluids are constrained to small (sub mm) dimensions, their flow properties become simple and predictable. We can exploit this property to separate and detect species in complex solutions. For example, a "lab on a chip" could determine the presence of a contaminant in water or a disease biomarker in blood. This project includes the design, 3D printing and analysis of simple microchannels for microfluidic diagnostic devices. We are particularly interested to see how small a channel can be reasonably fabricated and how fluids flow in the channels.

**Skills Required:**

1. be a motivated, organised and enthusiastic student
2. be willing to keep trying different ideas to make their product work
3. enjoy problem solving and be practical and hands-on
4. be skilful at 3D modelling, preferably using SolidWorks, and 3D printing

**External Partner:** Callaghan Innovation Research Ltd (CIRL) \* Participation in this project may be subject to signing a confidentiality agreement.

**Supervisor/Contact Person for more information:** [jeongbin.ok@vuw.ac.nz](mailto:jeongbin.ok@vuw.ac.nz)

### **Project Code: 54 - Earthquake Protection Equipment**

This project is aimed at developing equipment that senses a tremor and automatically activates a passive mechanical device to protect invaluable articles on display or in storage, even without an external power supply such as electricity. While recent and continuing occurrences of strong earthquakes have reminded us the significance of disaster preparedness, they also hasten our opportune development of reliable, mass-producible, customisable and economical protection equipment.

**Skills Required:**

1. Outstanding design and making skill
2. Strong curiosity and self-motivated exploration - Proficiency in computer-aided 3D modelling
3. Persistence

\* Participation in this project may be subject to signing a confidentiality agreement.

**Supervisor/Contact Person for more information:** [jeongbin.ok@vuw.ac.nz](mailto:jeongbin.ok@vuw.ac.nz)

### **Project Code: 138/139/140/141 – 3D Printed Futures**

The research will explore scenarios for future architecture, vehicles and interior designs for a television series set 40-60 years in the future. A specific focus will be on the visual qualities of 3D printing technologies including 'FDM' mono material printing and 'Objet' multi-property material printing. Applicants will be expected to work in a small creative team.

**Skills required:**

1. Conceptual idea generation/illustration for futuristic vehicles, interiors and architecture.
2. The ability to explore the aesthetic and physical potential of 3D printing (primarily with 'Up' FDM printers).
3. 3D Cad modelling and rendering with 'Solidworks' or equivalent software.
4. 3D printing experience (Primarily with 'Up' FDM printers).

**Externally Partner:** Weta Workshop

**Supervisor/Contact Person for more information:** [Ross.Stevens@vuw.ac.nz](mailto:Ross.Stevens@vuw.ac.nz)

## **Project Code: 142/143 – Elite Prosthetics**

Currently human prosthetics attempt to normalise a person's anatomical disfigurement by disguising the disability through a process of sculpture and mechanical technologies. This project will investigate the design of 'elite prosthetics' that speculate on desirable prosthetics with entirely different aesthetic qualities and/or performance. The project will utilise digital Multi-material 3D printing technologies to build 'synthetic anatomy'. The research undertaken by the scholar will establish a foundation research portfolio of 'elite prosthetics' that physically demonstrate viable alternatives to contemporary prosthetics. The scholar will work with people who require prosthetics, and maxillofacial (plastic) surgeons.

### **Skills required:**

1. An interest in human physiology/anatomy, prosthetics, and 'synthetic anatomy'
2. A desire to work with research participants and medical specialists
3. Skills in 3D modelling programmes (solidworks/3Ds Max) and a proficiency in learning new software for 3D/MRI/CAT scanning and (Objet) printing
4. The ability to research and develop concepts and prototypes effectively & record and document techniques and processes logically

**Supervisor/Contact Person for more information:** [Bernard.guy@vuw.ac.nz](mailto:Bernard.guy@vuw.ac.nz)