Cook Islands Dance
and the
Introduction of Wearable Technology
A thesis by Rachel Hockin
An electronic copy of my thesis and additional video files (as referred to on p.65) can be found on the attached USB device.
Cook Islands Dance and the Introduction of Wearable Technology

How can wearable technology be appropriately integrated into traditional Cook Islands dance performance?

By Rachel Hockin

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ABSTRACT
This thesis records my journey through designing Cook Islands dance costumes with the enhancement of wearable technology. In my research I aim to demonstrate cross-cultural awareness of rich indigenous traditions, such as the Cook Islands performing arts, combined with the futuristic quality of wearable technology practices.

This area of research is not widely explored, so I travelled to the Cook Islands to expand my basic knowledge of costume design. Applying an ethnographic approach to the topic, I interviewed past and present costume makers, and documented their processes. The first trip was timed to coincide with the annual self-governance celebrations in the Cook Islands, Te Maeva Nui. Groups from all islands in the Cook Islands travel to the capital, Rarotonga for a week of celebration and trade: the highlight of which is the much anticipated dance performances, which runs every evening through the week. The weeks before the performances were spent observing and taking part in the costume making process with one of the teams participating in the event. I investigated the difference between ‘traditional’ and ‘modern’ materials utilized in Cook Islands costume making. The second trip to Rarotonga was to refine my experiments based on field research and create my final garment, Ta’akura. This was informed by my in-depth research into traditional methods of costume design, as well as practical experimentation with cutting-edge technologies.

What I found in my research is that the combination of digital wearable technology and traditional costume design can result in a unique marriage that is contemporary, yet still acknowledges and respects the fundamental values and tradition of Cook Islands dance performance. My experiments throughout the course of this research have integrated this technology cautiously. Notwithstanding the paramount cultural context in which Cook Islands dance costumes (and any modification thereof) must be considered, wearable technology can be applied in the same manner that modern materials are integrated into the costumes of today: discreet yet still effective.

There is a place for traditional, if you want to be traditional, and there is a place for creativity and you can combine the two.
(Tuara, 2014)
Introduction
I have combined several methodologies in order to explain my research clearly. These methodologies include auto-ethnography (Hamilton, Smith, & Worthington, 2008), reflexive ethnography and narrative inquiry (Burawo, 2003). With auto-ethnography I portray an autobiographic experience of living in Rarotonga and my previous knowledge of Cook Islands dance costumes, as well as an ethnographic approach to observing the costume making process. With reflexive ethnography I investigated previous ethnographic studies, within the realm of Cook Islands dance, to clarify the significance of this research to a specific audience. This research is illustrated through narrative inquiry to furthermore express the significance and adaptability of wearable technology within Cook Islands culture. I received ethical approval from the Human Ethics committee in order to interview participants. This was so I could envisage wearable technology to become part of the costume making process and grow to become a regular application.

I was 12 years old when I received my Permanent Residency for the Cook Islands. There hadn’t been a formal ceremony for years, and needless to say the line was long and it was a good two hours and a broken necklace later before I stood up on stage to shake the hand of the Cook Islands Prime Minister, Dr. Robert Woonton.

I attended Apii Avatea, one of the local public schools. It was one of the larger primary schools, having two classes for each grade, starting from kindergarten to year eight. Every week a different class would perform an item for the Friday Assembly. The performance was usually a Cook Islands dance item that coincided with the ‘Virtue of the Week’. Each student was to supply his or her own pareu (sarong), ei (lei or string of flowers), and titi (like a tutu) for the girls, made from leaves. The boys would wear their school shorts, a leaf necklace, and a flower in their ear. If you arrived at school on Friday without your pareu or titi, you were not allowed to perform. I forgot one day, and that was the last time I ever forgot anything.

Because Cook Islands culture and dancing has been a part of my life since the age of five, it is something I am deeply passionate about. So throughout my education I included myself in dance groups, including college, where I intended to lead the school team but was pulled away by the focus on my art subjects instead. It wasn’t until my final years of university that I started dancing again.
Over the five years of my university degree in Design Innovation, I have found different ways of expressing my background and culture, and have integrated these into my design work. In the beginning of the first trimester in my third, and what I then thought would be my final year at university, I sat staring mindlessly at the assignment brief, lost for ideas, lightly overdosing on caffeine and sleep deprivation. I desperately tried to think of what to make for my first wearable technology assignment. Sure, there were a few things I could do, but I needed something different, original, and ‘me’. Our assignment to design a costume of our choice with the enhancements of LEDs (Light Emitting Diodes) and micro-controlled sensors: I created a section of a Cook Islands dance costume, the titi, which was illuminated by LEDs. It was at this point that I realised I could further combine my degree with something I loved, and that was to use wearable technology as a way to display Cook Islands dance culture, in what I believed would be the most contemporary way possible.
CHAPTER 1

Introducing Wearable Technology
The idea for my research sparked when I discovered wearable technology in the final year of my Bachelors degree during the Wearable Technology course, lead by Anne Niemetz. As soon as I grasped the basics of wearable technology, Cook Islands dance costumes came to my mind. ‘Imagine if they lit up?’ I thought to myself. ‘What if the lights changed colour when you danced faster and slower?’ After I had made my first costume, Firedancer 3.0, my interest in contemporary costumes grew. Since then, I’ve made a costume that was accepted and showcased in the renowned World of Wearable Art show in New Zealand (World of Wearable Art, 2013), and have researched ways in which an audience can further empathize with a dancer. From there I progressed into my postgraduate degree with the purpose of researching Cook Islands culture and its costume designs in greater depth, as well as exploring methods of integrating wearable technology in dance costumes in general.

WEARABLE TECHNOLOGY AND DANCE COSTUMES

I used an open-source physical computing program called Arduino (“Arduino - Introduction,” 2015) with sensors to control LEDs in my costumes. Arduino has its own programming language, which I learnt in the course of Wearable Technology. There are many categories in which wearable designs can be applied, e.g. medical/health, sports/fitness, security and gaming. However, my research explores wearable technology in the fashion and costume design domain and examines how wearable devices have and can be used in a performance environment. Most of the resources I came across were linked to art installations or theatre shows in which wearable costumes worn by actors or dancers and visual displays or sound help enhance the environment of the stage.

I drew inspiration from wearable technologist and sound installation artist Anne Niemetz and her project REVOLVE. REVOLVE is a collaborative project with Dr. Philippa Gander and Dr. Carol Brown, and is an interactive performance inspired by sleep science (chronobiology). The dancer wears a suit that allows her to adjust the environment
around her based on wearable sensors and an interactive sound environment. By exposing or hiding light sensors arranged on the suit, the dancer can create a sonic response based on varied speeds and movements. The dancers gestures react to light waves within the environment, amplifying the experience of the space. The performance is structured to a human sleep/wake cycle and the different states the brain goes through within this cycle. The dancer was accompanied by a visual display of a sleeping silhouette. What influenced me most about this project was that it combined wearable technology with contemporary dance. The influence of light and sound heighten the experience of the performance space and create a different dynamic to performing art (Niemetz & Brown, 2011). (See Figure 1)
CURRENT
PROTOTYPES:
PRE-THESIS

Firedancer 3.0

Firedancer 3.0 was the first Cook Islands dance costume with integrated technology that I knew of, and was the costume I produced as part of the course Wearable Technology in 2012. About a year later I found out that a dance team from Waikato University had put battery-powered Christmas lights into their dance costumes around about the same time Firedancer 3.0 was made. I only made one part of the costume, which was the ‘titi’, a skirt worn by female dancers. Firedancer 3.0 was made by hand plaiting kiriau fibres, taken from tree bark, which was stripped and then soaked in the sea. While the titi is similar to a tutu in form, it is soft rather than stiff. It emphasizes the swing of the dancer’s hips when they sway from side to side, and, as it is quite large in size the materials create a fluid, sensuous movement.

A RGB LED (red, green and blue light emitting diode) strip was attached to the titi to illuminate its fibres. Fibre optic wires were placed at the base of some of the LEDs. They were then woven through the plaits of the titi, and spread into the out-facing fibres to help disperse the light. The LEDs were controlled by an accelerometer attached on the inside of the waist, programmed to change the colour of the LEDs when the dancer moved her hips. The colours changed within the red, green and blue colour spectrum randomly, which indicated movement, but didn’t do so in a particularly legible manner for the audience. So after the completion of that particular assignment, I realised that this concept could definitely grow with technical improvement. (See Figure 2)
Towards the end of my Undergraduate degree of Design Innovation, I decided to take a summer course. During the summer of 2012/13, I worked on an independent study in which I could focus on one assignment for the entire trimester. It was not a surprise to my wearable technology lecturer when I decided to create a contemporary Cook Islands dance costume. The final design was an illuminated Cook Islands dance costume titled ‘Ura Rā (meaning Sun Dance), which was submitted to the World Of WearableArt (WOW) show for the South Pacific section, and accepted as a finalist in 2013.

WOW is a two-hour show based in Wellington New Zealand. The show reaches an audience of about 50,000 people from around the world and is held over 12 nights. WOW combines fashion, art and theatre to create an ‘out of this world’ experience (World of Wearable Art, 2013).

I decided to design a garment that was a little ‘out of the ordinary’ for Cook Islands dance costumes, and that was to make it ‘non traditional’ in the sense that it would be recognizable, but made out of different materials. It was also an expansion of my previous design degree projects, because I was creating the entire costume, not just one component. For ‘Ura Rā, the focus leant towards the fabrication of the outfit, rather than the electronics. With the many requirements for a WOW costume to get past the judges, there was one requirement that I had to keep in mind, and that was size: the bigger, the better. The costume needed to be seen from afar and still make an impact on the audience and the judges.

A WOW costume gets worn up to about 19 times on average, so the costume needed to be sturdy and easily repaired if needed. My concepts for the design varied in terms of shape and materials. I sketched out drawings of recycled materials, plastic bags and shattered mirrors that formed the costume’s shape, and after some fashion research and study of past WOW entries, I made the decision to use wood veneer. There were two types of wood used: New Zealand kauri and sapelle. The kauri is a light creamy shade of brown, whereas the sapelle is a rich mahogany colour. The combination of the two colours not only created a balanced dynamic to the costume, but also symbolized my Rarotongan cultural background paired with my European upbringing.

The final concept displays each part of the costume as a different symbol of the earth. The headpiece is a portrayal of the sky, depicted through the use of Cook Islands symbols of the sun and the bird.
bra represents the land with symbols of the moko (land gecko) and the tiare (flower). The tītī and pareu show symbols of the sea with spearheads and waves. The dark blue of the pareu is wrapped in kiriau that had been plaited into a fish net. Because veneer is thin and fragile, it needed to be glued to thin plastic sheets to ensure it didn’t split. These sheets were then hand crafted into the shapes they needed to be, and decorated with the symbols for each section. Most of the pieces were sewn or woven together by hand, unless they needed a more permanent hold, in which case they were glued down to make certain they would stay put.

Warm white LEDs were laced into all the components of the costume once the final form had been constructed. There were just fewer than 50 LEDs and five 9V batteries in the entire garment. The main focus was to illuminate the outfit without too much technical advancement. Gold mesh was placed into the tītī to help disperse the light through the structure, and because the inner sides of the veneer were glued to plastic, the light refracted throughout the outfit beautifully. After several judging platforms, ‘Ura Rā was accepted into the show as part of the Air New Zealand South Pacific section. (See Figures 3, 4 and 5).
Tourist Vs. Dancer

Within the first year of my postgraduate degree, I built an outfit by taking a psychological approach as a part of the ‘Design and the Human Mind’ course, lead by Edgar Rodriguez-Ramirez. This outfit was merely a work in progress, as it was never fully developed. The concept was based on a desire to elicit more empathy towards a dancer from a tourist audience, an idea that was influenced by Kalissa Alexeyeff’s book *Dancing from the Heart: Movement, Gender, and Cook Islands Globalisation*, published in 2009. Her chapter regarding the politics of contemporary dance outlines how tourism has influenced the dance culture and records her finding that Cook Islanders dance more now than they used to. In the past, however, she states that because tourism has a large influence on the islands’ economy, dancers are mainly dancing for tourist’s attention rather than for themselves, and that the ‘spirit’ of dancing is being lost (Alexeyeff, 2009). During an interview with Mamia Savage (an acclaimed Cook Islands dancer who is now deceased), Alexeyeff explores the difference between an audience full of locals and an audience full of tourists and how they respond to the dance.

For tourists, you are just dancing for them. They don’t understand what you are dancing about, what you are singing about, and they don’t appreciate. They just watch, and when you finish, they clap. Whereas when you are dancing for a national event, you are dancing for your own people. Well, this is only my opinion - you feel pride in dancing for people who really know and feel how you are feeling. Saying that, they [locals] criticize you as much as they can. They are the best critics around Kalissa; you can never satisfy them. There are some papa’ā who appreciate it - well, they say they like the hand movements. And of course, they are the ones that pay us.

(Mamia Savage, n.d., Alexeyeff, 2009)

Therefore the concept of my final design was to create a technology-enhanced bra that built an empathetic relationship between the dancer and a tourist audience. Initially the bra was to be lit and controlled by the heart rate of a member of the audience. When the wearer of the heart rate sensor was calm, the bra would be one colour, and when the wearer grew enthusiasm for the dancer (with a consequent increase in heart rate) it would change. Unfortunately, the time limitation for this particular assignment meant I was unable to execute the technical components, and so the concept was simplified to having a similar sensor (to that of the heart sensor) on the dancer that picked up simple vibrations, which changed the lights similar to an accelerometer. (See Figure 6).
Figure 6 (Steel, 2014)
CHAPTER 2

A Brief History of Contemporary Cook Island Dance and Costumes
‘URA (DANCE)

In the Cook Islands, music and dance are the most prevalent and popular of the arts. They are the main vehicles used by Cook Islanders to express nationalistic feelings and pride in their culture.

(Mason & Williams, 2003)

The Cook Islands are made up of 15 small Islands, with Rarotonga being the capital. I have noticed previously that Cook Islands dance and costumes, which have undergone some degree of modification over the years, are still very traditional and authentic in some of the outer islands. On Rarotonga and a few of the close-by islands, the performances and costumes have adjusted to modernized culture. Most materials for costumes are sourced from natural plants and trees and are put together by hand to create a lush and vibrant costume, which is designed to accentuate the movement of the hips and hands in women, and the legs and arms of men. The performances are regularly referred to as ‘items’. This chapter defines the different dance items (that are specific to my research), which are performed, with their traditional costumes, as well as examining and discussing previous ethnographic studies relating to Cook Islands dance performances.

Akono’anga Maori: Cook Islands Culture reveals Cook Islands performing arts (Tamataora) in the chapter outlining ‘Creative Expression’. This chapter, written by Jean Tekura’Timoana Mason and Sonny Williams and defines the styles of dance used in performances in the Cook Islands. There are many different performances within Cook Islands dance covered in Akono’anga Maori. My research, however, only focuses on integrating wearable technology into the Action Song and Drum dance item costumes, performed by a female solo dancer.

ACTION SONG (KAPA RIMA)

An action song is slow performance that emphasizes arms and hand movements of dancers. It is a storytelling dance that is sung either by the dancer or a band. The band is usually made up of ukulele and guitar players, and drummers. The action song is performed either by a solo dancer or a dance troupe. The dance troupes usually dances and dresses uniformly. Costumes for this item are traditionally simple and unembellished, so that more focus is drawn to the actions of the song.
**Drum Dance (‘ura pa’u)**

The drum dance is an upbeat item that has more emphasis on the lower body movements. The women usually move their hips faster than in the action song, while the men move their legs in a scissor-like movement. An ensemble of drums produce the music, accompanied sometimes with a cabin bread tin (tini) for a high-pitched beat. The tini is believed to have been part of Manihiki (one of the outer islands) dance since the late 1800s. The costumes are much bigger than that of the action song, especially around the hips for women, and tassels are added to the men’s legs below the knees. The drum dance can also be an item for a solo dancer and dance troupe.

**EXISTING ETHNOGRAPHIC RESEARCH**

When researching Cook Islands dance culture, there are few resources and they rarely expand on the costume making. I mainly looked into ethnographic sources that are previous studies of Cook Islands dance as a whole. As research is still scarce in terms of Cook Islands costume design and wearable technology, I decided it would be best to do field research and travel to the Cook Islands to find out more. This also meant I could expand my knowledge on costume design by talking to experienced costume makers.

*Dancing from the Heart: Movement, Gender and Cook Islands Globalisation* is a book written by Kalissa Alexeyeff in 2009, as mentioned in the previous chapter. Alexeyeff travelled to Rarotonga to research the ways in which dance in the Cook Islands has been affected by Western influences since the Missionaries arrived in the early 1800s. She discusses the expressive culture that is shaped by the past, and how it is shaping the future, as well as outlining the political, personal, moral and economic practices of postcolonial Cook Islanders (Alexeyeff, 2009).

The meaning of contemporary dance in the Cook Islands creates a political discussion between and among generations, debating the interaction between
ideas shaped from the past and local traditions and religious values. (Alexeyeff, 2009).

Our special and unique culture, is it alive and kicking or is it dying and being overwhelmed by cultural commercialization? Are we enjoying it, the way it was before the advent of modernization? Is financial reward the ultimate weapon to destroy our forefathers, our parents, ours and our children’s, great grandchildren’s and many many generations to come’s heritage? We hope not!
Program notes, Festival of Dance, Constitution Celebrations, 1997 (Alexeyeff, 2009)

Another important source of information in this field is Dance Encounters: Exploring Cook Islands identity through staged performances, a very recent thesis by Camilla Jensen. Her research outlines the dance culture in the Cook Islands as a ‘National Identity’, identifying that the different islands of the Cook Islands each have a unique way of dancing and composing dance performances. Each island also has its own legends, which influence the respective dance movements, songs and cultural attire (Jensen, 2011). Jensen addresses the way in which a national identity was sculpted through the beginning of the tourism industry since the opening of the Rarotonga International Airport in 1974, by creating dance troupes that performed solely for tourists. This topic raises issue with Alexeyeff’s study as she discusses how the tourist industry has assisted in the loss of sentimentalities within tourist audiences compared to local audiences.

That tourists do not respond to, or feel, the ‘spirit’ of the dance in the same ways that locals do is the most serious criticism that Cook Islanders of both the old and new generations make about contemporary dance practice (Alexeyeff, 2009).

This topic raises issue with Alexeyeff’s study as she discusses how the tourist industry has assisted in the loss of pride within the youth of Cook Islanders.

That tourists do not respond to, or feel, the ‘spirit’ of the dance in the same ways that locals do is the most serious criticism that Cook Islanders of both the old and new generations make about contemporary dance practice (Alexeyeff, 2009).

(Jensen, 2011) briefly touches on the ‘traditional’ and ‘modern’ aspects of Cook Islands dance. She does not regard these terms as conceptual, rather they are descriptive terms used by the locals of Rarotonga. During the Te Maeva Nui performances in 2011, the Aitutaki dance team (Araura Enua) focused their performance around what used to be performed in ‘the old days’ and how these aspects are performed today. This focus was displayed both in dance style and in costumes. The dance style for the portrayal of the modern-day was a Cook Island dance paired with a Latino dance influence, such as the salsa and mambo. The colour of the costumes determined the difference between traditional and modern day representations: green and brown portrayed Mother Nature and the past because of the earthly tones of natural materials, whereas pink and yellow
symbolized the present time and modernization. The costumes worn by the two primary male and female dancers (the highlight of the performance) differed from the rest of the dance team. The female dancer wore high-heeled shoes - this is rarely seen in Cook Islands dance as dancers are usually bare foot on stage. The dance style and costume were adapted appropriately to represent a specific theme of ‘modern’ and ‘traditional’, therefore the performance was still well received by the audience.

These case studies from Kalissa Alexeyeff and Camilla Jensen pose important questions about what the future will be for Cook Islands dance culture. Their research examines the ways that the culture has been affected by commercialization and tourism. As a young Cook Islander, and having seen and experienced the atmosphere of Cook Islands dance culture of today, I understand the significance of keeping a culture alive through dance. Therefore it is important that I maintain the basics of costume design and use wearable technology as a secondary feature, similar to the way that modern tools and materials are used today in creating what still looks like a predominantly traditional costume. This way the dance style is kept traditional, and may potentially heighten the ‘spirit’ of both a local and tourist audience.
CHAPTER 3

First Prototype
For three to five days each year, Cook Islands tertiary students congregate from around New Zealand to celebrate an event called Taokotaianga. A different Cook Islands students association hosts it every year so that students have the opportunity to experience a different university lifestyle. In 2014, Victoria University of Wellington’s Cook Islands Association (VUWClA) hosted Taokotaianga. Over the few days students participated in various activities, such as sports, debates, inspirational and motivational speeches, and a general sharing of Cook Islands culture and performing arts. The theme for Taokotaianga 2014 was ‘Journey’, and events reflected this theme throughout the week. I am an executive member of VUWClA, so I was fortunate to have the opportunity to help with the planning of the event and to participate in the dance competition between the universities. We made the dance costumes for the competition ourselves, which enabled me to get hands-on experience. Not only did I make my own costume for the drum dance (‘ura pa’u), I also took on the role of creating the costume for the Female Solo, performed by dancer Brienela Tauira, which gave me the opportunity to further refine my attempts at integrating wearable technology into dance costumes.

In the weeks leading up to Taokotaianga there were many workshops, dance practices and meetings to enable a smooth running event. Many emails were sent around to plan the costume workshops for weekends and weeknights. The first few workshops were to make sure that everyone had their own kiriau skirts to wear for the drum dance. As skirts were chosen, strands of kiriau were added or removed, so they fitted perfectly around the dancers’ hips. We hung the skirts so they could be combed through (in Cook Islands Maori, this is called verevere), making them smoother to dance in, and to allow them to emphasise the dancers’ movements better. Once this was done, the tops of the skirts were sewn into calico with interfacing, with industrial strength Velcro added to ensure they stayed secure on the dancers’ hips, and to make the skirts more comfortable for the dancers to wear. Once the skirts were finished, they were trimmed to the right length - men’s skirts were cut at the knees and women’s skirts at the ankles. The next steps were to make the other components of the costume: women’s titis and headpieces, men’s headpieces and necklaces. The cuttings of the skirts were used to embellish these parts of the costume, but were predominantly used to make the titis. The short strands were gathered and put into bundles (poroporo), and put into a pile to await the making.
of the bands for the titi. The band for the titi needs to be strong but flexible so that it can hold the weight of the titi and not sag on the dancer. Materials such as pandanus strips or thin linoleum can be used, but in this case insulation foil was utilized for the titi band. It was encased in the desired coloured fabric with Velcro, ready to have the poroporo arranged on top of it.

In the past, costumes were sewn together with coconut fibres, and later nylon or fishing wire. Now, in the present time, the hot glue gun is a very prominent tool in Cook Islands costume design. We used it to glue the base of the poroporo bundle to the band of the titi (Figure 7). They were aligned in alternate heights along the band to give the titi more volume. In some bundles, coloured tulle was added, being placed facing downwards on the band. This gave a flash of colour to the audience when the dancer moved her hips quicker. For nearly every embellishment attached to the costume, the hot glue gun was used. These embellishments, apart from an arrangement of shells found on the beach (See Figure 8) and the kiriau used in the poroporo, were all ‘modern’ materials: Paper raffia was plaited and used for the bands of both the male and female costumes, plastic flowers were arranged in a cluster with kiriau and used as an accent piece on the titi. When the first titi was completed and tested, I was able to move on to the first costume prototype for my research, which was to be used for the Female Solo dance.

**Prototype**

The colours of Brienela’s solo costume were chosen based on the theme of ‘Journey’, by representing New Zealand Maori culture teamed with Cook Islands Dance. Brienela’s performance narrated her story as a Cook Islander who has grown up in New Zealand. While being in a country far from home, she has maintained her pride in Cook Islands culture by dancing. Therefore colours chosen for the costume were red, white and black: the national colours for the New Zealand Maori flag (Maori Symbolism, 1927). The bra for Brienela’s costume needed a section to drape over her stomach. She comes from a conservative background and therefore is offensive to show too much skin. I used several layers of sparkling red and gold mesh and fabric to cover the area of her stomach accordingly. I then moved to working on how to integrate the electronic composition.

With the help of programmers, I administered 18 RGB LEDs to change from blue to red depending on the speed of movement. Blue was the base colour, so when Brienela was dancing slowly, only blue would show. Once she began to dance faster, the lights would smoothly transition to red, and back to blue when she stopped. I trialed the LEDs on the test titi made for the drum dance costume, so the light changes could be seen in action and I could establish how they dispersed throughout the costume. Changes to the programming were made based on this trial. When that was complete I moved on to making Brienela’s titi, starting with the placement of the electronics. By designing a half titi (poroporo only lay across the back of the band while the front was decorated), I could apply the electronics for the front of the titi. I followed the method that I’d observed through the costume workshops, and glued the poroporo on half
of the titi band. I paired half of the poroporo with the sparkling red and gold mesh, which caught the light emitted from the LEDs. The LEDs were then secured to the poroporo enough so that they wouldn’t fly off, but not so much that they couldn’t be taken off if they needed quick repairing (Figure 9). The bra and headpiece were made to match the skirt, which completed the costume.

During the VUWcia Female Solo performance, the curtains open to Brienela kneeling elegantly in the middle of the stage, with the band situated behind her. The music for the action song plays from a CD. Brienela swiftly dances across the stage, showing off her costume and acting out the narrative of her performance with her arm and hand movements. The LEDs within the costume are turned off for this item. The music pauses momentarily, only to introduce the beating drums from the band. Half of the drum dance item is performed with the stage lights lit. Suddenly the lights dim down, and Brienela switches on the LEDs. A huge cheer from the crowd erupts as she swings her hips at different speeds to display the changing colours of the LEDs.

Not only was Brienela’s charm and outstanding skill a crowd pleaser during her performance, her costume was also very well received by both the audience and the judges. She took home the first place prize for Female Solo Performance (Tarere Mire Kapa Vaine - Re Ta’i) against Waikato’s and Auckland University’s student associations. One of the judges for the Taokotaianga dance performance was Caren Rangi. Caren was an avid dancer when she was younger and is also a researcher of Cook Island dance. When I asked her about thoughts on Brienela’s costume, she provided me with beneficial constructive feedback. She said that when Brienela came onto the stage, she didn’t look comfortable in her costume, however with her beaming personality, she pulled it off just fine. In terms of the electronics, they were applied in just the right way to boost Brienela’s performance to first place. (Figure 10, 11).

I liked that it was only used for the drum dance, any more and it would’ve been too much. There needs to be a balance between technology and culture. It is very easy to overdo technology and it can affect the performance. Less is more. (Rangi, 2014).

This feedback from an experience Cook Islands dancer helped me further refine the adaptability of wearable technology into my costumes. Knowing that the costume looked good without being dependent on electronic components meant that the electronics were adapted appropriately. The aim for my research then progressed to research traditional methods of costume design to see if wearable technology could be integrated similarly.
CHAPTER 4

Field Research
RAROTONGA

I visited Rarotonga, Cook Islands, in order to research traditional costume design methods. Rarotonga is divided into three Vakas: Vaka Te Au O Tonga, Vaka Takitumu and Vaka Puaikura. The Vakas are the original tribes that first arrived by boat (vaka) on Rarotonga. Villages (Enua) subdivide the Vakas. To participate in Te Maeva Nui, you must have a team (of no more than 50 dancers) that either represents the Vaka itself, or as an Enua. For my field research I chose to observe Vaka Takitumu. I spoke with Jacqueline (Jackie) Tuara, a renowned dancer and the choreographer for the Vaka Takitumu dance team, and she encouraged me to follow her along to their practices and costume workshops. I also interviewed Jackie for more background knowledge and history on Cook Islands dance costumes.

During my four-week trip to Rarotonga, most time was spent visiting the library for resources during the day, and in the evenings I would be at the Enua Manea Hall, where the Vaka Takitumu dance team were making their costumes and practicing for the Te Maeva Nui celebrations. The librarian Jean Mason was curious as to why I was looking for such specific resources, so I told her about my research and she became very interested in what I was investigating. She mentioned that she wanted to expand the library museum in order to make room for a chronologically ordered set of Cook Islands dance costumes. This chronology would be to display a set of costumes to display how they have changed through the ages.

When I discovered that Jean was in fact a co-author of Akono’anga Maori: Cook Islands Culture, I was eager to interview her.

Jean Mason is the curator and manager of the Cook Islands Library and Museum in Avarua. She started as a volunteer librarian in 1999 and was appointed to her current position in 2007. She has always been invested in Cook Islands culture and she was a dancer from a very young age until her early 20’s. When I asked her about dancing and how it made her feel, she responded by referencing the youth of the Cook Islands:

I think Cook Islanders just have a natural sort of bent for it anyways. You know, they’re dancing from when they’re really little. Their parents are always encouraging them to dance before they’re one, or by the time they start to walk or talk. They’re being (sort of) pushed into it, you know? Their parents and grandparents are making impromptu music around them, like banging on tables or making the noises with their mouths, and get the kids going. Firstly it’s there, it’s all pervasive and if you’re participating it’s fun and I can see how, as you get older, old people still enjoy it. I think it reminds them of their youth and how vigorous they were once […]. I still love watching the dance, it would be more fun to participate, but it’s a very physical thing and so it’s better to watch other people. It’s certainly a young person’s sport. It’s an art and a sport and you have to be very fit to do it properly. So even though old folks will dance around, it’s not for
any continuous length of time. It’s not uniform, so you’re not under pressure like performing in a dance troupe, where you’ve got to do all the same things. Like most people, you thoroughly enjoy it, it’s just fun.
(Mason, 2014)

As someone who has been dancing for years, I agree that it’s fun, and as I also learnt from a very young age I don’t even remember being taught how to do it. Yet, I do remember learning how to make costumes. Sewing eis (flower leis) was a regular task when I was young, as we had many guests from overseas come to visit, and greeting them with an ei is part of our culture. Being the only sibling with enough time on my hands, the job of making them was appointed to me. Back then there were plenty of flowers around the yard to collect by myself, now the trees have grown too tall, and due to a devastating blight that came about in the early 80’s, many of our frangipani trees were destroyed.

Observing Vaka Takitumu and the Process of Creating a Costume

Theme

Before any particular costume is made, there are a few things that need to be taken into consideration first. To start, there is usually a theme, which is based on history, lore and varied interpretations of both. The theme is generally left open enough so that the judges and audience can draw their own conclusions as to what the performers are representing within the particular theme. Once the theme has been chosen, choreographers and performers are free to start planning the choreography and costumes. Based on how many performances they are doing, they are then able to start gathering materials accordingly. The theme for the 2014 Te Maeva Nui was ‘Based on the Traditional Attire for your tribe’. When I asked Jackie what is involved when choosing a theme, and then executing a performance based on that theme, she replied:
For Te Maeva Nui, the Ministry of Culture will come up with a theme for that year, so it would then involve our ta’unga korero (language expert). In this case for Vaka Takitumu, Mauri Toa has done a lot of that for us for many years. He’d put together songs, just the lyrics, of songs or ute or pe’e for us, and then we would have people with the musical talent to put the musical arrangement together and Pastor Eliu has been a huge influence in that area [...]. Once we’ve got that then we can start to think of how we put the choreography into effect. Choreographing the actions can start the moment I know what the words are. But movement I won’t know until I know what the musical arrangement is. 

(Tuara, 2014)

As the theme for the 2014 celebrations was expressly stated as traditional attire, the use of non-traditional materials and processes in costumes for Takitumu was minimized: no or little dyeing, no wires or feathers, and spray paint was only used to paint components black and red (colours that could otherwise only be achieved with months of soaking in mud or other natural dyes).

It depends on the theme. For example, some years we might use a lot of European materials: things like synthetic dyes, florist wire and hot glue to put together costumes, as well as feathers that have been dyed and purchased from a shop. 

(Tuara, 2014)

Te Maeva Nui in 2014 was not specifically a competition. In fact, according to Jackie, it hasn’t been a competition since 2009. However, the teams are still judged and put into a ranked category (A, B or C, with A being the highest rank) for each performance. These ranks determine how much money the team receives in order to make new costumes and gather resources for the following year.

COSTUMES AND MATERIALS

During my childhood, I started making more elaborate costumes, particularly once I reached standard one at Apii Te Uki Ou. My fellow students and I were taught to plait leaves into titis. I grasped the concept reasonably quickly as I had watched either my mother or close family friends make my previous costumes many times before that. But when I asked Jean about her experiences with costume making as a child, she revealed that she didn’t have the same helping hands as I did. Instead she learnt to make her own at a young age.

I learnt very quickly to make my own kikau dance skirts and sew my own leis and collect my own flowers and stuff like that, and my mother just pretty much left me to it, right up until I was about 17 or 18 [...]. I’d have to buy the stuff, borrow or beg, and I used to write to my grandmother as well who lived in Mauke. She would quite happily make my hula skirts for me and send them over, and it was good
because she used to do the old style with the band, which was plaited around your waist. It was nice it was actually woven: it was like a mat, using the same fibre that the hula skirt was made from. So my skirt always looked better than everyone else’s and I was grateful for that. (Mason, 2014)

The materials used to create Cook Islands costumes have changed significantly over the years. The question now is: how have they changed? I asked both Jackie and Jean questions about the costume process. To put the questions into context, I relate the questions for Jackie to what Vaka Takitumu do for their Te Maeva Nui costumes, both in the past and present. In addition, Jean’s questions were focused on her personal experience with making costumes.

As a means of fastening the costumes onto the dancer, Jean reflected on how she would take the clips out of her father’s or grandfather’s old trousers because they were heavy duty and would hold up the costumes really well. ‘You didn’t want to be dancing and then the whole thing falling apart!’ But these days, Velcro is used to hold the costumes together. She noted that retailers helped accelerate the development in costumes. Feathers were taken from feather dusters and other imported items: these were non-existent when she was younger. The hot glue gun also made everything easier.

We never had that when we were younger, we used to hand stitch everything with thread and string and nylon. But now the hot glue gun is just the number one tool…and so I reckon just the availability of the products has accelerated dance costume creation and the tools for it. In my day it was just manpower. It was all sewn on and it was all nylon. (Mason, 2014)

Although nylon is not specifically ‘traditional’, it was introduced to fishing in the Cook Islands when the missionaries arrived. Before this fishers used sennit (coconut fibre string), or the bark from some trees (Tai’a, 2003). Jean mentioned that in ‘the olden days’ dancers would use props such as boxes to dance both on and around. When I showed her the costume I’d made for Taokotaiaanga, her response was positive, saying it was ‘wonderful’ and ‘clever’. She said that in the past, candles in coconuts and fire torches were used in dance, which back then was very dramatic: ‘people loved that, and it was so beautiful’.

**KIRIAU/RAU’ARA**

Jackie stated that for costume production the first material to be mass collected is the kiriau. Kiriau is soaked and dried tree bark from the Au tree. The Au tree (Hibiscus tiliaceus) is a coastal Hibiscus tree found in Eastern and Northern Australia, Oceania, Maldives and Southeast Asia (Elevitch, C.R. & Thomson, L.A.J., 2006).

There are a few methods to make the bark soft and ready to use in costumes. The first way is to leave the bark on the branches and soak them in seawater for two to three weeks. The bark is then stripped and left...
out to dry. Another way is to strip the bark from the tree first, place the bark into sacks and then soak them in seawater. The longer the bark is left in the sea, the more the colour fades and the bark becomes a very light brown. The third way is to strip the bark in a certain way that leaves it soft and flexible for costumes. This is also known as ‘rau’ara’. (See Figure 14).

If a darker colour is desired mud can be used at this stage to stain/dye the bark: the longer it is left soaking, the darker it becomes. These methods of changing the colour of the kiriau used to be carried out before commercial products such as dyes and paints were available. Now that there are contemporary methods of doing this, as well as a decrease in the amount of time spent making the costume, tie-dying and bleaching methods are much more preferred. I asked Jackie what goes into dying or staining kiriau, and this is what she had to say:

I really have no idea because I’ve never done it. But I can say, from this year’s experience, that mud certainly does stain. We had our kiriau prepared and readied it to be put in the sea, and normally when you put that into the sea for about 3 weeks, you’ll have kiriau that comes out nice and white. But this year, where we placed it was close to a stream outlet. When it rained three days after we’d done that, and because we’re not at the site, we discovered two weeks later that it had been covered in mud from that downpour. Some of the bags were really dark, so we cleaned them out and tried to save them by putting them out further into the lagoon and closer to the reef. A week later they weren’t
as white as they normally would be, certainly a bit brown, but after using a lot of NapiSan (well that’s another modern thing we do), they turned out fine.
(Tuara, 2014)

Once the desired colour has been achieved, the kiriau then gets strung into skirts, ‘kiriau pareu’. As individual skirts are made for individual dancers, the length of the kiriau is left long until the dancer has a full skirt, and it then can be trimmed to the preferred length for the individual dancer (Figure 16). The next task is splitting the fibres (the verevere process). Once this is done, the women usually trim their kiriau pareu to their ankles and the men to just below their knees. The trimmings are kept for poroporo to make the titi or to embellish different sections of the costume.

**Pandanus leaf (Rau)**

The pandanus leaf has many different uses in costume making both in its fresh or dried form. It can be used to cover a large area if woven. It is also used to help secure the structure of the titi because it is strong enough to hold the weight, yet thin enough to be sewn through. For Vaka Takitumu, pandanus was woven in order to embellish the men’s waistband (Figure 18). For the women, pandanus was sewn into brown calico material so that poroporo could be sewn to it to make a titi. Pandanus is sewn into the calico so that the weight of the titi is supported properly, and so it is more comfortable for the dancer.
**Tamanu Seeds**

Tamanu seeds are used for necklaces and costume embellishments. Their green skins are peeled to reveal a pale brown seed. They can either be soaked in mud or dyed to give them rich colours, or left to dry naturally. (Figure 20).

**Mother of Pearl Shell**

The shine and subtle colour of the pearl shell makes for eye-catching embellishments on costumes. These can either be left whole to cover a larger amount of space, but are commonly broken into pieces and scattered across sections of a costume, where the pieces can catch the light as the dancer moves. (Figure 19).

**Rautī**

*Rautī* (*Cordyline Fruticosa*) is a broad flat leaf that comes in different shades of green and red (see Figure 23, 24). Rautī costumes are made for one-off performances, because it’s a fresh material and turns brown after a few days. The leaf is stripped along the veins and removed from the stem to make smaller pieces. These pieces are then plaited together to create a *titi*, headpiece or hand/foot band. The leaf can also be used as neckpiece for both women and men: by stripping away the stiffness of the stem, the leaf becomes soft and malleable, enabling it to sit against the body neatly. For this purpose, Rautī are stripped along the veins of the leaf (but not removed), then tied together and draped around the neck. The Vaka Takitumu dance team used *rautī* for their Action Song performance, utilizing the different colours in the women’s costumes to represent the four *motū* (small islands) within their village.

Solid materials usually have holes drilled into them so they can be threaded onto costumes. Using a drill is definitely a modern method and much faster. When there are 50 dancers in a team, drilling holes as opposed to manually hammering holes is much less time consuming, as there is less potential for the materials to crack or shatter. Jackie reflects on the methods of tradition versus the methods of today in this quote:

> I think traditional methods are just really time consuming and that’s why the shift to use or using modern materials is so much quicker. Back in those days, what else did people really have to do? And so it was normal to sit all day making tapa, or all day doing kiriau […] But in today’s world, everyone is busy working, and so
we try to find the quickest methods of creating costumes. But also times have changed. And I think that’s just progress, like anything else. We can’t stay stagnant, because dance, like any other art form, is creative and creative is new. […] In a huge way everything has changed and it’s just the creativity of individuals that influence that. (Tuara, 2014)

For Jackie, the sky is her limit when it comes to choreographing a great performance. To follow up on the theme for Te Maeva Nui, Jackie wanted Vaka Takitumu to portray the Moon Goddess Ina. Ina is responsible for introducing tapa cloth (which is the traditional attire for Vaka Takitumu) in their drum dance item. They added a different dynamic to the beginning of the performance by leaving the stage pitch black, with only a giant moon prop to be lit. The moon was made out of a big metal hoop with white fabric covering one side. Behind the moon stood a dancer that represented Ina, and she opened the performance with graceful imitations of making tapa. To carry through that theme of tapa, the women’s backs were painted in a tapa pattern. These patterns were hidden throughout most of the performance by their kiriau capes. At one point of the dance, the men stood behind the women and removed the capes, which was followed by the women turning their backs to the audience in unison to reveal a long line of tapa patterns. The moon prop and tapa patterns on costumes are rarely seen (if at all) in Cook Island dance performances. These modern features, as well as a fantastic performance overall, placed Vaka Takitumu in Category A. Takitumu was placed in Category A for all their performances.

I love traditional culture and I love modern changes to traditional culture. I would use wearable tech in a costume, but dependent on what the performance is for. (Tuara, 2014)

A detail that caught my attention during the interviews was the use of candles or torches in costumes and the standard of craft and originality in costumes today versus several years ago.

It wasn’t that long ago that candles were being used as a light effect for costumes. I remember as a kid thinking, whoa, that’s so fascinating. And so back then it was the standard, so it’s interesting seeing the lights in costumes now as the standard and how interesting it is seeing how far costume development has come. (Rangi, 2014)

As Caren is someone who has seen many costumes in her time, her perspective on the use of technology in costumes today demonstrates that it can impact a performance in the same positive way that modern materials or creative expressions have in the past. Her statement is similar to that in Jean Mason’s interview, when she mentioned that, back then, candles and torches were considered very dramatic and utilized as a crowd pleaser. Jean has seen many Cook Islands costumes over the years, and states that the costumes are getting bigger while the skill of the dance is becoming less. This provided me with encouragement to consider costume innovations that could be simple
but still effective. Jackie, who has been the foremost person to hear about my ideas and has given me more inspiration than anyone in regards to dance, was more intrigued by the novelty of my costumes. It is her view that the originality of the innovations had value because they still have, and respect, the basis of a traditional Cook Islands dance costume.

If you compare my lifetime, and even just 20 to 30 years ago to today, there’s a huge difference: in dancing and in costumes. Then, you know now with modern technology, electricity and things like that have influenced costumes like your light up ideas. That’s like, wow, that’s another step that no one’s ever done yet, and that’s really, really exciting.

(Tuara, 2014)
CHAPTER 5

Creating Ta’akura
CHOOSING THE THEME

For my costume design it was necessary to choose a theme that could be easily portrayed through emotion and movement. I chose The Legend of Ta’akura. As is to be expected in a culture that records its history and legends primarily in oral form, there are many different stories told about Ta’akura, such that it is hard to decipher what the real story is. Most Cook Islands myths and legends have been passed down through generations, and although the story may have changed, the themes of the stories have not been lost (Jonassen, 1985). I contacted Jean Mason once more, and asked her what she knew about the legend. She replied with a number of different stories:

Ta’akura is the name of both ancient Cook Islands people as well as mythical characters. ‘Ta’a’ means to soar, float or skim, to plane, to fling or to fall, and ‘Kura’ means red in old Maori, along with message, petition or gift. Ta’akura is no longer a name that is used to name offspring, as it is believed to be both respected and/or feared (similar to Jesus/Satan). One variant of the story was that her lover betrayed her by cheating on another woman. Because of this, she committed suicide and now seeks revenge on all men. It is also said that she haunts the lagoon of Ngatangiia (a village within Vaka Takitumu). She is feared and loathed by men, because legend has it that she lures them to their deaths. Ta’akura has been sighted sitting on a rock in the Ngatangiia lagoon, combing her long red hair. The colour red is often chosen to represent Ta’akura, as it is a rare colour in Polynesia, and rarity makes it special.

Jean also provided me with a poem about Ta’akura that she wrote at the age of 16. It was published in her book Tatau in 2001. It reads:
TA’AKURA

In the light of the full moon
an ethereal purotu
sits on a rock
combing her long hair
As the pu’i sleeps she sings her siren song
to the music of the breeze rustling au leaves
She floats above water in her gossamer gown,
alighting on the sand
her footsteps leave no prints
Ko’iti scurry for their holes as she walks over the ridge
to Paringaru Bridge
where she waits.
Disappearing in the headlights
of a car out of control
a startled driver
looks around beside him
A vengeful apparition,
a hideous face
framed by red hair
is the last thing he sees.

(Mason, 2001)

Glossary: purotu - a beauty, pu’i - eel, ko’iti - ghost crabs (Ocypode laevis), au - beach hibiscus.

For more legends about Ta’akura, refer to the appendix.
Concept Art: Ta’akura
TECHNICAL EXPERIMENTS

My findings during the Taokotaianga costume design process showed that the majority of materials used were either modern or put together with modern techniques. After researching costumes in Rarotonga, I realised that there was more meaning in natural materials being considered more valuable. My final design integrated the electronics appropriately into a fresh rautī costume to achieve the traditional aspects of costume design. The final design, which I named ‘Ta’akura’, was an interactive choreographed performance piece performed by Jana Whitta. I travelled back to Rarotonga a second time, as it was the best place to compose and perform the final design. Performing in Rarotonga put the costume and theme into a suitable context and it meant fresh and natural materials were readily available. The technique used for making the costume was based on my observations from the Vaka Takitumu dance team, accompanied by my previous knowledge of costume design. The costume for Ta’akura was developed through experiments and refinements to my previous designs. As I had used LEDs many times before, these new experiments included adding a different element: the introduction of a video production as backdrop to the performance. The visuals were interactive and were controlled by Jana on stage.

During my first trip to Rarotonga, I carried out experiments with LEDs and their effect when shone through fresh materials, such as rautī, hibiscus flowers and coconut fibre. The light would reveal the veins within the flowers and rautī leaves and the glossiness of the leaves would emit the light further. When a LED is shone against the coconut fibre, fascinating light patterns can be created. (Figure 30).

Upon returning to New Zealand, I began experiments with plaiting and twisting wires as well as weaving wires through the kiriau plaits that I had learnt from the Vaka Takitumu dance team. This was a way to keep the wires orderly and out of the way. I tested two different sets of wires: with and without individual...
LEDs attached (Figure 32). The set of wires with LEDs attached made for a quick application, and without LEDs took more time to integrate, but were also effective. I also experimented with off-the-shelf LED strips. Their integration proved a little more challenging, as they couldn’t be woven as an entire strip. If the LED strip was cut into pieces of three LEDs each (12V LED strips are connected in a parallel circuit in series of three), then wires could be run to each separate strip plaited through the skirt (Figure 31). This method distributes the light throughout the costume differently. Instead of weaving LEDs through the kiriau, I tried sewing the strip at the base of the titi below the fibers. The strips could either be sewn flat against the base, or gathered to distribute the light further throughout the costume.

Considering the success I had experienced with the Taokotaianga costume prototype, which was illuminated and changed colour depending on different movement and speed, I decided I would expand the idea further. I added another component to the costume that not only enhanced the performance as a whole, but also challenged and improved my technical skills. To accompany the lights controlled by an accelerometer in the titi, I added accelerometers on the wrists of the dancer. These accelerometers measure the dancer’s hand movements as she dances. The data measured was then sent wirelessly to a computer using a transmitter and receiver. Once the data costume is received, it is linked to interchangeable effects in a live video editing software. These visuals, which were a compilation of documented costume making processes, were projected onto a large screen behind the dancer. The footage was manipulated and corresponded to the hand movements of the dancer.

I returned to Rarotonga for a second time. After researching the legend and coming up a concept, the focus moved to the costume and performance. The legend of Ta’akura is ideal for staging as action song, portraying a range of emotions from happy to sad, followed by a drum dance, which portrays Ta’akura’s revenge. The bra was the first part of the costume to be made, as this is where the Arduino and transmitter for the wrist accelerometers were housed. The bra also needed to have lights that changed colour based on the movement of the hips. I used an LED strip and positioned it so it curved with the shape of the cups. I had to cut the LED strips and separate the bending areas with short wires in order to do this. Velcro pockets held the Arduino and transmitter at the back, along with a lithium ion battery (these are small and light fitting). The Velcro makes for easy removal for the electronics, therefore Jana didn’t have to climb into an array of wires. The titi held the Arduino and accelerometer that controls the LEDs. The bra was attached to the titi, as well as the headpiece, with wires travelling along the dancers body. I intended to use wire connectors to separate the costume pieces more efficiently and appropriately.

Because the costume was made out of fresh materials, experiments were needed to find the ideal placement of the electronics within the costume. These experiments took place in Rarotonga. Using red rauti I went through several prototypes using the
same method I used when I was at Apii Te Uki Ou. I used different variants of red rautī to create the entire costume (Figure 33). For the bra, strips of the rautī leaf were staggered across the front cups and sewn on with cotton. As for the titi and headpiece, I plaited the rautī into a band (the same way Firedancer 3.0 was made, only with kiriau). After the first prototypes for the titi I found that the base was thick enough to have electronics sewn on the underside of the rautī leaves. I used the method of gathering the LED strips to disperse the light through the leaves. In contrary to the titi, the headpiece was a little smaller (the leaves used to plait were shorter because they don’t have to stretch as far out from the body). I instead laid the LED strip flat against the rautī, as the light doesn’t have to reach far to illuminate the headpiece.

SETTING UP THE VISUAL DISPLAY

By using a programming language called Processing (“Processing.org,” n.d.) I was able to control the Arduino and accelerometers on the dancer using a software library called Firmata (“Arduino - Firmata,” 2015). This software then communicated with a live editing software called VDMX5 (“VDMX5 · VIDVOX,” n.d.), through OSC (Open Sound Control) (“Andreas Schlegel - oscP5,” n.d.). Through corresponding IP addresses, data is wirelessly sent from the Arduino, then received by Processing, then sent VDMX5. Throughout my research I video documented various methods of costume development, particularly during the Vaka Takitumu costume workshops. I also documented my own processes while making the Ta’akura rautī costume: first the method of how it is made, then the sewing of the electronic components into the rautī. For the action song item, I created a collage of the video footage portraying the different methods of creating a costume, and set this as the first layer of footage to be displayed on the screen behind the dancer. The second layer was of the electronic components being applied to the rautī costume, and was slightly transparent. This was so the first layer of footage could be seen through the second. The visuals for the drum dance item changed to a black and white view of Avana passage, a location said to be where Ta’akura spirit wanders. I chose the video documentation as the visual backdrop for the action song item to tie together my research of
costume making processes throughout my research with the integration of wearable technology. The computer was then hooked up to a projector, which cast the footage onto the screen behind the dancer.

The performance required a big screen that would display the dancer’s corresponding visuals. These visuals were projected from the computer, which was wirelessly connected to the dancer. The first challenge was finding a location in nature with access to electricity. An outside venue was desirable so as to emphasise the environment and put the performance into context, and because I was in Rarotonga, it would be a shame not to use this opportunity. I found the perfect location by a poolside. With the help of my mother and father, I set up the screen a few meters away from the edge of the pool, and because it was dark during the performance, you didn't see the pool tiles. Instead you saw the reflection of the dancer and the projected visuals.

Due to a few hurricanes, near on 10 years ago, the waves from the sea washed away the fence around the pool. The waves did, however, leave the supporting poles, so they were used to mount the frame for the screen. The screen was hand sewn out of poplin sheets and reached approximately 5m high and 8m wide. A night before the performance we dressed the area with lilies, rautī, vines and ferns. They were aligned on the sides between the screen and the edge of the pool. We disguised the concrete with sand, rocks and more vine. The stage was now ready for a dancer (Figure 34).
THE FINAL PERFORMANCE OF TA’AKURA

I chose Jana Whitta as the dancer, particularly because she is a close family friend and, more importantly, a presumed descendant of Ta’akura. Jana performed the items: action song and drum dance, which she choreographed herself together with her close friends, Mariata Pittman and Tarita Mulholland. Jana performed ‘Ta’akura’ in front of Jackie Tuara, members of VUWClA, my parents and family friends.

The night was still and the water of the pool stayed as calm as the starry sky for the entirety of the performance. Vao Mai Te Akau (Beyond the Reef) by Bobby Browne, 2011, is a soft instrumental that opens the performance. It is a soft slow song that I chose as it reflects Ta’akura’s happiness and beauty, at first, then slowly progresses to her heartbreak towards the end. The slowness of the song also means that hand movements send clearer data to the live editing software on the computer. Visuals of the costume making process by various individuals play on screen in time with the music. Based on Jana’s left hand movements, the colour of the footage changes while her right hand movements alter the opacity of footage integrating technology into the costume. The graceful hand gestures gently narrate Ta’akura’s loss and heartbreak. Jana ends the action song by kneeling on the ground, which suggest Ta’akura’s self-destruction, leading then to the drum dance: Ta’akura as a ghost. The drum dance shows Ta’akura’s revenge. The music I chose for the drum dance was the opening drum beats of Tiare Rarotonga, played by the Orama drumming team. The focus moves from the screen to the costume as Jana turns on the LEDs. The visuals for the drum dance change to the black and white view of Avana passage. This location is the village area in which Ta’akura’s spirit has been seen. As the drum dance increases in beat, the movements become more abrupt and Jana’s actions suggest Ta’akura’s calling to an un-loyal man nearby. The lights on the costume symbolize the ghostly effect of Ta’akura, and to attract men like a moth to a flame. She lured the imaginary man to her with summoning actions, only to follow with a gesture of driving force of a spear into his heart, killing him, succeeding in her revenge.

The audience responded well to the performance and gave positive feedback. The water of the pool was comparable to glass, so planning the reflection of the performance was worthwhile. Jackie’s feedback for the Ta’akura performance was more focused on the visual backdrop behind Jana: there wasn’t a clear connection between the hand gestures and the changing footage. I hope to have Ta’akura performed to a wider audience in order to obtain some more critical feedback. This way I can grow and develop wearable technology and its integration with Cook Islands dance costumes appropriately.

A video of the performance can be found on the attached USB device and at http://taakura.tumblr.com (password: temaevanui)
CONCLUSION
My research into Cook Islands Dance and the Introduction of Wearable Technology has been a personal journey that I hope to be able to share with future scholars. During the entirety of my research, I have undertaken various experiments. These experiments are focused on finding the right style and technique of appropriately integrating wearable technology into Cook Islands dance costumes.

My thesis encourages the integration to be thoughtful. Cook Islands costumes have been subject to change over many years and more advanced evolution is inevitable. At this stage, wearable technology in costumes is still a novelty, and my research is still in its infancy. The ‘balance of technology and culture’ is a very prominent theme throughout Cook Islands dance. It is important to keep in mind that there is still an underlying concern that Cook Islands dance and culture is at a risk of being watered down by technology. Technology can be adapted to costumes in a way that will heighten the cultural performance if it is done with reason. I have been encouraged by the fact that most feedback on my costumes thus far has been enthusiastic and supportive. However, the novelty factor of integrated technology will quickly wane. For instance: an LED-filled costume with absence in significance will have less impact over time. It may also divert the attention from the narrative of the performance. If LEDs, or wearable technology generally, can be used to better reinforce a theme, then the future use of wearable technology will become more substantial and applicable. With thoughtful integration of technology, the foundation of Cook Islands dance can be maintained, and wearable technology can be used as a tool to enhance the costumes and the dances.

The outcomes of prototypes and my Ta’akura design were successful to the extent that the feedback from audiences was generally positive. I received constructive criticism from Jackie, stating that the placement of the electronics could be better hidden. She also suggested that the link between the dancer and background footage could be more evident. Unless the audience had been told prior, there wasn’t a distinctive interaction between the two. This feedback encourages me to push my research further, and to do this I would need to reach out to a wider audience. Further research on this topic could include investigations into how other forms of interactivity between the dancer and wearable technology could be achieved. With advances in technology, new creative expressions will be found, many of which we couldn’t even conceive of today.

Wearable technology in Cook Islands dance costumes may play a part in affecting the ‘spirit’ of a performance vis-a-vis a tourist filled audience, as well as a local audience. There are a couple of ways it could be received: either the audience will react to the familiarity of modern technology and see it as an enhancement to the culture, or they will take it as a degradation of the culture and disapprove of the technology altogether. Again, this will be dependent on how sensitively wearable technology has been integrated into the costume. This is also reliant on how considerately the interaction has been designed in service of the larger purpose – to keep the legends and traditions of Cook Islands dance alive.
My research has helped me understand and expand my knowledge of Cook Islands culture and how I can contribute to the positive development of it with wearable technology. As a designer, integrating my cultural background into my work has been both motivating and inspiring. By giving my projects a purpose, culture has helped form a deeper meaning and strengthened the aesthetic and technical functionality. I have aimed to establish a strong connection between traditional and creative expressions by appropriately adding a Western tool into a proud, traditional culture.
GLOSSARY
<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
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<tbody>
<tr>
<td><em>au</em></td>
<td>Hibiscus tree (<em>Hibiscus tiliaceus</em>)</td>
</tr>
<tr>
<td><em>ei</em></td>
<td>Or lei: string of flowers/shells/plant materials. Worn on the head (<em>ei katu</em>) or draped around the neck</td>
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<tr>
<td><em>enua</em></td>
<td>land</td>
</tr>
<tr>
<td><em>ingoa</em></td>
<td>name</td>
</tr>
<tr>
<td><em>kapa rima</em></td>
<td>action song</td>
</tr>
<tr>
<td><em>kikau</em></td>
<td>coconut frond</td>
</tr>
<tr>
<td><em>kiriau</em></td>
<td>bark from the <em>au</em> tree</td>
</tr>
<tr>
<td><em>ko’iti</em></td>
<td>ghost crabs (<em>Ocypode laevis</em>)</td>
</tr>
<tr>
<td><em>kura</em></td>
<td>red, message, petition or gift</td>
</tr>
<tr>
<td><em>manea</em></td>
<td>lovely, attractive, beautiful, nice</td>
</tr>
<tr>
<td><em>motū</em></td>
<td>Small islands</td>
</tr>
<tr>
<td><em>pa’u</em></td>
<td>drum</td>
</tr>
<tr>
<td><em>pe’e</em></td>
<td>chant</td>
</tr>
<tr>
<td><em>pu’i</em></td>
<td>cel</td>
</tr>
<tr>
<td><em>purotu</em></td>
<td>A beauty</td>
</tr>
<tr>
<td><em>rā</em></td>
<td>The sun</td>
</tr>
<tr>
<td><em>rau’ara</em></td>
<td>See kiriau</td>
</tr>
<tr>
<td><em>ta’a</em></td>
<td>to soar, float or skim, to plane, to fling or to fall</td>
</tr>
<tr>
<td><em>tamataora</em></td>
<td>Give pleasure, entertain</td>
</tr>
<tr>
<td><em>Tā’unga korero</em></td>
<td>Language expert</td>
</tr>
<tr>
<td><em>tini</em></td>
<td>Cabin bread tin</td>
</tr>
<tr>
<td><em>titi</em></td>
<td>Skirt made from kiriau or rautī</td>
</tr>
<tr>
<td><em>‘ura</em></td>
<td>dance</td>
</tr>
<tr>
<td><em>ute</em></td>
<td>Celebratory chant</td>
</tr>
</tbody>
</table>

(Tisam, 2011)
REFERENCES


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MEMORANDUM

TO      Rachel Hockin
COPY TO Anne Niemetz
FROM    Dr Allison Kirkman, Convener, Human Ethics Committee
DATE    11 June 2014
PAGES   1

SUBJECT Ethics Approval: 20886
          Modern Dance Culture in the Cook Islands

Thank you for your application for ethical approval, which has now been considered by the Standing Committee of the Human Ethics Committee.

Your application has been approved from the above date and this approval continues until 2 March 2015. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Allison Kirkman
Human Ethics Committee