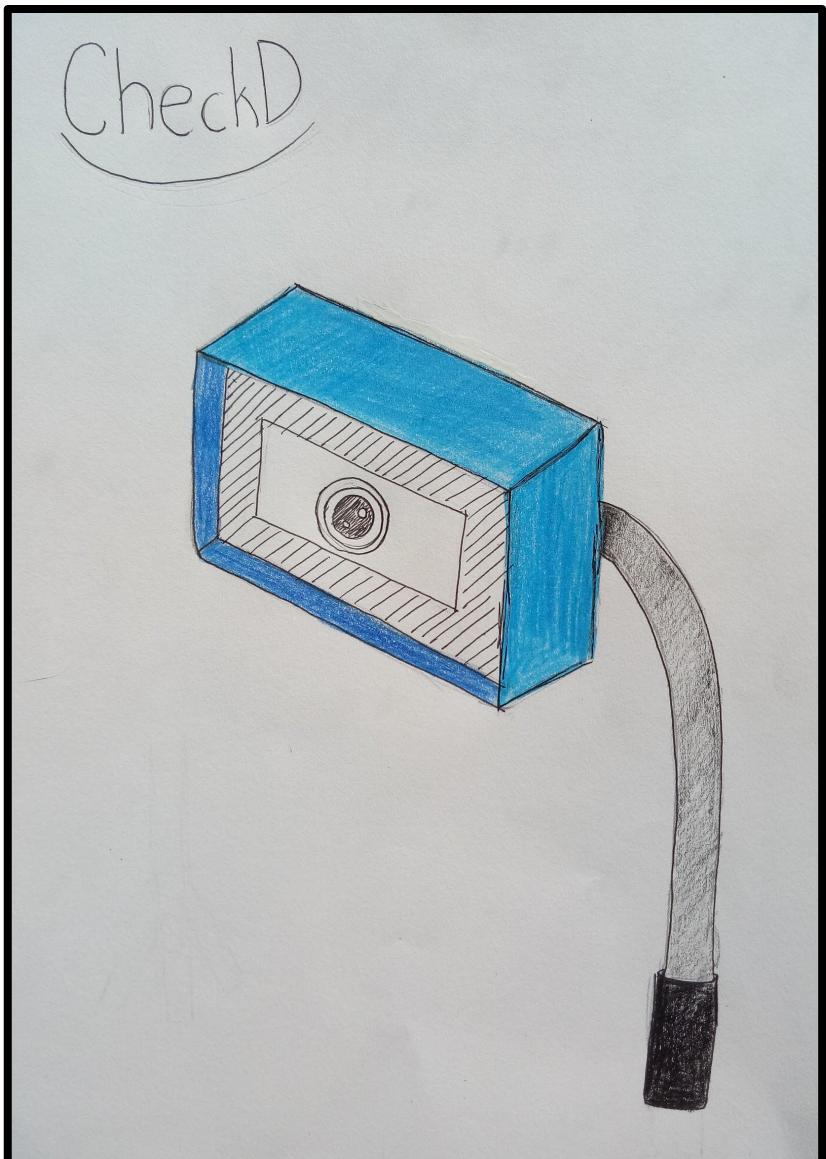


**YOUR
BIG IDEA**

Summarise your idea using our 'fill in the blanks' template below and a visual which reflects your project.



MY INNOVATION IS CALLED **CheckD**

MY NAME / TEAM NAME IS **Alaya Callinan**

I / WE GO TO SCHOOL AT **Otumoetai College**

MY / OUR BIG IDEA IS **To create a device and app**
to help track moles at home.

AND IT HELPS **Those who are at greater risk of developing**
skin cancer, or anyone who is concerned.

BY SOLVING THE PROBLEM OF **People not getting their moles**
checked as frequently as they should.



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THE PROBLEM

Communicate the problem you are trying to solve, how big it is, who it affects and why it matters.

WHAT PROBLEM AM I TRYING TO SOLVE AND HOW DID I IDENTIFY IT?

The problem I am trying to solve is that many people are not getting, or are forgetting, to get their moles checked on a regular basis. They may struggle to afford mole mapping, have low self-esteem, or just cannot be bothered going to a doctor every 6 months.

My family has a history of skin cancer, and I am at an increased risk because of this. I have personally lost someone close to me from this disease due to them not getting their moles checked, and it has impacted my mindset greatly. Since I am at increased risk, I try to track my moles, yet I haven't been able to. The apps I have tried, have never worked for me since it was either too hard to take a photo or too hard to reach a spot. Molemaps are very expensive and seem quite invasive. Due to these issues, I wanted to be able to create a product that's easy and reliable to use so people are not afraid to be checked and are not paying great expenses. This could save a life.

WHO'S AFFECTED?

Everyone can be affected by this problem since anyone can get skin cancer. However, those most at risk or worried about this disease are the most affected groups.

WHY DOES IT MATTER?

This problem matters since skin cancer is the most common cancer in the world. It can spread very quickly throughout the body if left too long, and can be fatal. In NZ, we lost 486 people in 2012 because of this disease. If people continue to leave their skin cancer undetected, many will continue to die.

HOW BIG IS THIS PROBLEM?

To really understand how big of a deal this problem is, I looked through many articles.

- Cancernz.org.nz states that skin cancer is the most common cancer in New Zealand, resulting in 486 deaths in 2012. It is a highly preventable cancer with over 90% of cases being linked to sun exposure. They say, "It is important to detect skin cancer, especially melanoma, as soon as possible. Early detection generally gives the best chance of successfully treating cancer."
- Molemap.net.au mentions how by the age of 70, two out of three Australians have been diagnosed with skin cancer. They also state, "While most people know that early detection is best, there's still a lot of confusion about whether you need to undergo regular skin checks. You may be surprised to learn that, according to the American Academy of Dermatology, 40% of melanomas are detected by patients at home because they noticed a suspicious looking mole or a change to one. This goes to show how important regular self-checks are. However, if you are a high-risk person or you've found a suspicious-looking mole or spot, it's beneficial to visit a melanoma detection specialist or dermatologist every 6 to 12 months for a more thorough check."
- I also noticed on the molemap.nz website that a FAQ was people needing to get a molemap, have to take their clothes off. The answer included that the Melanographers are experts at making patients feel at ease, proving that often people are embarrassed or do not want to take their clothes off for examination.
- Dr. Ben Tallon agrees that this is a problem in New Zealand.
- From a family survey, they all agreed that this problem is relevant and is quite significant currently because we're in such a high risk country due to the hole in the ozone layer.

Seeing how dangerous and common skin cancer is, it being left undetected could be extremely detrimental to a person and their family. In New Zealand, skin cancer is the most common type of cancer since we are underneath the giant hole in the ozone layer, meaning we are constantly being exposed to high amounts of UV rays. Skin cancer alone is a major problem, and factoring in people not getting checked, makes it a problem.



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Communicate who your innovation is for, what they need, who you spoke to when carrying out your research and what technology or science you might use to make your innovation work.

3

REACHING OUT TO PROFESSIONALS

To gain the best insights for my project, I reached out to several professionals. Being in lockdown due to the global COVID-19 pandemic, I am unable to physically visit any professionals. This has proven to be a bit of a barrier since you cannot continue asking questions without having to resend anything or re-contact the professional.

First I contacted molemap.nz, asking for advice, suggestions, and a few questions.

I got in contact with Adrian Bowling, CEO and Founder of MoleMap NZ and Chief Technology Officer. He mentioned that from their internal study, it suggests that patients are not good at identifying malignant moles, and mentions that 80% miss melanomas. He provided great insights on what people might not know and what I would need to consider if I was just creating an app; what are you going to do once you've chosen a mole, changing moles aren't always malignant, how would I promote the app, how would I engage the people who are classified at most risk (people 65 and older). Also, he mentioned to forget other types of skin cancer since they are mostly found in people over the age of 65 and aren't generally life threatening. He suggested, "Research how you could get a mobile phone camera to take a consistently good image of a mole (distance away, exposure, focus, blur, hair, etc). Once you have solved that problem then life becomes much easier. Imagine collecting 100,000 standardized skin lesion images, having these labelled by experts and then training an AI algorithm with these. Then use the AI algorithm to serve up comparable images so

that patients can get an idea of how concerning their mole is. This is never going to be as accurate as a visit to a skin doctor (or Molemap) because they use a special technique called dermoscopy that looks under the surface of the skin and has a much greater accuracy than a naked eye view. BUT, identifying the more advanced melanomas is entirely possible if you have a good image to start with!"

Secondly, I contacted the Skin Dermatology Institute located in Tauranga.

Ben Tallon, a dermatologist at Skin Dermatology Institute, was the one who replied to my queries. He agreed that the problem I have identified, people not getting their moles check at all or as frequently as they should, is a particular problem in New Zealand. He states, "This is certainly an issue which has been recognised, and you are not alone in your thoughts here. The difficult issue for app based screening is finding an algorithm that is sensitive enough to not miss any melanomas, but specific enough not to cause over treatment. The main role of an app like this will likely be as an adjunct to the clinical exam with a dermatologist, to improve the diagnostic accuracy there. As you mention though, there is always a role for increasing awareness of concerning lesions that could then be brought to a dermatologists attention." He also provided many links which answer some of my questions I had sent him.

Lastly, I contacted Tim Grubb, Chief Executive of Haunt Digital. (This is thanks to my Uncle who is good friends with him).

Tim provided a lot of very useful information when it comes to app design and what I should be focusing on. He states, "Less is more". He mentions I should be thinking about developing a Minimum Viable Product (MVP) instead of the Product Roadmap, which is for further down the track. "Thinking about the MVP is really useful, because you basically have to ask yourself what is the very least we could build and still have a product that people would want to use. This forces you to think about what your value

proposition really is. Think about a lot of apps that are out there - many of them don't actually do too much". At first, I wanted to include as much as I could so my app was 'more interesting' or 'not boring', but after hearing what he had to say has really guided me in the different direction of 'simple'. I described what Adrian Bowling mentioned about collecting 100,000 standardized skin lesions, and Tim stated, "The way that this would work is using AI, to develop an artificial cognitive framework to improve diagnostics. This technology is not too difficult to programme but would need a LOT of data though." Further, he mentioned I should be focused on demonstrating a business case based on what the app DOES rather than how nice it is to use. He provided questions to ask myself, "Who is the real audience - is it users, or doctors, or other?", "What is the Killer Feature that your thing will do?", "What does the MVP look like - what is the smallest possible thing you can build and still have a viable product." Finally, he mentioned to not get too caught up on what I'm building since most products evolve from launch. He says start with 'Market Validation' - talking to lots of people to decide what you will actually build, then Proof of Concept (POF).

Tim provided many links which will help me with these concepts and what not to do such as; a single founder, bad location, having no specific user in mind, and not enough money. The information in the links are very business based, as if I was actually going to go through and create this product. However, having the outline of what could happen has helped me alter my project when thinking of the bigger picture. I will also make New Zealand the focus of this app.



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SkinVision



DermIA



CURRENT APPS

To create the best product I can, I looked through multiple apps to gain the pros and cons of each one so I can understand the customer and their needs.

- **MoleScope - 3.4 star rating on the Google Play store.**

In regards to reviews, there are many positives. This app does come with a phone attachment as well. Many of the positive reviews were impressed with how easy it is to track the moles. One review stated how it's great the app compares your moles to other images of moles. The negative reviews weren't very descriptive, with one just saying "Hopeless app". Another stated that it doesn't tell you whether your wart is malignant or benign.

PROS AND CONS-

Pros - None

Cons - It is not available in New Zealand...

Personal Review: Useless since it's not available in New Zealand.

- **DermIA - 4.5 star rating**

This app is a self-diagnosing app, which at a first impression seems unreliable. A negative review states that they received a false positive. They had kept track of their moles for 6 months and received a 97.99% and 100% chance of melanoma. However, they went to their doctor and was in the clear. Other reviews stated their percentage fluctuated since the lighting of the pictures were different. Many other reviews have had the same experience, with the prime problem source being the difference in lighting.

PROS AND CONS-

Pros- Straightforward?

Cons- There were a lot of problems... - Spelling errors, inaccurate, have to pay for 'deeper analysis', very sketchy? doesn't seem professional.

Personal Review: I would not trust this app. It self-diagnoses you which is straight away very inaccurate. They do recommend to see a doctor if your 'result' is viewed as positive.

I tried it out on one of my moles, which has not changed in shape, size or colour for as long as I've known. I got a 63% positive result, then 29.8% which is negative, then 18.3%. It has a very unprofessional design, especially since they misspelt 'analysis'. Would not trust this app at all.

- **SkinVision - 3.4 star rating**

Many positive and many negative reviews. Positive ones have stated the professionalism of the app and how simple it is to use. The negative ones complain about the high price just to even access the app. One stated the camera wouldn't focus.

PROS AND CONS-

Pros - Seems very professional and has a very simplistic design. Tells you the purpose of the app in the beginning.

Cons - Have to pay high prices to even access the app.

Personal Review: If I had payed, I assume it would have been a very professional app. When downloading the app from the store, they mention that they have made it possible to send your doctor the photos from the app in regards to the COVID-19 situation. I refuse to pay that amount of money for a tracker.

It is cheaper than a molemap, yet it is not a qualified service.

- **Firstcheck - 3.6 star rating**

From the first review, they express their disappointment for the business model. They mention they had to pay \$20 for a singular mole report. "There is no ability to submit multiple moles for opinion. It is one at a time, which for some like me with multiple moles is not worthwhile. Secondly, the report back is vague. Either I do or don't have skin cancer." Positive reviews state how it's great that doctors physically review the mole.

- **PROS AND CONS -**

- **Pros** - Straightforward. Explains the service. Gives you instructions on how to take a photo. Makes you take multiple photos.

- **Cons** - A very time consuming process for ONE mole. Doesn't seem that professionally designed. Can only select 2 countries, New Zealand and Australia.

- *Personal Review: I don't really want to be paying \$20 for a singular mole review. It's good how they instruct you on how to take a photo, yet I definitely struggled trying to stay exactly 20 cm and 10 cm away. Doesn't seem too professional, and from reviews, may not be worthwhile with the reports being 'vague'.*

- **Miiskin - 4.2 star rating**

Many positive reviews. A lot state how easy it is to use and that the reminder to continue tracking is helpful. Negative ones state how you have to pay and that it takes your personal information.

- PROS AND CONS-

- **Pros** - Well reviewed, mentioned at UK melanoma patient conference in 2018

- **Cons** - Takes a lot of your data. Have to be 18 or older to sign up.

- *Personal Review: I did not sign up since I didn't want to put my personal information into it. I could not sign up since I am not over the age of 18. It seems alright from reviews. From photo previews it also looks rather reliable.*



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THE CUSTOMER

To understand what other people would want out of the device and app, I surveyed my family members to get their insights on the design, content, and other aspects of my innovation. Being in a time of a global pandemic, where New Zealand is currently on lockdown, I could not go out in public and interview other people for their opinions and comments.

From my previous internship with Virtuo design earlier this year, I was lucky enough to learn some great skills in regards to surveying people and questions. I remembered they mentioned to ask personal things, and keep asking in regards to that, to gain a deep connection with the interviewee.

I interviewed 4 of my family members, my Mum, my Aunt, Grandmother, and Grandfather, in regards to the skin cancer, and my other aunt, who is experienced in design, for the product and app.

- Out of the 4, only my Grandfather has had a mole map. Another expressed they've put it off due to it being so invasive.
- Only my Mum has used a mole tracking app before, MySkinPal, which she expressed discomfort and struggle with in regards to getting a photo.
- They all agreed that the problem of people not getting their skin checked as frequently as they should is a problem in New Zealand.
- All check their moles. However, only 3 check the moles they are particularly concerned about, or can see. My Granddad checks his moles every 6 months when he visits the doctor, and if he notices something that's a bit odd, he will mention it then.
- Everyone is rather concerned about skin cancer since we live in such a high risk country, because we have a close family history of it and have seen the consequences, and some regret the amount of time they used to spend out in the sun getting a tan.
- Most aren't particularly worried that if they have a mole map, they will be diagnosed or told they have skin cancer. This thought won't stop them from actually receiving a molemap. However, my Nan is worried because she doesn't want to go through the whole treatment process again since it was very long, and has left her leg 'deformed'.
- Skin cancer has personally affected them all with close family members having had it or have recently gone through it.
- They have all struggled to look at some of their moles. The most common places of difficulty mentioned is on the top of the head and on their back. Some mentioned they needed to get someone else to take a picture or look at the mole, which was difficult and quite embarrassing.
- All would use a device with a camera which could help photograph and track their moles at home. At first, my Granddad mentioned he wouldn't use it since 'he wouldn't have a clue', but if I taught him he would be 'quite keen' to use it.
- They all wanted something on a handle. Mum, Aunt, and my Gran suggested something bendy. Some mentioned something that could clip onto a door, or another surface. My Granddad mentioned something detachable. Good camera.
- For the app, they all mentioned simple. My Mum mentioned something educational with the ABCDEs - how to identify your moles e.g. **A**symmetry, **B**order irregularity, **C**olour that is not uniform, **D**iametre greater than 6 mm, and **E**volving shape, colour, and size. Also, when you take a photo, it can identify the probability and possibility of its risk and put it into a zone of needing further investigation, a full body outline which shows places you've taken photos, can modify fonts and picture sizes for people who struggle to see, different languages, a calendar to record when you last took a photo and when you next need to take a photo.
- My Granddad suggested a percentage of risk for an image, some sort of server to send an image to a database to process data and tell you whether it's fine or not, recommend seeing a professional if image is suspicious, in different classes/categories, record the sizes of each mole (in-built scale).
- My Nan mentioned to not use big words since it is off putting, something attractive and easy to use, nothing hard to set up.
- My Aunty mentioned something fun and friendly.
- They would all want their doctor to be able to review these images and records from this app.
- Many were concerned about privacy. They want it to be secure. Mum mentioned not on the iCloud database.
- For price range, \$250 max for my Granddad, around \$80 for my Mum but would be willing to pay more, under \$200 for my Nan.

Before the survey, I was thinking of creating a device without a handle since I personally found the handle to be bulky. However, after hearing everyone say a handle of some sort would be great, changed my process of thinking. I also didn't think about some of the suggestions provided which has allowed me to adapt my product to their needs. Even though I only had 4 people to talk to, it was my only option during this crazy pandemic.

Also from the professional viewpoints I received, I will focus on not making my product too crazy or too complicated. Also, I know now what not to do when it comes to app development.

My innovation is focused on people who aren't getting their skin/moles checked as frequently as they should. They will need an easy object which will help improve how people take photos of their moles and skin lesions without difficulty. The app will need to be extremely simple so any age group can use it.



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ONLINE RESEARCH

During the COVID-19 lockdown, restrictions on going to the doctors are pretty high. You are not allowed to break your bubble unless you absolutely need to. This means that going to a dermatologist or going to get a mole map is not possible without prior organisation and PPE. My innovation applies to this situation, and potential future situations, which could have an effect like this current pandemic.

Using links provided by Ben Tallon from Skin Dermatology Institute, other websites, and articles I discovered online, I have gathered this information.

A link mentions, "Melanomas are notoriously difficult to discover and diagnose. After years of education through skin cancer awareness campaigns, patients or their close relatives are, nonetheless, often the ones to sound the early alarm about a concerning lesion. However, many patients are still surprised when the lesion they presented to the doctor, and in many cases another lesion, actually turn out to be a melanoma. The simple fact is that there is no typical appearance of a melanoma that is easily detected by the naked eye." This is what both Ben and Adrian have mentioned. It also mentions, "Studies have shown that the average person may not be very proficient at looking out for any change to their skin, particularly when the change occurs over an extended period of time or in an area of the skin that is not easy to see. Patients and their partners may also not be very comfortable with being tasked to perform regular skin checks to look out for subtle changes."

<https://dermnetnz.org/topics/skin-cancer-and-self-exams/>

Further, 'there is a concern that patients may not have sufficient awareness of their skin's appearance and so may only catch any suspicious skin changes at a belated stage.' This proves the same point which Adrian Bowling had pointed out, that a lot of people do not know what to look for. 'Given the need to closely inspect for changes to the skin, photographic skin surveillance, such as digital dermoscopy of individual lesions and full-body photography to capture images of the skin, have emerged. Many healthcare providers now offer clinical photography for melanoma patients and some consumers also spend out-of-pocket on surveillance programs in private clinics. This is encouraging.

The more skin that can be recorded with photography, the higher the likelihood of catching any future skin change at an early stage.

For this reason, the Melanoma Institute Australia actively recommend the use of photos in the skin self-examination process.

'1) Clinical photography does come at a cost given the requirement of clinical equipment and personnel, 2) Some patients have reported uncomfortableness with non-physician photographers and different sex photographers and, 3) There's a need for ensuring patient consent and secure storage of the photos - especially if images are to be given to the patient .' It is prevalent that this website is sponsored by MiiSkin, an app which I was not able to test out since I am not eligible to do so.

SUSTAINABILITY

For the body of the CheckD device, I will use recycled plastics. Originally I was going to use liquid wood which replicates the look and feel of plastic but is biodegradable. However, the idea of having something produced which uses new materials instead of recycled and renewed materials, could have a large impact on the environment with production e.g. deforestation and pollution. Recycled plastics are from old toys, milk bottles, dishwashing liquid bottles, and other stiff plastics. In New Zealand alone, around 252,000 tonnes of plastics are disposed in landfills every year. We also throw out 750 million plastic containers every year. By using either liquid wood or recyclable plastics, it is one less piece of plastic entering our landfills and oceans, or it's taking out plastics which still have value. Every year, according to the National History Museum in the UK, between 4.8 and 12.7 million tonnes of plastic enter our oceans. Also, according to The Ocean Cleanup, 5 trillion pieces of plastic were in our ocean in 2019.

Personally, I believe that using recycled plastics will impact the environment a lot more in a positive way since you are reusing what's already there.

The bendy arm will comprise of recycled rubber and plastic coating around pliable reused copper stems. The handle will also include the recycled rubber and plastic for a comfortable non-slip surface.



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Explain your final idea, how it works and how it solves a problem.

FINAL PRODUCT; CheckD

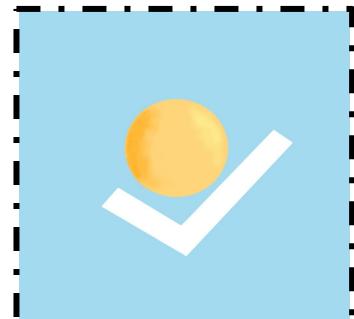
My final product is **CheckD**, a small rectangular device, and app, which helps people with checking, imaging, and tracking their moles at home. It is made from recycled plastics, a camera, and light. **CheckD** is a New Zealand focused project. It allows for people to view and photograph difficult places such as your back, head, back of leg, etc, which are hard to photograph with just your phone. COVID-19 has restricted all of our movements such as; doctor visits, leaving your own home, and shopping. People may refrain from visiting the doctor, dermatologist or getting a mole map as they fear the spread of this virus. This could be dangerous since skin cancer could remain undetected and develop into something troublesome the longer it's left. With **CheckD**, they can now take photos of suspicious moles, or continue to track the progress of them, and send the images to their doctor. Should their doctor require they pay a visit to their local dermatologist due to the images from **CheckD**, the patient may need to exit their bubble for peace of mind. Even when this pandemic is over, **CheckD** allows for people who aren't getting their moles checked as frequently as they should, to continue to do so.

The **CheckD** app has the ability to photograph and review your image, providing a report whether or not this mole could be worth further investigation. It is not a diagnostic app, it will only provide suggestions through an artificial cognitive framework of over 100,000 images of standard moles to allow for a more accurate report. Your mole will be put into a category of how potentially at risk it is, eg. Category 1 - No risk, 2 - Low risk, 3 - Medium risk, 4 - Relatively high risk and we suggest you book an appointment with your doctor, 5 - High risk and we suggest you book an appointment with your doctor/dermatologist soon. The scanning will work by the AI using an in-built scale, influenced by the zoom scale, to trace your mole and identify any uneven edges, size changes from previous scans, along with colour differences or abnormalities. You can review when you last took an image of a mole shown through a gallery, in the form of a calendar, for comparison. You can also see where you exactly took the photo on your body and compare it to your most recent photo of that mole, through a 3D body model. **CheckD** will also allow for the font size and icon sizes to be manipulated so that people who struggle to see can alter them. After receiving your report, if the app believes you should get that mole checked, it will display nearby dermatologists and mole mapping places in your region. (When first signing up, you can put what region you're in as it's a New Zealand only app).

The **CheckD** device has a bendy handle allowing for manipulation to reach around your body and photograph your moles e.g. behind your back, legs, on top of your head, etc.

The device and app connect through Bluetooth, allowing for you to control the camera from your phone so you can see where your mole is. This also allows you to control the focus, light, and zoom of the **CheckD** device. For the device light to continuously work, the unit is chargeable through a USB cable.

Some mole tracking apps which currently exist have an add on attachment for your phone which improves image clarity. However, it is still difficult to view hard to reach areas on the body; the **CheckD** device will eliminate these issues.



Original Logo Design

Purple colour emits a calmer feel compared to the light blue, almost reassuring. My aunty helped me with designing since graphic design is her job. She suggested ideas for colours, etc.



Official Logo Design



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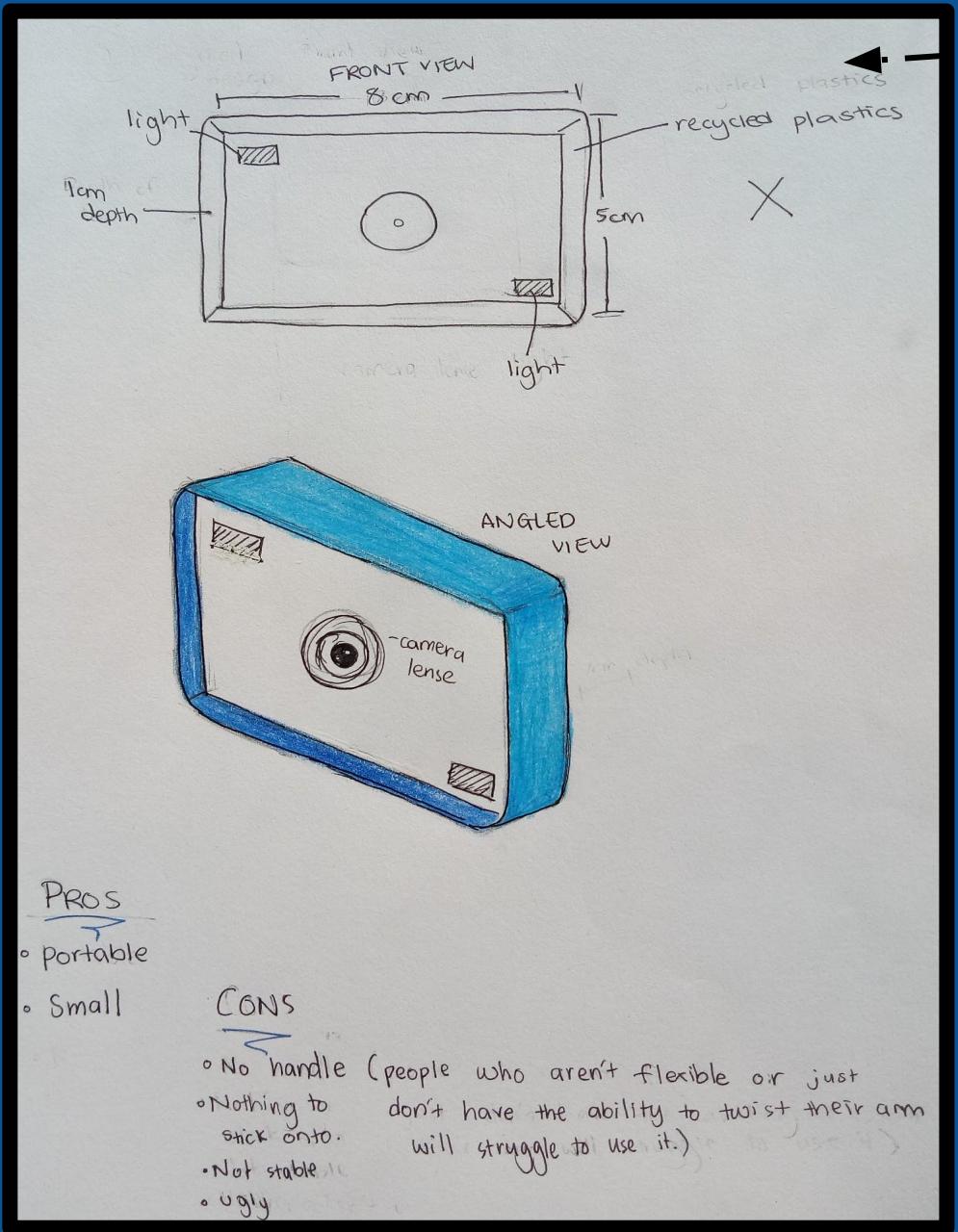
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YOUR INNOVATION

Explain your final idea, how it works and how it solves a problem.

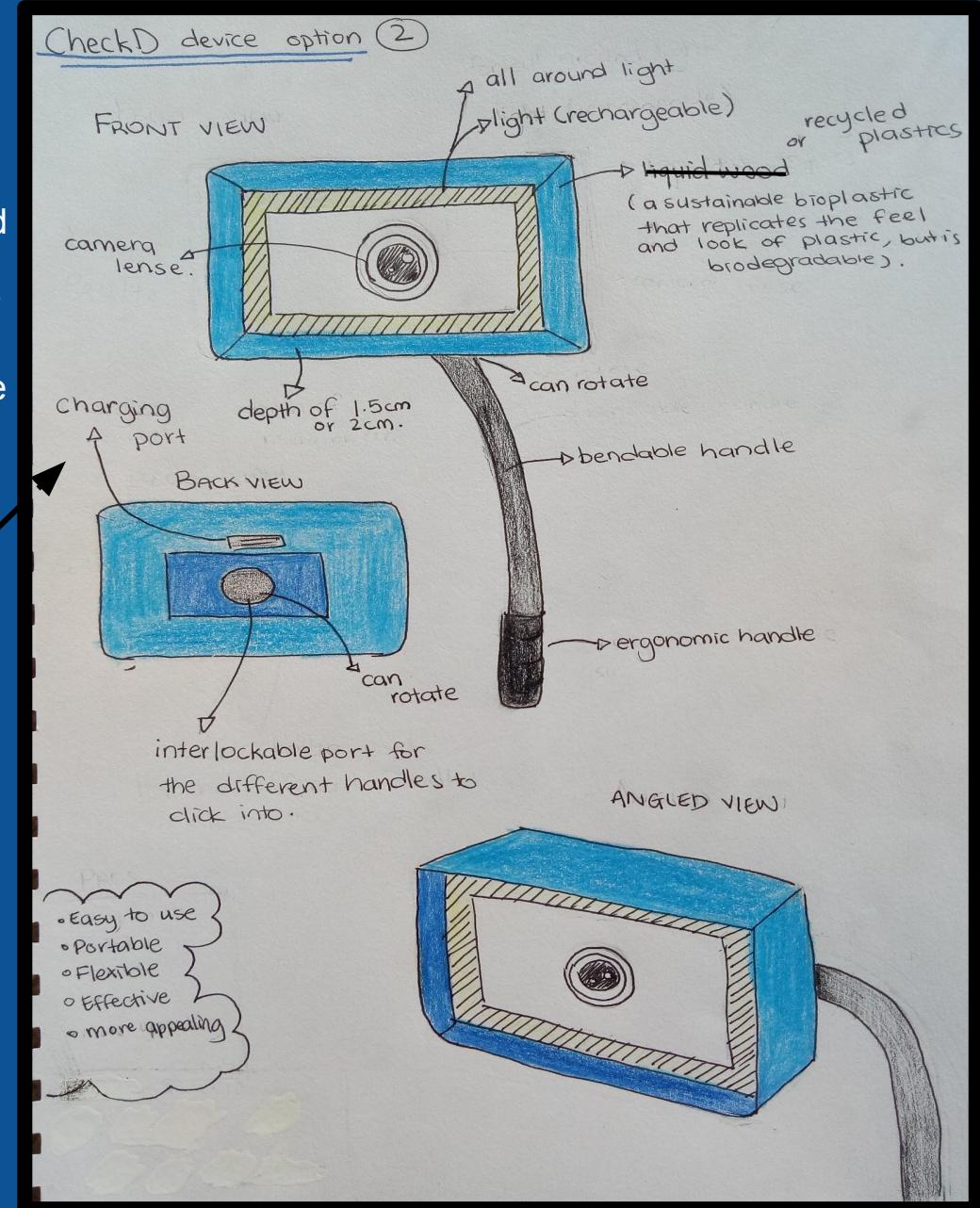
CheckD device:



Original Idea: No Handle

Not having a handle would cause the customer to physically bend/twist their arm to reach the difficult spots which could be quite difficult for people who aren't flexible, etc.

Final Idea: With Handle Different Body Design



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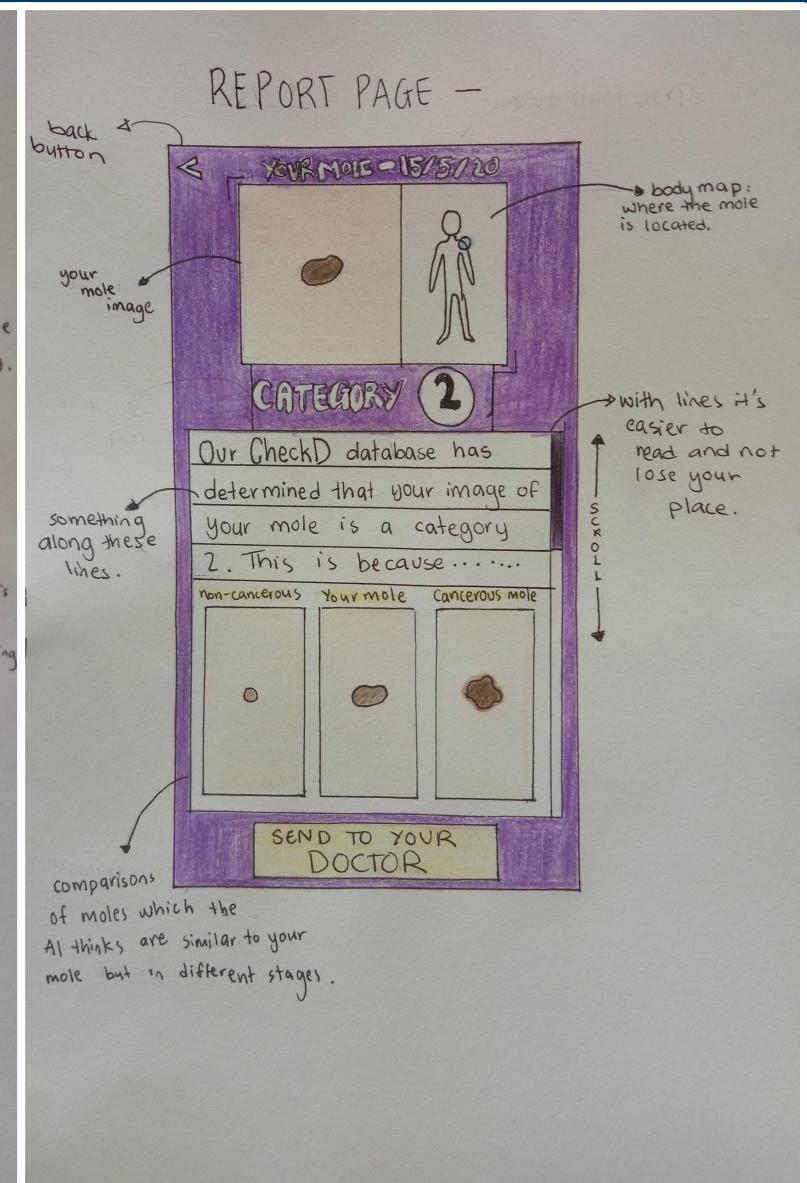
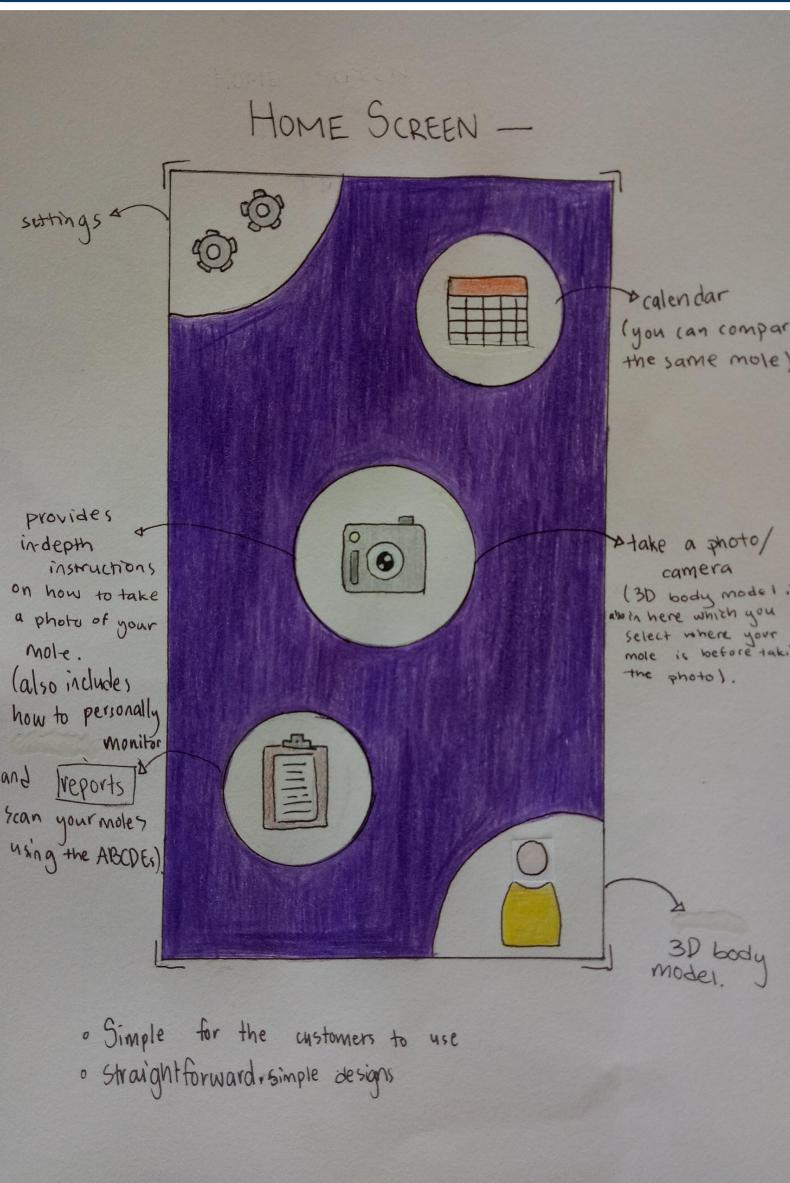
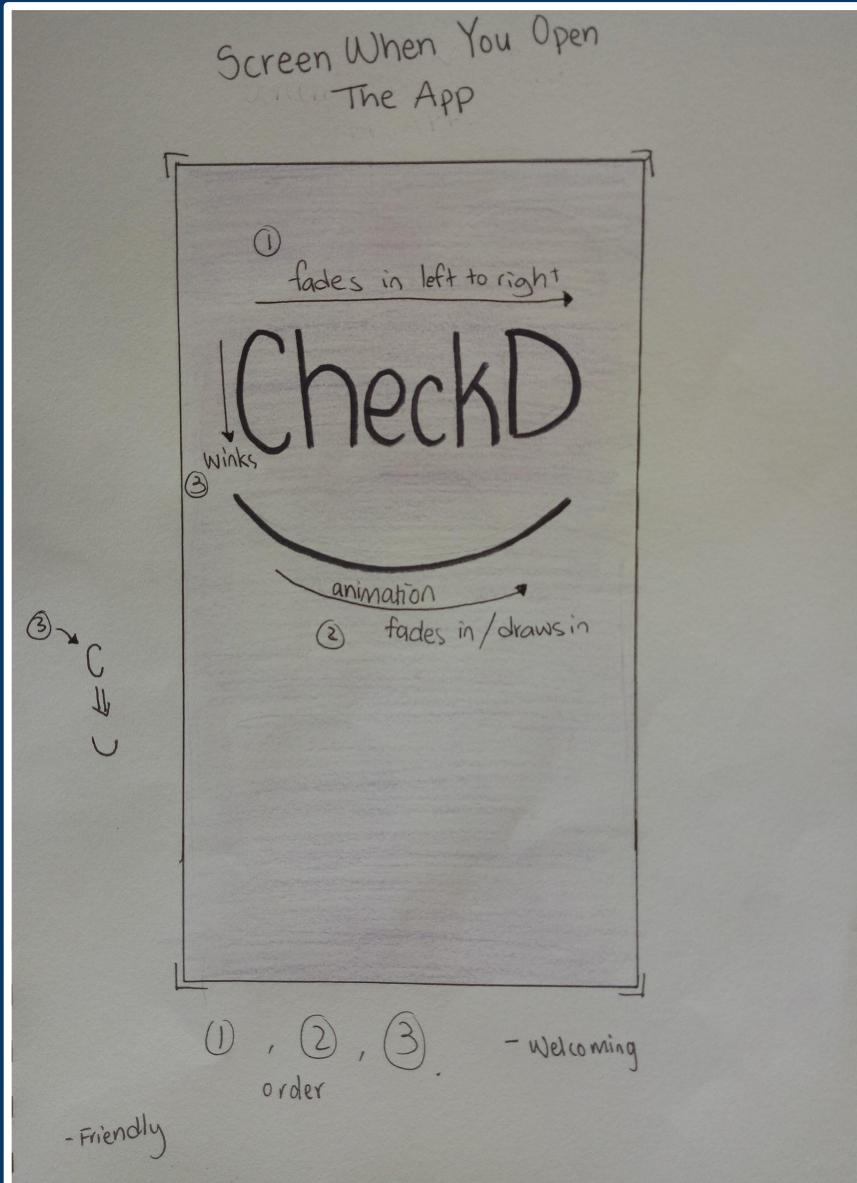
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Explain your final idea, how it works and how it solves a problem.

CheckD App:



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