# ENGG4930D: SIGHT

## Spring 2020-2021

# Squ-easy Band: a child-friendly solution to increase hand hygiene for children during the COVID-19 pandemic

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# Introduction, Objectives and User Needs

## Introduction

The squ-easy band is a band that helps to remind young children, aged 4 to 11, to regularly sanitize their hands. During the last two years of the coronavirus pandemic, hand hygiene has become increasingly important for everyone to practice. Through our preliminary research, it was found that the demographic with the worst hand hygiene were children. Through the first few rounds of interviews with parents, it was also found that parents have a serious concern about the hand hygiene of their child, and most parents did not feel confident that their children were practicing enough hand hygiene during periods where schooling was in-person. With the increasing possibility of going back to school face-to-face in Hong Kong, parents continue to worry about the wellbeing of their children as they are one of the only groups that cannot be inoculated with vaccinations, so they are still at risk of spreading COVID-19 amongst themselves and their parents.

## Objectives

The objective of the project was as follows:

- Increase the rate of hand sanitization amongst children aged 4 to 11
- Teach children good hand hygiene habits through workshops and video demonstrations
- Ease the concerns of parents about the hand hygiene practices of their children through the product
- Make hand hygiene a fun and novel experience for children through the product

## User Needs

Through the design thinking process, it was realized that this product is not only intended for children, but also for parents. In order to increase parents' confidence that their children are properly practicing regular hand hygiene, there needed to be an easy-to-understand feedback system incorporated into the band. Simultaneously, the band needs to be attractive to young children and they must feel engaged throughout the day to keep regularly sanitizing their hands.

Other needs that needed to be addressed were to make the bands suitable for use of children in schools. Through the initial rounds of interviews, it was found that many schools have strict policies that do not allow children to bring smart watches, smartphones/tablets and other electronics that may pose as potential distractions. A key need required that the band cannot be distracting or too electronically sophisticated (i.e., cannot be a 'smart' band/watch) such that its use is allowed in schools. In a similar vein, the watch cannot be too distracting for children as it would detract from their attention in school.

# Design Solutions

## The evolution of the product

The project started initially as a different product altogether. Initially, the project idea was a portable handrail to attach during public transport use to avoid touching public transport handrails. However, through the ideation process, it was eventually settled on making a sanitizer band after multiple other products were ideated and discussed.

Some of the earlier products that were ideated included:

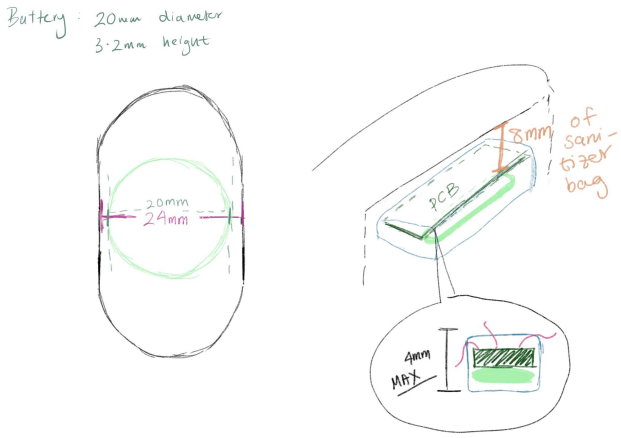
- Multi-purpose band - containing tissues/wet wipes, mask holder, potentially UV light, sanitizer spray
- Portable disinfection machine - similar to the ones available in large shopping malls in Hong Kong, these were made for the purpose of on-the-go disinfection
- Portable handrail (as described above)

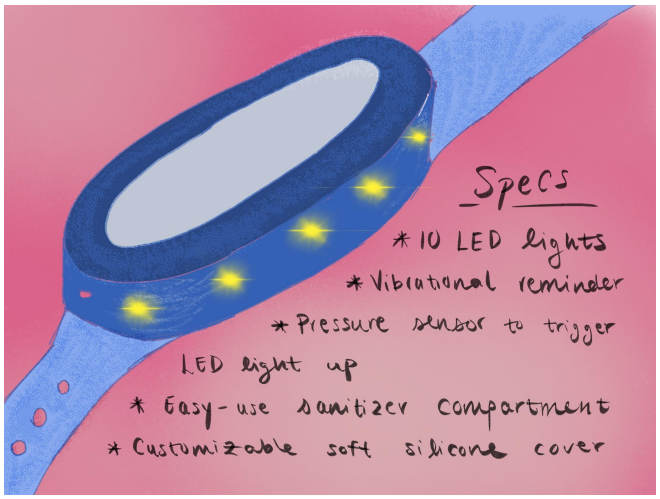
Due to a range of issues, including feasibility, marketability, usefulness and complexity, these ideas were not suitable. Furthermore, the target demographic was too wide to obtain meaningful market research. The complexity of some of the products also was beyond the feasible skillset, such that prototyping would be next to impossible. The band sanitizer was settled on after conducting further research on how hand hygiene habits have changed across demographics, and clearly, there was a need in improving children's hand hygiene.

Once the band sanitizer was settled on, current competitors were researched. It was found that band sanitizer does already exist (see: Squeezyband™, multiple types available on Taobao, Amazon, etc). It was realized this product must be more functional than currently available products, and that the target demographic must be narrowed. Further specifications, such as the target age group, and band specifications were determined throughout the design process and through obtaining user feedback.

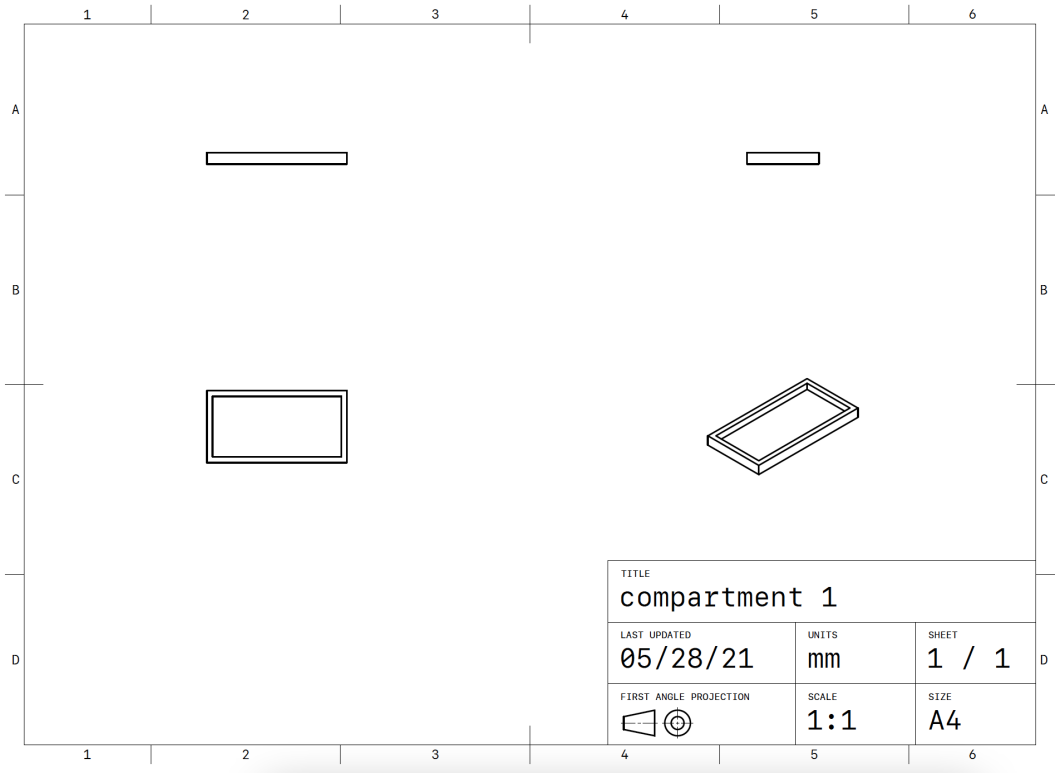
The target demographic was narrowed down to young children (aged between 4 - 7). This is because, through market research, it was found that young children have the worst hand hygiene out of all demographics; there is clearly growing concern about hand hygiene for parents of young children during the COVID-19 pandemic. The pain points identified were the lack of hand hygiene of children, the growing concern and worry of parents sending their children back to school due to their poor hand hygiene, and the potential spread amongst young children due to poor hand hygiene.

Thus the current product was made with the following features: vibrational reminder system, light-up LED system, and attractive/colourful watch with designs to appeal to children. The watch used is pictured on the left, as it was the only watch with a functioning dispenser and a design that could accommodate the electronic features easily. This watch was used as the 'base' of the band for the next few rounds of prototyping.

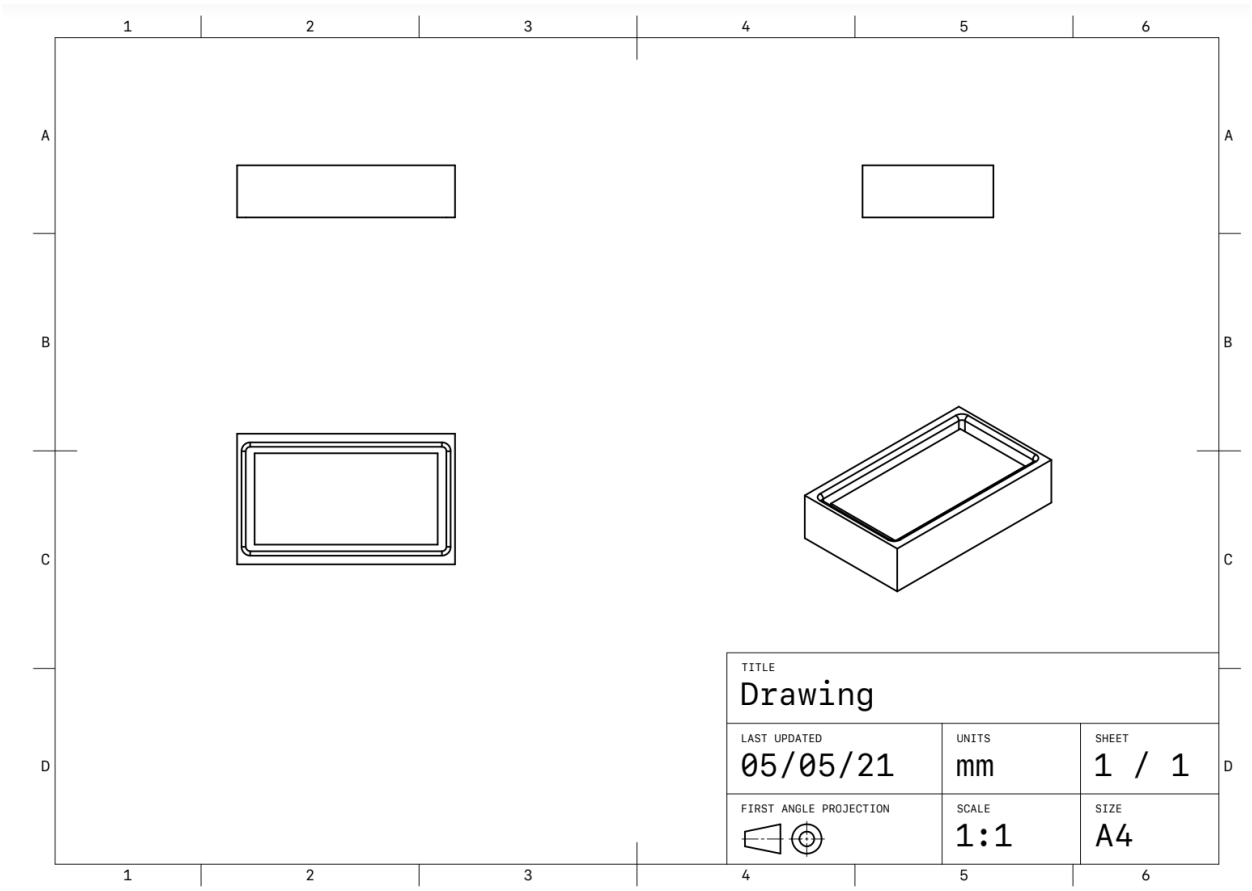


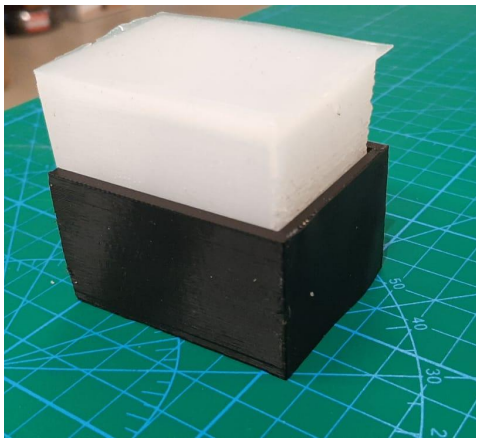

The current band makes use of two separate compartments, which could not be executed together during the semester due to time limitation and the very late arrival of the PCB. Instead, a 'form-heavy' and a 'function-heavy' prototype was made. This is discussed in the next section. The band design is based on introducing this separate compartment to the previously pictured band in the previous page.




Pictured above is the hard plastic compartment (the printed form of this can be seen as the image on the left for the 'form-heavy' prototype later on).




Pictured above is the 3D rendering of the mould to create a silicone compartment. This is just one of the many that were designed, and is still in need of some tweaking to match the true sizes of the final components. These moulds were designed on estimated sizes.



Pictured on the right is the silicone compartment that would hold the 'functional' parts that were presented during the final roadshow. This dimension was created for a smaller breadboard configuration of the electronics, as the PCB had not arrived yet.

# Problems

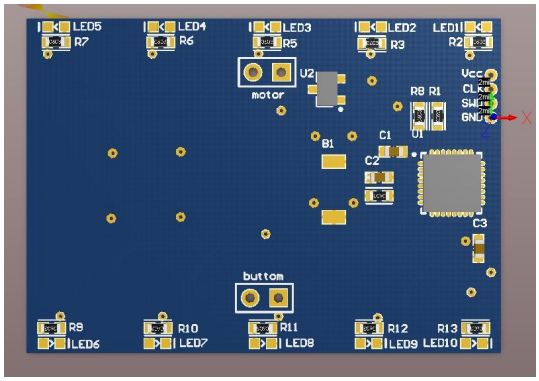
There were several problems throughout the process of creating the band:

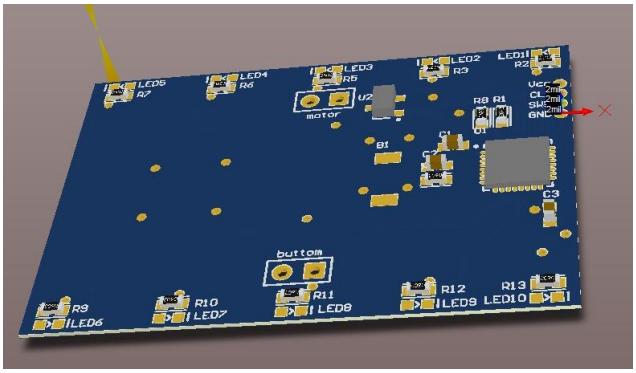
Lack of appropriate pre-existing technology. Despite the fact that many band sanitizers were on the market, nearly none of them worked. Many different bands were purchased until one was found that worked. The bands that were functional and worked are pictured on the left and stored in InnoLab for further designing. These bands have a separate plastic inside that sanitizer can be stored in, and it releases an appropriate amount upon pressing.

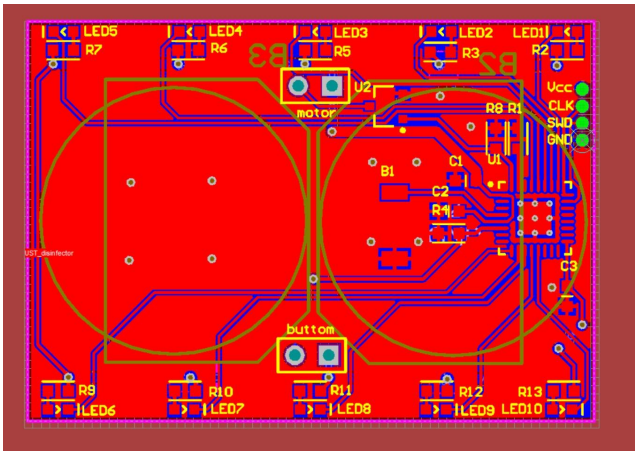
Some other issues, however, is that the type of sanitizer needs to be carefully selected. At the moment, the sanitizer chosen was a liquid type, though this can be very runny and end up leaking out of the band. One of the big considerations for the next step of the band is to figure out an appropriate storage compartment for the sanitizer, the best 'type' of sanitizer to use (e.g., gel or liquid, alcohol percentage etc).

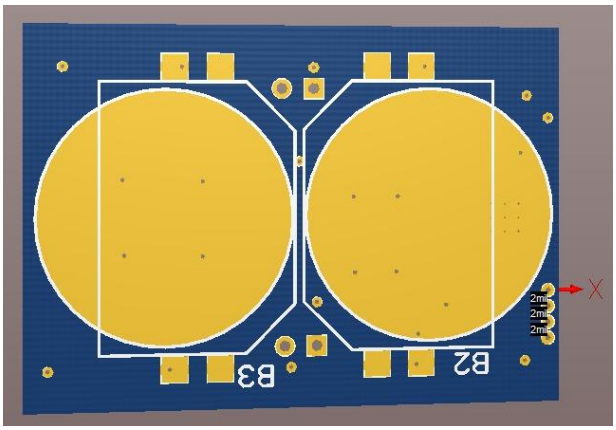
Bands that did not work are as follows (not all are pictured, others are stored in InnoLab):

Another issue is the production of the PCB. The PCB was the most time-consuming part of the process, as it takes a significant amount of time to get just a few of them for prototyping purposes. The PCBs that were eventually made are pictured below:




In addition to this, the components selected for the electronic components need to be tested to see if they are compatible with the PCB. This was an issue as we managed to get the PCBs on the week after the roadshow, thus there has been no testing done on all the components to see if they will work. One component in particular that has an issue is the pressure sensor. At the moment, there is no fixed pressure sensor that has been tested to work with our product. Piezoelectric sensors were purchased but tested without being integrated into the watch - thus it is hard to tell whether it will work underneath the other layers of the watches. Contacting Einstein for the PCB is the next step; as adjustment may need to be made in the code and further PCBs produced to check if it functions properly and as expected.

Another issue was how to contain the electronic components and combine them to a pre-existing watch. One solution that was prototyped was to create a separate 3D-printed plastic case and store the components, and another solution was to keep the components in a silicone mould (these moulds and cases can be found on the GitHub page for further exploration). These different compartments have not been fully tested, as the electronic components (in particular, the PCB) were late to arrive. On the left, a badly-fitting 3D printed compartment is pictured. The measurements were not

made correctly. It was also too thin to contain any electrical components. Another version was printed, which was more suitable in size and shape afterward for the final roadshow.

# Sustainability

At the moment, there is no way to recharge the battery of the watch - it simply runs on the protocol that it will eventually die out, and then the parents can either purchase a new watch, or possibly replace the batteries (if the battery storage compartment can be opened this way). The ability to recharge the battery would definitely make the watch a more attractive product for parents, as it would mean not having to repurchase the same thing, or needing to buy batteries for it constantly. It has been expressed in interviews with parents that a rechargeable battery would be the best option.

There are difficulties in incorporating a rechargeable battery. Firstly, it is difficult to do so without significantly increasing the cost of the product, as it would mean introducing a charging port and chargers. This would add bulkiness to the final product, which is at the moment, still quite bulky. Another issue is that it would be a potential hazard: in the event that even a small amount of sanitizer ends up in the charging port, it could be a hazard if a charger is plugged in afterward. Similarly, another issue if the route of being able to change the batteries can be taken, is that children may end up getting sanitizer inside the battery holding compartment, which can be a hazard. It is easier to mitigate this with the latter design (changing batteries) as the compartment can be designed to be child-proof (i.e., only parents will understand how to open it; potentially using 'screws' or a difficult unlocking mechanism).

# Evaluation of the final prototype

The final prototype was split into a 'form-heavy prototype' and a 'function-heavy prototype'. This is because the integration of the PCB and other components, such as the vibrational motor, piezoelectric sensor, and LED lights into the watch was not possible due to time constraints and the lengthy process of creating the PCB. The next step of the project would be to integrate these components into a band, to determine if the currently-used components are suitable.

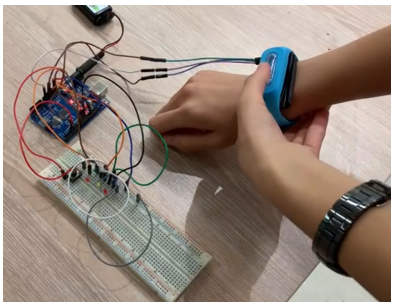
## Form-heavy prototype

The form-heavy prototype utilized the most suitable pre-existing watch that was found on Taobao, and attached the 3D-printed silicone compartment that would contain the electronic components (seen as the blue compartment in the image on the right). This was done to demonstrate, roughly, the size specifications of the watch. One of the key issues was to prevent bulkiness as this would not be suitable for children to wear - it would be too heavy and would likely be difficult to use. This allows the user to see what the size will be to ascertain whether the size is appropriate for children.

From our test run with one child, it was found that the watch is slightly too big for the target demographic (child was between 4 to 7). This image can be seen on the left, where the watch is visibly much larger than what

would be appropriate for the child's wrist size. Thus the current final prototype is not suitable, and needs to be made smaller to fit better for the target demographic. Additionally, the strap was slightly confusing for the child to put on themselves, so changing it to a more child-friendly design would be the next step.

## Function-heavy prototype



Other feedback found was that the initial use of the band was slightly confusing for the child, which were resolved through a demonstration of the band's function. This indicates that a clearer, visual and physical demonstration will be important for children, and potentially implies there is a role for parents to play in teaching the child how to use the band properly. The main confusion was from understanding what the vibrational buzz meant. Once this was explained, the child was able to understand the need to press the band and release sanitizer, and sanitize their hands. There was positive feedback on the LED light-up display, which showed one light after the first successful sanitization, and then a second light as well after the second successful sanitization. The child understood it was counting the number of sanitizations, and seemed to feel encouraged to keep going with sanitization.

Overall, both the form and function are in need of slight improvements before the product can be fully integrated into one functional band. The main improvements will have to be sizing the band correctly, which will require some market research into finding a suitable band/straps for children and which types are preferred.

The improvements for progressing the project further are as follows:

- Changing the strap size and dimensions of the band to meet that of children aged 4 to 7.
    - Possible solutions can include experimenting with different types of straps (including but not limited to: 'snap' on straps, velcro, magnetic)
- Making the electronics component less bulky
    - The obvious next step would be to integrate the components and PCB, and then make the compartment that holds these parts slimmer. One possible solution that was suggested was to actually use liquid-proof coating to prevent the need for such a big compartment. Another solution would be to encase the components in a thin, silicone mould instead of the 'segmented' design that is currently being used.
- Changing the sanitizer compartment to a smaller one, to reduce the bulkiness.
    - A potential solution would be to make the sanitizer compartment not of a plastic material, but possibly a silicone casing, which allows more movement and 'squishing into shape' than a harder plastic. Material degradation due to the alcoholic sanitizer should be determined.

# Technologies involved in the product

The three mainly technologies involved in the product include:

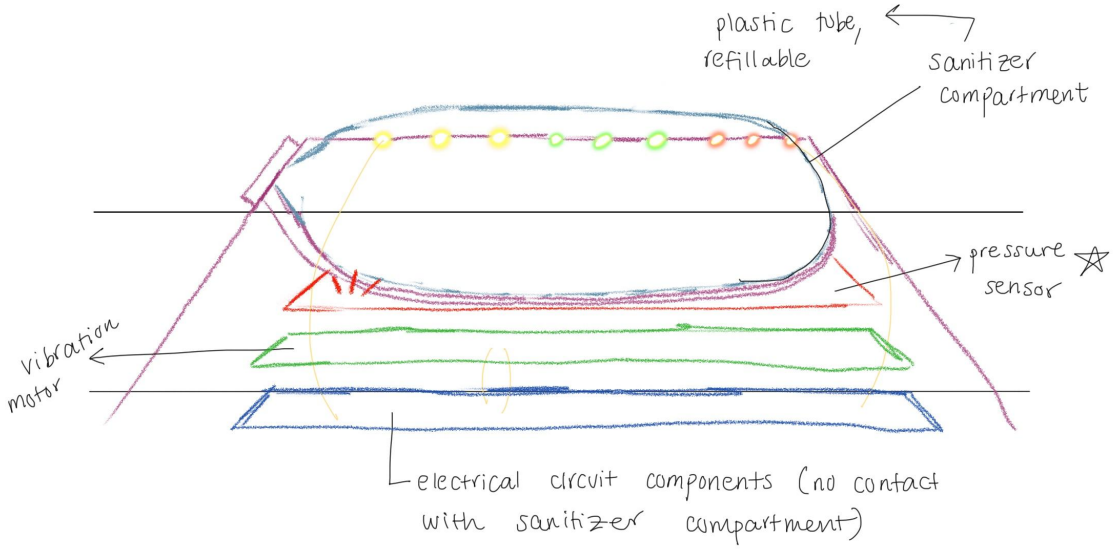
- Arduino: for writing the programme that senses pressure, and lights up an LED corresponding to the number of times that the child has sanitized their hands.

- PCB: in order to input the programme written from the arduino code into to watch, by attaching the necessary components into the watch.
- Design/sketching software: used for creating prototype sketches of what the band sanitizer should look like, as well as arranging the electronic components into separate layers.
- 3D modeling software: used for creating silicone moulds to keep the electronics inside of to prevent accidental leakage of sanitizer into the electrical parts, and another mould to hold the entire watch together. The next step would be to create a mould of the entire watch and place the completed electrical components together. Software mainly used was Shapr3D.
- 3D printing (done in InnoLab with the aid of Joel): The exported files of the moulds made in Shapr3D

# Meeting the needs of the end-user

The product meets the needs of the end-user through the following features:

- ❖ Vibrational reminder - the vibrational reminder happens every one hour to remind the child to sanitize their hands.
- ❖ Pressure sensor (piezoelectric) - this sensor can detect whether the child has successfully 'pushed' the sanitizer compartment to sanitize their hands. Upon successful sanitization, one of the ten LED lights will light up. With every subsequent time, another LED will light up.
- ❖ LED light-up - this not only 'gamifies' the product but also can tell parents how many times across the school-day the child managed to sanitize their hands, thus reducing parents anxiety about their child's hand hygiene.
- ❖ Simple electronics - as many schools prevent children from bringing in high-tech mobile phones, watches and other electronics, the basic electronics here will not disrupt the child during the school day.
- ❖ Colourful/attractive designs - to further appeal to the child such that they feel more inclined to comply with regular sanitization.



The sketch adobe shows a simplified cross-section of what the inside of the band should look like. The bottom three layers, in red, green and blue, should be contained separately from the sanitizer layer to avoid any spillage of sanitizer into the electronic components. The pressure sensor must be placed either directly on the sanitizer compartment, or somewhere with more stress applied, such that it can activate the LED light-up properly. The vibrational motor must be timely (vibrate every one hour, ten times a day) and must be strong enough to be felt whilst wearing the band. The electrical circuit, in the form of a PCB, should be placed at the bottom (either on top or below the batteries). The batteries used in this are CR2032 button cells, and two of these are used and placed side by side. The sanitizer compartment should hold an adequate amount of sanitizer, about 15ml or more, based on rough estimates.

In summary:

- ➔ Vibrational reminder every one hour, ten times a day to remind the child to sanitize their hands regularly.
- ➔ Pressure sensor will detect when the child presses the band to release sanitizer and counts as one successful sanitization. It will light up an LED. The next time this happens, one more LED will light up, until a total of ten LEDs are lit.
- ➔ Electrical circuit contains the information on how often the vibrational motor goes off, how long it vibrates for, and helps to light up the LEDs after the pressure sensor senses it.

# Future Outlook

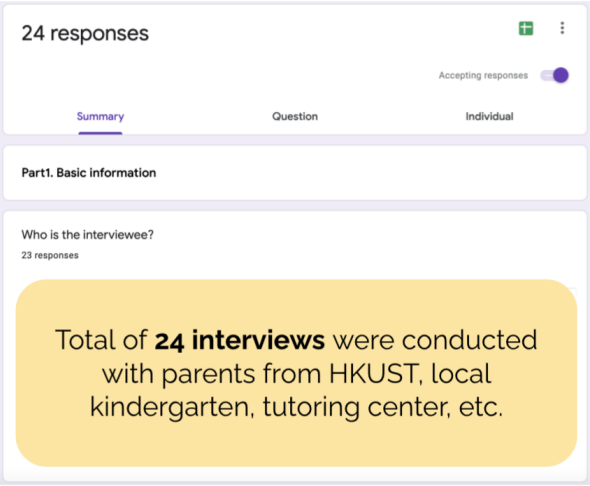
The future outlook of the product, in terms of design,is as follows:

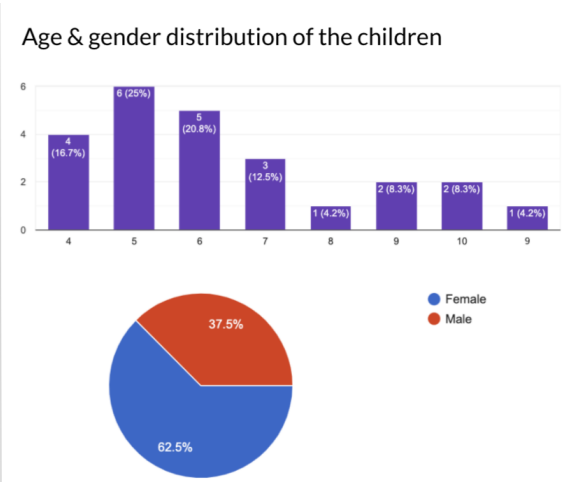
- ❖ PCB and electronic components must be finalized and integrated into the watch in a separate compartment of their own.
    - ➢ The compartment they are in should be prototyped (e.g., one hard compartment, as 3D printed previously, or a soft silicone compartment, made by creating a mould and placing the components in)
    - ➢ The initial PCBs have been created by Einstein and can be used for the next step of prototyping.
- ❖ The outer moulds need to adequately contain the entirety of the electronic components, and must be the same length and width dimensions as the watch such that it can be smoothly attached on. The moulds that have been tested can be found on the GitHub page.
- ❖ The product size needs to be changed to accommodate the sizes of children aged 4 to 7 years old, as at the moment the product is too large. Changing the strap design is also necessary, though market research needs to be conducted in order to determine whether the strap is suitable. Only one child has tested the product so far, so it is difficult to ascertain whether the current trap is too confusing across all children, or just the much younger ones.
    - ➢ There may be a need to create the entire band and strap on our own, using 3D printing to create a mould and make straps as well as the band's "head" that stores the sanitizer and compartment. This is because there are not many pre-existing child-friendly designs of these types of sanitizer bands that are functional.
- ❖ User feedback must be gathered after the initial prototype, where all components are integrated and put together, are used. As PCBs are hard to create individually (much easier to create at a mass production scale), these tests need to be done once the product is functional, and have as many children test it as possible.

- This is to determine if the components such as the pressure sensor, LED lights, and vibrational motor are suitable for the child. It was found that strong, distracting vibrations are not desirable amongst parents and teachers as they could distract the child and impact their learning during face-to-face lessons. Similarly, the brightness and size of the LEDs need to be ascertained. The pressure sensor needs to be functional, such that it is not overly-sensitive and hyperactive, but also not so difficult to sense that the child needs to put in significant effort for the LED to light up (as this would cause them to potentially damage the band, or use too much sanitizer at once which is wasteful).

# User Experience

## Design for receiving user feedback




First stage of our user feedback collection was through 1-on-1 interviews with 24 parents. Demographic details of the parents are summarized in the graphs above.

The aims of the interviews was to:

- Identify an appropriate/suitable target age range of our product;
- Verify demand of the product (Product viability);
- Increasing/decreasing interest (Will the interest be sustained even after COVID-19?);
- Gel sanitizer concern/preference General feedback/concern about our product;
- Identify preferences on band design and OLED/Battery life preferences.

Our team had two more user feedback collection sessions over the course of the project. Second stage was a workshop with local kindergarten children and parents. Our aim was to raise awareness of the hand hygiene issue especially during COVID-19, and also to introduce the general idea of our product to the public for the first time.

| Feature | How to test? | Remarks | Results |
|---|---|---|---|
| Introduce our prototype | Demonstration video<br>--Video shot by Riya & Yujung<br>--Cantonese explanation by Ada | NA | NA |
| Ease of wearing band | Kinds of band they usually wear/ prefer  | NA | Both the traditional type and easiest type are popular but convenience is prior. |
| Band width | Proportion of band width to size of container part  | May use the options of Q.2 as examples/ choices | A long container with similar width with band is prefered. |
| Lightness of LED | Use color graduation with 10 levels & see which light intensity they prefer  | | Most prefer 6-8 intensity, i.e. strong LED light. |
| Amplifier of vibration | Compare to the vibrations of electric toothbrush/phone, etc. | Try phone vibration on their arms besides the parents face-to-face | In one words, slight vibration is better |
| Vibration duration | At the beginning of the test, tell the kids once they hear a certain melody, please stand up.<br>When they pay attention to the chat, play the melody suddenly and count the time required to stand up. | The melody is "silence", a phone ring I think is suitable for making reminder.<br>Online stopwatch<br>https://www.timeanddate.com/stopwatch/ | Older kids often stood in a short time. All took <10 s. |
| Handwashing duration | Play handwashing song and count the time they followed the song to wash hands | | 1/4 could wash for 20s (the whole song), but it really depends on their personality. |

Third stage of our user feedback collection journey was actually testing our prototype product with a child. Our findings and changes to our product afterwards are summarized in the section below.

## Changes of product based on user feedback

### New features based on user feedback

- Designs for boys and girls
  - There were significant likes and dislikes for boys and girls
  - Incorporating these characters on to the watches as designs would serve them to be more aesthetically desirable and possibly increase user usage
- 'Crocs idea'
  - Exploring the idea of mini 'pins' that can be inserted on to the watch; collectible in nature
  - Boys and girls can try to get the characters they like; more variety than just one design on the watch
    - May require further changes in the watch design to include holes for these pins - next prototype will try and incorporate this

In addition to the ideas of potential new features of our product, our team has obtained many valuable information through three stages of user feedback collection, and have made several changes to the product accordingly.

Regarding the battery life of our product, we were wondering if we should make it the battery-replacement type, charging type, or one-use type. After collecting user feedback from the 1-on-1 interviews, we identified a significant preference over the battery-replacement type, and thus decided to proceed the development focusing on battery storage and working with the suitable usage time/life of one battery.

Also, we have tried various strengths of vibration motors on potential users both physically and also through interviews. We have settled on a certain range of vibration after collecting feedback. Feedback was physically obtained by trying out varying vibration strengths with the use of silicon as buffers.

### User feedback's impact on better and sustainable solution

# Implementation Plan for Summer & the Future, recommendations and conclusion

## Summer Implementation Plan

This summer from June to August, we are going to commence the delivery to the local community via running social media pages, building networks in the community and holding online workshops:

(A) Social media

As Facebook and Instagram are the most popular social media among middle-aged Hong Kong citizens, Facebook and Instagram pages would be created in June as the main platforms for propagation as well as communication with the local parents, who may become the purchasers. The parents who have participated in our parent survey and introductory workshops would be invited to follow us via email. After every outreach to the kids, we can give them a card/ flyer with the social media information such that the interested parents would follow us too.

On the pages, the demonstration video would teach the children how to sanitize their hands using our product and show the parents how to refill the container using the squeezing bottle attached. Once changing the battery or any new features is available in the latest version, we would put an additional demonstration video. When our team is going to conduct new workshops and offer retails somewhere, we could notify them via social media so as to keep updating our activities with the parents. For enquiries regarding our activities, difficulties in using our product, etc., parents can just directly message us via social media and our team will reply to the inquiries every day.

(B) Networking in the community

Many of our target users would like to join activities organised by the community center near their home during summer vacation in July. In our freshman year, we built certain networks with

the community centers or even the children served thanks to the HLTH1000 requirement. If the community centers still open in July, we can do some voluntary services for a month and get along with the kids in the center. Then, we may request a time slot for an online introductory workshop on Zoom or Google Meet with social workers in-charge. If we have served the center for a long period of time, we can ask them directly.

(C) Introductory workshops to the public

In order to introduce our product by suggesting the importance of hand hygiene to the kids and their parents in summer, we are supposed to hold at least two online workshops in early August, adapting the same plan (Table 4.1.1) as the introductory online workshop in the spring semester which seems to be fascinating to the kids. Hopefully, we can get around 20 children within age 4 to 7 from any two community centers collaborating with HKUST Connect each online session.

| Age | Content | Duration | Medium | Materials |
|---|---|---|---|---|
| 4-5 | Origami of watch<br><br>Demonstration video | 30 min<br><br>10-15 min | Cantonese | Origami paper,<br>Baby shark handwashing song 0:16-0:56<br>https://youtu.be/L89nN03pBzI |
| 6-7 | English story telling about hand hygiene<br><br>Demonstration video | 50 min<br><br>10-15 min | English & Cantonese | Ross, T. (2003). *I Don't Want to Wash My Hands*.<br>https://www.youtube.com/watch?v=H6a8_Wf2HNE<br>Baby shark handwashing song 0:16-0:56 (1:34 if have time left)<br>https://youtu.be/L89nN03pBzI |

**Table 4.1.1** Online Introductory Workshop Plan

Considering the pandemic and the feasibility of non-local students in summer vacation, all contact to the community would be carried out on Zoom and Google Meet which are the main platforms for the online teaching at local kindergartens and primary schools respectively. Since the 6 years old children are graduated from the kindergartens, they would be grouped into the higher-level. To eliminate the differences in understanding caused by translation, we would make a comprehensive demonstration video with Cantonese voiceover in addition to the same materials used in previous online workshops.

## Future Implementation Plan

In the next academic year, we are supposed to conduct the final user test and launch the product on the local market after we have a certain amount of products manufactured in Shenzhen, China.

(A) Final design stage of the first version

We plan to approach the following from mid-June to late October.

- ❖ Integrate electronics with PCB. (Should be delivered by Einstein; Joel and Malinda will help with communication). Code is available on GitHub repository, replicate for 10 LEDs and change time as consider appropriate from user feedback.
- ❖ Modify design files for the 3D mould to fit the smaller electronics. Use liquid silicon in InnoLab to make the smaller silicon compartments
- ❖ Attach silicon compartments to watch sanitizers.

(B) Final user test on the target users

While the product design is finalizing, we would like to invite over 10 children within the target age range among the participants of introductory workshops for the final user test in late August and September. We would request the testers to try on the prototype in person this time because there were not enough prototypes provided for the first user test. With more prototypes available for testing, the testers could provide more precise feedback this time. Moreover, we would have 2-3 children in a group and record our observation during the face-to-face user test in the community centers instead of online chit-chat with the kids who might not be capable of expressing their feelings precisely.

Since we have requested the parents participating in previous workshops to follow our pages, we can still recruit testers from the interested parents through sending a post on our social media pages in case the community centers cannot open due to the pandemic. Playgrounds, arbors or clubhouses near their home could be the testing venues other than community centers. It would require the supervision of parents but it is a practical alternative.

(C) Manufacture of the product

The design of the product should be determined by the end of October in case we would like to alter the prototype a bit based on the final testing results. For the initial launch, we would like to order 500 products. The manufacturers of electronic and printed circuit board (PCB) would be clustered in Shenzhen, China near Hong Kong. Here are the companies we would like to know more:

- ❖ Customized silicone bands made from food grade silicone gel and the refilling bottle wholesale: Shenzhen Genyuan Silicone Gel Limited（深圳市根源硅胶有限公司）https://show.1688.com/shili/factory/shop.html?spm=a260k.21129858.kj9mj3wz.137.24667c12pfUNIY&__pageId__=99183&cms_id=99183&facMemId=b2b-340697220617b1e

- ❖ Customized PCB with electronics wielded: Department of PCB, Shenzhen Jialichuang Keji Co. Limited （深圳市嘉立创科技发展有限公司PCB事业部）https://www.jlc.com/newOrder/client/index.html#/pcb/pcbPlaceOrder?x=431.85194954368023&quoteOnline=yes

(D) First launch of the product

While the product is manufacturing, we would update the product information and demonstration videos on social media. We would also request free timeslots from local

kindergartens and primary schools(12) in Tseung Kwan O for conducting hand hygiene workshops during the period between the first term exam and Christmas holiday (probably 13-17 December 2021), which is usually without any important classes. If it is still adapting the online teaching method, we would create more interactive opportunities with brand new content for online workshops. With a view towards improving the convenience of customers, we would create a website as the site for purchasing as well as browsing our products.

For the first launch in early November, only online shopping via our website is available. To expose to more local parents, we would share our promotion to FaceBook parents groups in which many parents would seek favorable goods for their kids. The online workshops conducted in Tseung Kwan O schools might raise the students' interest in our product too.



## Recommendations

With a view towards boost the efficiency of this project on the basis of the experience in the spring semester, there are some recommendations/ improvements helping with the future implementation:

(A) Designs and technology involved in the prototype

As sophisticated technology is required for the main features of the prototype, sufficient fundamental information is always prior to the determination of look as well as the development of technology involved. By managing and sharing the sources, less time would be wasted for repeating the tasks or even the unnecessary trials. Encountering obstacles, never hesitate to inquire about the professional technology with the advisors immediately.

(B) Clear labor division and collaboration at the beginning

There would be more and more tasks required to implement so the clear labor division would become more and more important to the smooth progress. To cite an example based on the implementation plan since November 2021, the labor division and collaboration could be implied as below for a team with 4 members:

- ❖ 1 member would be in charge of the role of contact with the kindergartens and primary schools via email, requesting for the permission for outreaching workshops. This member also needs to follow up with the manufacturers in Shenzhen regularly.
- ❖ 1 member would be in charge of creating the new content and preparing materials (and an interactive worksheet with our social media usernames written, e.g. @squ_easy_band) for the workshops.
- ❖ 1 member would be in charge of managing the social media accounts for creating content about our new events at schools, creating marketing posts sharing to the "mother groups" on Facebook, and replying to the user inquiries on a daily basis.
- ❖ 1 member would be in charge of the online marketing matters prior to the first launch in Hong Kong, such as the propaganda and identifying business potentials by analysing the user feedback.
- ❖ All members should reach out to local kindergartens and primary schools according to their availability on weekdays.

(C) Understanding the local users and customers

Preferences and demands for both kids and parents are important to the first product launch on the local market. Meeting the demands of the parents is definitely our mission but the importance of kids' opinions could be denied in the modern family - The new generation insists on their preferences while their parents respect the kids' opinions when it is bought for the kids.

- ❖ A majority of local kids focus on the convenience and look of the product. In the chit chat sessions, many kids preferred easier wearing wristbands by fewer steps. Regardless of the ages, all kids have requested their favorite color and cartoon character or animals.
- ❖ Regarding the design with animals, it is a localized notion suggested by some kids. Affected by traditional customs, Chinese toddlers usually resemble cute animals like panda, teddy bear and zodiac signs by their parents.
- ❖ Most of the local parents tend to build images based on the recommendations of other parents, as if more parents would like to participate in a survey after some of them told others that our prototype aimed to benefit the hand hygiene of kids. Thereby, we can encourage them to introduce our product to others by giving electronic coupons at our website.
- ❖ To ensure whether the product satisfies the users and expectations of parents or not, feedback should be collected continuously.

# Conclusion

In conclusion, the band sanitizer is in its early stages of development, and there is more work to be done to bring the product to market. The first and foremost step is to integrate the electronic components and PCB into a suitably-sized watch. Then, more market research and user feedback needs to be collected, such that changes to the design can be made accordingly. Finally, there needs to be a robust implementation plan to manufacture the product, as well as marketing strategy development. Further diagrams, pictures, codes and more can be found in the GitHub files.