



TalariaTag: NFC Wristband

Arjav Prasad, Leonard Gao, Lohita Swaminathan, Ethan Au, David Rupf
Integrated Engineering - University of British Columbia



Problem Definition

Have you ever reached into your pocket to retrieve your wallet only to find a handful of pocket lint? Don't worry if this has happened to you; you are not alone. Roughly two-thirds of people claim to have lost their wallets, while nearly one-third claim to misplace their wallets frequently. As a result, many people carry an e-Wallet, such as Apple Pay, which can store almost any card. However, if you are a student who frequently uses public transportation, misplacing your wallet could mean missing the bus and final exam. What if you could keep both your transit and student card in a single, easily accessible location?

Our project aims to combine a UBC and Compass card into one wristband for easier access. With TalariaTag catered to mainly UBC students, users will be able to store their Compass card and UBC student ID on a sleek and minimalistic wristband that travels with them wherever they go. Getting onto the bus or accessing buildings is now as simple as raising a wrist near the scanner. Our wristband will store your two most important cards, Transit and UBC cards. So, the next time you are at the bus stop and reach into your pocket for a handful of lint, you'll notice your wristband and remember that TalariaTag has got your back.

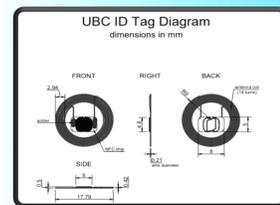
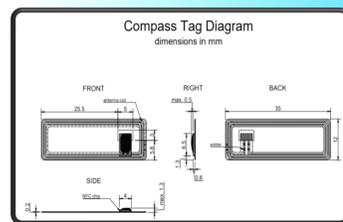


Requirements

- Capable of storing both the UBC ID and compass chips
- Adjustable for all wrist sizes
- Withstand daily wear and tear for at least 3 years
- Reliable-works 9/10 times
- Weather-resistant (minimum rating of IPX4 in IP Ratings)
- Must not exceed the cost of \$10

Design

TalariaTag's design is a flexible wristband made from Smooth-On Smooth-Sil 950 silicone with a keeper made from PLA. Two communication chips and their separate circuitry is embedded within the wristband. One chip is a Compass transit pass, and the other chip is a UBC Student ID. TalariaTag is a convenient and efficient replacement for carrying both a UBC and Compass card for UBC students. One multipurpose tap gesture with TalariaTag can grant access to UBC facilities and public transit within Metro Vancouver.



Keeper 3D printed with Polylactic Acid (PLA) filament



Prototypes



Prototype 1

- Made from Smooth-On Dragon Skin 30 platinum cure silicone with both chips embedded
- Too soft and delicate due to having a low shore hardness of 30A
- Buckle hole was too thin, would get caught on the clasp and snapped after a few uses (Right)



Prototype 2

- Made from Smooth-On Smooth-SIL 950 Platinum cure silicone
- Higher durometer (hardness) of 50A making it stiffer and feel more premium
- Loop (Right) eliminated the catching of the clasp, however, due to being a soft silicone, putting on the wristband was difficult, and it snapped

Materials

Throughout this project, we used a variety of materials listed below:

1. Platinum Cure Silicones

Key Differences	Dragon Skin™ 30	Smooth-Sil™ 950
Product Type	Silicone Rubber - Platinum Cure Skin Safe FX Materials	Silicone Rubber - Platinum Cure
Mixed Viscosity	20,000 cps	35,000 cps
Mix Ratio By Volume	1A:1B	N/A (gram scale required)
Shore A Hardness	30	50
Color	Translucent	Blue
Die B Tear Strength	108 pli	155 pli
Tensile Strength	500 psi	725 psi
100% Modulus	86 psi	272 psi

2. 3D Printing Filaments

• TPU (Thermoplastic Polyurethane)
This low-cost, flexible filament was used so that we could 3D print a rough prototype in a couple of hours



• PLA (Polylactic Acid)

Due to its low cost and quick print times, this was our best option for creating the molds to cure and cast the silicones

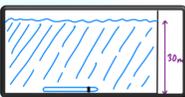


Testing and Results

Testing was conducted to ensure we met the requirements. Lab testing was unnecessary because we were able to test the everyday functionality of our wristbands through other means. Real-world testing included:

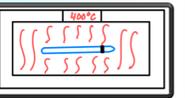
1. Water Resistance

IPX8 waterproof rating is submergence of 1.5 meters deep water for 30 minutes. TalariaTag was dropped into 3-meter-deep water for 30 minutes and was completely undamaged.



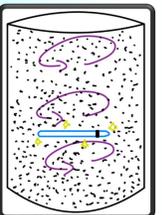
2. Heat Receptivity

Our wristband was able to stay intact at 400 °F in an oven. This temperature is much higher than any temperature regular use would entail.



3. Dust Resistance

We dropped our wristband into vacuum dust bag and turned the vacuum on to simulate an extreme dust environment which would not be seen during regular use. The dust bag had debris of sizes ranging from small dust particles to square-inch pieces of metal. After a rinse, TalariaTag remained completely operational and dust-free. We are unable to give it a dust rating because it was not a standardized test- X rating.



4. Daily wear and tear

Over the course of a week, we have been putting on and taking off the wristband to simulate normal use. It is completely intact and can withstand daily proper use for at least 3 years.



5. Chip Reliability

Our wristband reliably works on both Compass transit and UBC card terminals.

Conclusion

TalariaTag is a sleek, convenient way to combine the UBC and Compass Card into one wristband. It is comfortable and can withstand the elements for daily use. In the future, we would like to pitch our idea to the HATCH Accelerator in hopes of working with them to gain engineering-specific and entrepreneurial skills while building on our design. This could include a wristband that incorporates more cards, such as credit and debit cards, and even use them in other wearable accessories (rings, keychains, etc.).

Special thanks to:

