

# Badge of Authenticity

University of Victoria CSC 485 – A3

Donovan Aikman

## 1 Introduction

This project is a prototype open tool aimed at small-c to professional-c level visual artists to aid in disseminating their art to fans at nerd and geek culture conventions. It is focussed on artists who are self-branding [1] micro-celebrities [2] or aspire to be one. It does this by trying to alleviate the work done in the relational labour often involved in being an artist in the digital age [3][4][5], so that they can have more reliable income. It also does this by re-imagining the most ubiquitous object at conventions, the convention badge, as both a physical and digital tool for the artist's benefit by increasing its value to the fans via art and authenticity.

### 1.1 What the Badge Does

The badge is intended adds an extra dimension to process of attending a convention through the following steps as a stepping off point for the artist and the fan:

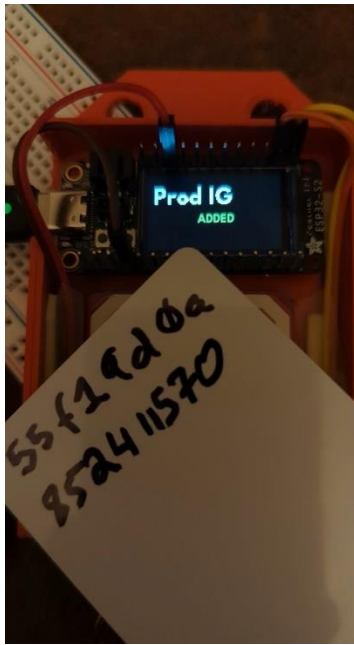
Step 1: Pre-event, either the artist or the convention prepares RFID tags based on the artist's desired details.

The image shows a mock website for 'GerbilCON Artist Registration'. The header is a blue bar with the title 'GerbilCON Artist Registration' in large white text. Below the header is a navigation bar with five buttons: '2023', 'Guests', 'Schedule', 'Register' (which is highlighted), and 'Past Years'. Below the navigation bar, there is a link 'Register > Artists'. The main section is titled 'Badge Art Tag (Free and Required)'. It contains instructions: 'Upload an image or enter a weblink where the badge will download the image from over conference hall wifi.' Below this are two input fields: 'Select file to upload' with a camera icon, and 'HTTPS://'. Below these fields, there is a paragraph of text explaining the authentication process: 'Now, enter your authentication text that will be uploaded when conventioners get your image to prove its authenticity. The authentication text can be anything you want as long as it is text. It can be link to a video of you making the art, a blockchain token, or a Public PGP key, as a few example. If you enter a https weblink, the badge will fetch text from that link if you want generate authentications on-the-fly on-your-own. If we detect that it is a PGP key, we will use it to encode a time stamp for the attendee.' Below this text is a large text area with the placeholder 'Enter text here...'. To the right of the text area is a 'Submit' button. At the bottom right, there is a note: 'NOTE: You get 1 card for free BUT you can order more by contacting the organizers. The standard is open too, so if you have access to the tech, you can make your own too.'

Figure 1: Mock website registration where an artist would provide badge details.

Step 2: When meeting with fans, the artist can tap this the fan's badge with the RFID tag, and they will receive two things uploaded to the badge either from the tag or from the internet based on the card information:

- 1) An event-unique image
- 2) An authenticity marker that validates the art as being from that event or from that artist.



*Figure 2: Tapping the Badge with an RFID.*

Step 3: At the convention, the fan can use the image as part of the badge display right away to “peacock” off artists they have interacted with, giving the artists additional exposure. Touching the badge’s circuit board pins will allow them to see the authenticity marks and who they are from right away.



*Figure 3: The tapped image is added to the slideshow.*



*Figure 4: Touching the pins reveals the authenticity markers.*

Step 4: After the event, the fan can download the image and its authenticity marker to enjoy and share as desired separately from the badge.



*Figure 5: The received details are USB available post-event.*

## 1.2 Why The Badge Does This

The benefits for the artist are as follows:

- 1) RFID tags are a cheap and re-usable medium, reducing printing costs for physical promo materials.
- 2) Tapping an RFID tag is a more frictionless process as it allows the badge to do a lot of transactional work with the art digitally and with minimal physical effort. Fans do not have to find their phone, or scan a QR code, or visit a web site from a card to get the digital art.
- 3) The artist's work is now longer limited to just their booth and can now visually travel around the convention on the badge for others who didn't visit the booth to see and perhaps become inspired to visit the artist with their work.
- 4) The artist-fan interaction is validated by some kind of digital marker as well and this is perhaps the most important aspect, as will be discussed next.

## 2 Related Work

There are two important aspects of related work that were considered: authenticity and the nature of badge culture at conventions.

### 2.1 Authenticity

At the time of writing this, Midjourney AI version 5 had just been announced [6][7]. Midjourney and many other AI generative image makers are not exactly new, but the quality of AI generation has become comparable to a human-generated work. This raises the question of what place human-generated art will have in a world where AI is simply faster at providing similar results.

It can be said with some obviousness that human generated art will not simply go away because AI exists. Newer technology has consistently failed to kill its predecessors. Records did not kill live music, film did not kill theatre, TV did not kill film, Netflix did not kill TV, and so on. The question here is what that might look like.

Feelings that mechanical reproductions do not hold up to the quality of original or unique works is not a new problem and can be traced easily to a pre-digital age [7]. It is not just opinion either, there is a difference in our brain's reaction when we believe a work that we are looking is authentic [8]. It is from this that this project began to think about how people will value authentically human-generated work and want to show it off.

Therefore, it was considered important the authenticity be validated digitally in this project as well. Beyond just the memory of having had the interaction and the event specific art, the fan will have the digital marker that further validates that interaction, aiming to create a more positive fan-experience with the artist at minimal additional work to the artist.

## 2.2 Badge Culture

"Why does this tool matter? I have a phone/smartwatch that can do all this anyways!"

Putting aside the fact that not everybody has a phone or a smartwatch despite their ubiquity, it is very true that any functionality of this badge tool can be easily replicated otherwise. However, as convention organizer Kevin Standlee noted, convention badges had 4 unique functions to consider: identity, ticket, memorabilia, and utility [7]. Identity means that unlike a phone, the badge will be visible to others. This provides an event-specific platform this tool exploits. Memorabilia also means that after the event will be more likely to be hung on to, and perhaps displayed, not just lost inside a day-to-day device like a phone.

Standlee's value of utility is broad, but it is worth noting that fans often use as a form of "peacocking" that can be seen in ribbon and badge culture [8]. Fans showing their love of a character, artist, or fandom is a long-established tradition most obviously in cosplay, but not everybody cosplays either. However, everybody does have a badge and there is already some tradition to convention badges to show off. Hardware conferences in particular have some established traditions of PCBs as badges and art [9][10]. All this is another way that badges hold a value that phones or smartwatches do not always do.

## 3 Design Fiction

The tool was designed to be open and simple so that it could be built upon well into the future. Additionally, when designing the concepts of "Low Threshold, High Ceilings, and Wide Walls" as well as "Supporting Interchange" were considered important so that the tool could evolve and be re-purposed by its users. Although currently this supports sharing images, that would be trivial to re-purpose to other media. Additionally, what the artist uses to specify the authenticity was left open, so that it could evolved to always be a relevant form when better and clearer standards appear.

Let us consider two future scenarios of what that might look from both user sides: the artists and the fans.

### 3.1 Scenario 1: The Artists Find New Horizons

Dispensing a single image and an authenticity marker is just the current state of this tool. Being an open tool, it is intended for artists to find their own use for it. This is where supporting interchange was a concept while designing.

In the near future, it would be fairly easy for a technologically savvy artist to set up their own image and authenticity server. They could randomize the image drops, make the RFID taps more like a gachapon machine for fans with different fans getting unique prizes. Server side software could also uniquely brand images with event names and logos, saving the artists time to design that event unique by simply letting the software do it for them.

As time moves along, artists can also expand the specification to allow more than just images too. The artist could also include unique items like mods for games that include their art or characters. They could give away music tracks to games that their art is featured in. Although this is intended to promote private creators, corporate level entities could also exploit this too. Giving away unique characters, items, or characters to games they own. For instance, as a gift to fans that visit their booth, a company that makes fighting games could give-away a unique attack combo add-on via the RFID tap with a code to unlock it too. This would encourage more in-person attendance at fan events and cement those community bonds even more.

Authenticity is also what you make of it. The field is open. Some artists may never choose to use it. Some could personalize a video message to the buyer. Some may get involved in unique authenticity schemes well-beyond current standards like PGP and NFTs or even just more environmental ones.

### 3.2 Scenario 2: The Fans Go Wild

Although this is intended to be an artist supporting tool, it is physically a fan-owned tool and an open one too. The idea of "Low Threshold, High Ceilings, and Wide Walls" came into play while designing this prototype. The field for evolution is deliberately wide on the fan-side too, and here are some potential directions that it could potentially do.

In the near future, the low threshold comes into play. Physically, the badge can be modified anyway you want to. Crafty fans would decorate the outside with their favourite characters. This is a low bar open to anybody with craft supplies and intent. Fans or vendors with 3d printers and workshops can take it further to make it their own by adapting and painting custom cases or frames. What is

currently only a cheap plastic case in the prototype could be a full steam-punk pocketbook instead. It is intended that this kind of easy physical modification will inspire other kinds of modification as well in exploration.

The current version with some alternate physical fan decorations imagined by Amy Aikman, including an incomplete prototype on Adafruit Magtag hardware and a blank frame from Adafruit as well.



*Figure 6: Top left is the Badge in a 3D printed frame. The other items are envisioned frames and boards that might be created by fans.*

For the more enthusiastic hardware hacker, the high ceilings come into play as the imagination is the only limit on a simple protocol. Better touch interfaces and bigger screens are obvious mods if desired. They can also mod their own interpretations of what kind of slideshow software too. If e-ink fabrics truly become a thing, they can use their own clothes instead of the screen as display. If they like an artist they just met, they can add them directly to their shirt too.

Even the small ESP32-S2 used here has about a dozen available pins plus built-in wifi and BLE for use too. Proximity alarms, light shows, cameras enabling read-aloud text, keypads, virtual magic 8-balls, and everything else internet or 3.3V/5V compatible is a potential modification.

It also comes with a certain inevitability that fans will trade amongst themselves too, rather than with the artist. This may seem like a knock at the idea of authenticity, since it is no longer with the artist. However, it may lead to an evolution of it instead wherein, a yet-to-be-conceived authenticity key marker evolves with each passing along, verifying a different kind of unique connection. It may not marker a unique meeting with the artist, but instead with another fan and the sharing between fans builds more base for the artist.

## 4 Prototype Design and Implementation

### 4.1 Prototype design

Initially, this was conceived of as a Bluetooth Low Energy (BLE) device rather than an RFID one. However, for simplicity, that choice was made over the steps of iteration. In that version, both the sender and receiver would push buttons on their badge to send and receive data locally. However, that was phased out as not feasible to implement in the time given. However, the ESP32-S2 does support that too, if it should be brought back in.

E-ink was also considered as a better low-power option to a full-colour display. The Adafruit Magtag [13] was a partial inspiration for this. However, E-ink displays are not as fully developed as they could be for visual art just yet. It is hoped that future iterations can incorporate that in.

Most importantly though is that it became clear during iteration was that as a fan-held device, it would be necessary that the platform felt accessible and modifiable to them. Affordances for physical and hardware expansion had to be included.

Pages of the iterative artwork can be seen below. Most of the other core concepts of the badge design beside BLE remained unchanged from its initial ideas in order to keep a focus on an open platform that could support the concepts outlined in the Design Fiction above.

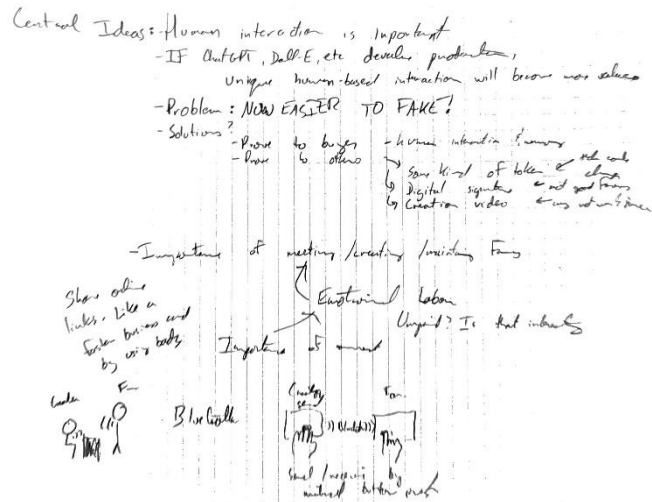


Figure 7: First round of ideation when BLE was considered.

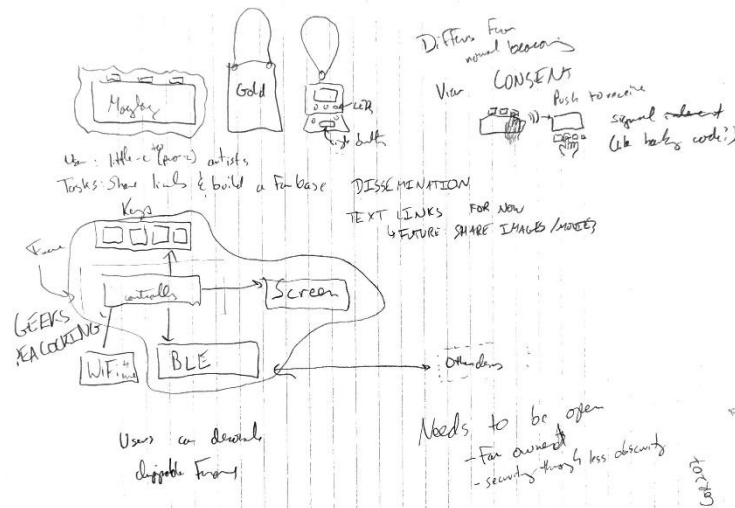


Figure 8: Second round of ideation. This round included working on an incomplete version using Adafruit Magtag.

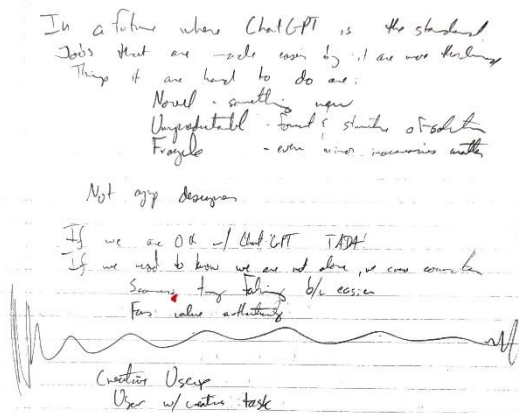


Figure 9: Ideation notes around ChatGPT before the Midjourney update.

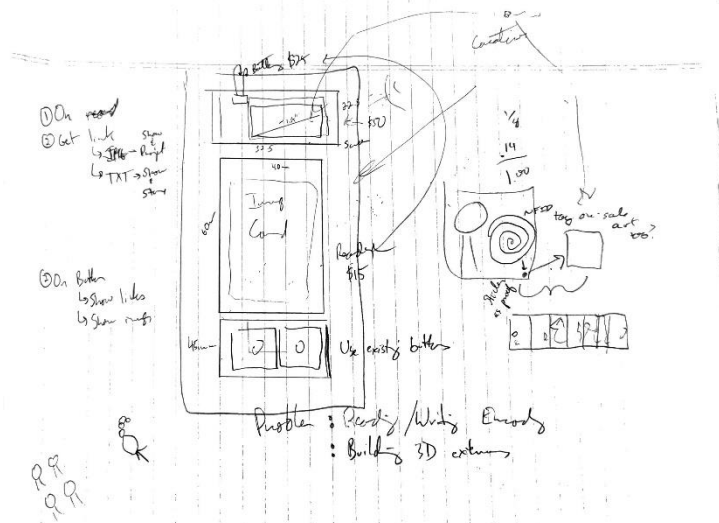


Figure 10: Third round of ideation. The swirl was about an idea to use RFID stickers as well or instead.

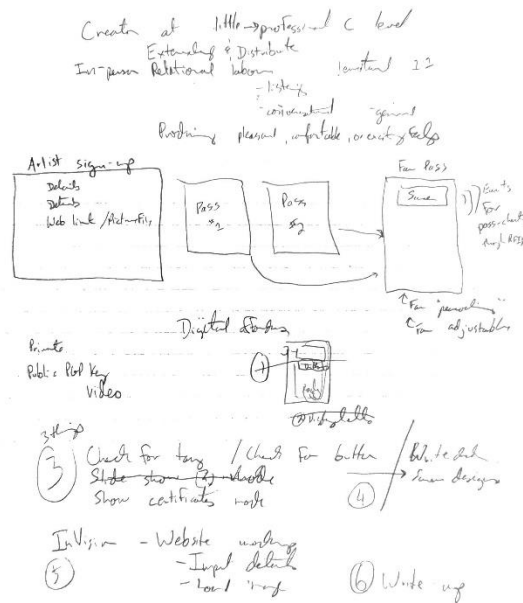


Figure 11: Final round of idea adding the website registration and code needs.

## 4.2 Implementation

### 4.2.1 Process

The hardest part of implementing this was finding the right parts that could support both a small display and an RFID reader in a badge sized device, such that the prototype would be roughly the size and shape of a normal convention badge. Most of the bulk that currently exists in the current design is from breadboard wiring and could easily be reduced by simply designing a circuit board that supported these parts in a flatter dimension.

As having a platform with suggestive affordances for fans to modify the platform was also important, the choice of the Adafruit ESP32-S2 TFT was a deliberate one as it already incorporated the screen with a microcontroller while still leaving a dozen pins available for people to build and modify the project further with. For those not comfortable with soldering, it also has a StemmaQT/QWICC plug to make adding additional sensors, lights, and other expansions as easy as writing supporting code. However, in order to support both the



RFID reader and screen in the current construction with existing libraries, CircuitPython became a necessary choice as well but Python is also very beginner and exploratory friendly.

#### 4.2.2 Assembly

Of course, since it was the intention of this project to be as uncomplicated as possible, to promote interchange, assembly should be fairly straightforward for a knowledgeable user. To build the prototype yourself you will only need the following things:

- Adafruit ESP32-S2 TFT microcontroller [11]
- PN-532 RFID reader (Elechouse or Adafruit recommended)
- Breadboard and wires as needed

To assemble this, connect the RFID reader to the ESP32 using the I2C wiring described here: <https://learn.adafruit.com/adafruit-pn532-rfid-nfc/python-circuitpython>. SPI is not recommended as it is already shared with the TFT and did not seem to work well. UART also did not seem to function with the Elechouse board. However, I2C is straightforward and functional.

A badge holder is not required, but recommended. The one used here is available at: [https://www.tinkercad.com/things/7MgtKQ2ldpl?sharecode=5DyV6Mq8XqgFC9GqAHpoEtFASltxVc\\_wlmsTBUGp6Y](https://www.tinkercad.com/things/7MgtKQ2ldpl?sharecode=5DyV6Mq8XqgFC9GqAHpoEtFASltxVc_wlmsTBUGp6Y).

The main code can be found here: <https://github.com/mdaikman/BadgeOfAuthenticity>. However, you will need to source the CircuitPython libraries yourself from the main source online and place them in the CircuitPython lib folder. Additionally, you will need to modify the code to your desired images and place them in an images folder in the Circuit Python root. Any size picture up to 240x135 should work in BMP format but full size 240x135 images are recommended.

## 5 Critique

Building for the future and imagining how others might expand on an open platform is a fool's errand. For example, Twitter's most popular feature the hashtag came from outside the company and its creators, who didn't think much of it [12]. That being so, it is hard to critique a device that way before its adoption. However, it does have three clear shortcomings as it begins.

The first is cost and size. It was already mentioned that the size could be reduced by using a dedicated board, since most of the bulk is from wire sticking off the board. However, the cost of the parts to make this single prototype was about \$70, which is considerable. It is unclear how much that cost could be brought down by mass production while still keeping the platform open and modifiable.

The second is adoption. Although this is intended to be as friendly as possible, its technical advantages may not be immediately evident to more artistically driven creators. It is also very unlikely that most creators would have RFID writing gear to make additional tags at first. That was why there is the intention of having the conventions provide the creators with at least one RFID tag to start. However, conventions may also not be interested in investing in buying a lot of expensive badges either as colour printed and laminated badges with lanyards can be made for less than \$1 each.

Third and most importantly is the potential for abuse. The code as written is only intended to pass non-executable strings that are provided by a benevolent authority. However, this badge still adds a potential attack surface to an item where it never existed before. As users begin to exchange with each other and expand upon the platform, that attack surface will grow.

In summary though, it is worth balancing these shortcomings against the strengths that have been outlined throughout this document. It is a fast and efficient way of sharing digital media in real life in a way that phones don't entirely replicate. This project is intended to make relational labour at convention events easier and more convenient for the artist. The costs of the badge are also offsetable over time as this badge could be used across multiple events. And finally, it is intended that by having an interested and active user base for an open tool, that potential for abuse could be limited by those invested in its maintenance and safety.

## 6 Future Work

There are three areas for future work here.

To start with, it would be necessary to figure out the feasibility of the features that have been simulated in the prototype. The RFID reading fakes downloading of images currently. The MiFare cards used here hold at most 1k of data and isn't big enough to hold even the 240x135 pixel bitmaps needed by the display. The ESP32-S2 chip does have Wi-Fi capabilities to pull larger files down to local storage in CircuitPython but that was never implemented or tested at scale.

The next area that needs to be addressed is making the adoption more feasible. Research into how to make the platform smaller as well as more affordable would benefit the potential adoption of the tool into broader use.

Finally, this prototype was built without input from its intended user groups, so assumptions were made. The author/creator has some experience with the live event side, but a focused user group or some directed co-design could help this immensely.



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