• MAKER PROJECT •

THE BILLY BUTTON BELL

{ KNOW WHEN TO ANSWER THE DOOR }

8 JUNE 2021

FROM PROBLEM TO PROTOTYPE IN 9 WEEKS

Idea

A doorbell that uses passcodes and assigned songs/tones/chimes to indicate whether the person at the door is 'known' or 'unknown,' and sends a notification to the primary user.

Motivation

Primary: I wanted to do something that would assist my mum in some way. I decided to find a simple solution to a known problem — my mum's unease at not knowing who is at the door when the doorbell is used, and the effort required for her to get to our current 'smart' doorbell's display.

Secondary: After a few months of Questions, a second motivation emerged. I wanted a doorbell that didn't have the same level of security risk that doorbells equipped with a camera pose, namely the potential for third parties to access the device and its data.

Challenges

Primary: To build a convincing prototype with a starting skillset of a background in international law and cyber policy and an eye for detail. I had to start from scratch, with Python proving to be a steep learning curve.

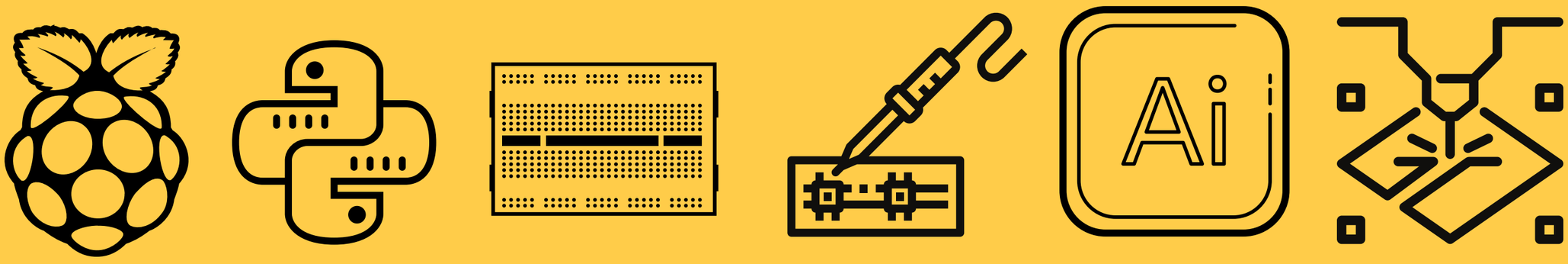
Secondary: To fit all of the components together in a functional manner (i.e., the buttons need to be secured to the doorbell box and provide adequate resistance when pushed).

Tertiary: To have everything working for the demonstration day.

Skill Acquisition and Support

I received a lot of support from the cohort and the teaching staff, which meant that I was able to learn the skills that I needed and push through the frustration and failures to produce the prototype.

The skills that I acquired:



How to set up and use a Raspberry Pi

Basic Python Programming

Basic Circuitry, including prototyping using a breadboard

How to use a soldering iron to solder components of a circuit

How to design a file in Adobe Illustrator for laser cutting

How to source materials and use the laser cutter

The first three skills aligned with the homework for Build, which meant I was able to learn them as the semester progressed and had lots of opportunities to ask questions and learn from the cohort. I found learning how to set up the Raspberry Pi relatively straightforward and had no problems with using it. In contrast, working with Python required considerable time and effort, which translated to reading and watching a lot of tutorials online and working through specific problems with the teaching staff, Chloe, Myrna and James. The Extra Python workouts and the dedicated 'Maker Project' hours with the tutors were critical to overcoming the challenges that I was facing with the code for the doorbell.

The reason that I used the Raspberry Pi is that it meant I could use Python, which is the only programming language that I am familiar with, and because we were using it in class. As for the breadboard, I used that to set up the circuit initially so that I could experiment with different types of tactile buttons and keypads before creating a permanent circuit using the soldering iron. Learning to build circuits and use the soldering iron was important for me as I wanted to engage with the process of being a maker in a meaningful way — actually using my hands to bring together the different components.

As for the final three skills, these were gained in the studio and the Maker Space@Physics, where Chloe, Myrna and I spent a considerable amount of time in the week leading up to the demonstration day. I found working with Chloe and Myrna in the week leading up to the demonstration kept me motivated and on track.

Made using Canva."Breadboard" icon by Mike Wirth from Noun Project

We were all able to make use of the Maker Space and the knowledge of the staff and mentors who work there, with Jordan working us through how to design files in Adobe Illustrator and use the laser cutter, and Sam explaining that a drill is sometimes the solution when the hole for a screw does not line up perfectly.

The reason that I decided to use the laser cutter for the doorbell is that it is quicker than printing something using the 3D printer and an acrylic case is stronger. It also meant that I could adapt an enclosure designed by Adafruit that could be secured without screws or glue.

Of course, on the day everything was not working as intended, but with Johan and Mina's help I was able to pull it together — bugs and all.

10:45 am vs 11:00 am

Reflections and Lessons Learned

Realising that I am a 'maker' has been my greatest takeaway from the project. I am incredibly proud that I was able to go from problem to prototype in 9 weeks, and that I was able to build a simple solution to a problem that I identified. This is a testament to the approach that has been adopted by the Build Team, that is, to learn by doing and to work through the frustrations and the failures to make ongoing progress. This approach is critical for the New Branch of Engineering (NBE), even if it can be incredibly uncomfortable at times. Another takeaway that I think relates to the NBE is the importance of having a clear intent behind what you are making and an appreciation of what came before. With respect to doorbells, the intent has changed overtime from indicating that *someone* is at the door to showing *who* is at the door, and more recently, to keeping an eye on the front of the house.

Overall, I was happy with how the project came together. If I were to do this again, however, I would definitely seek feedback more regularly and test the prototype in its intended environment of use earlier than I did (i.e., disconnected from a monitor).

1

Is there a role for the NBE in imagining technologies that are accessible for users with disabilities? What steps need to be taken to ensure that the technologies we build enable rather than constrain?

2

When it comes to bringing technologies into the home, do they disappear, or do they dictate? And, if we choose to introduce these types of devices into our homes, will we become more accepting of their presence in other spaces?

3

In the context of data collection in public spaces, like the front of a person's house, what constitutes 'meaningful consent'? In such cases, is consent taken or given?

Acknowledgements

I want to acknowledge the tremendous amount of support that I received this semester from everyone in the cohort. Thank you to the peer reviewers for your advice and kind words, as well as the Build teaching staff – Paul, Johan, Mina, Zac, Mem and Matthew — for your guidance, assistance and good humour. Special thanks to Chloe, Myrna, Kate, Jules and James for their help and positivity in the Studio and Maker Space in the lead up to the demo da

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Outside of the Institute, a big thank you to Jordan and Sam from the Maker Space for their help and my family, who tolerated my `maker mess.'

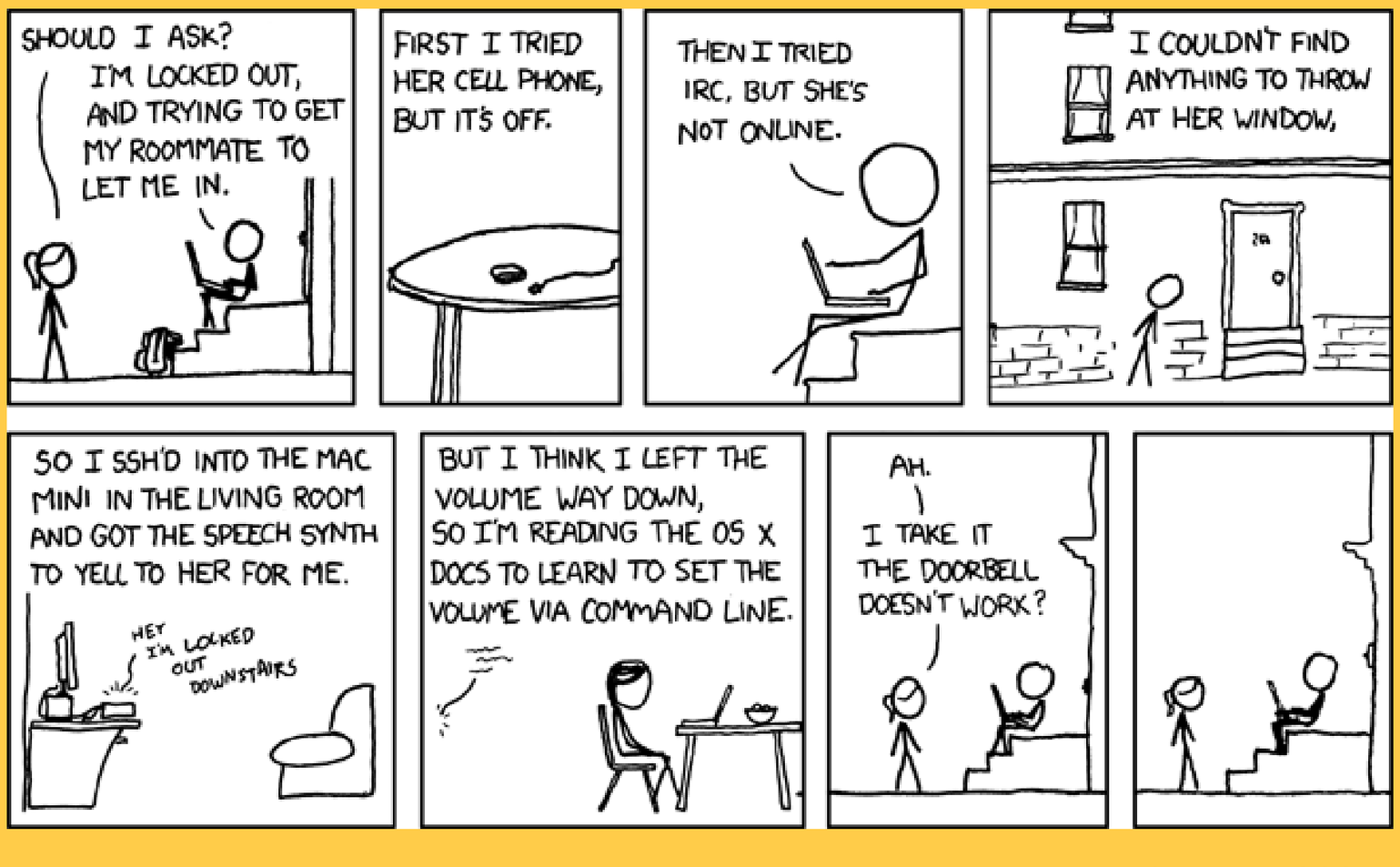

Image: Randall Munroe. n.d. `I'm An Idiot'. xkcd. Accessed 25 May 2021.