

bobo

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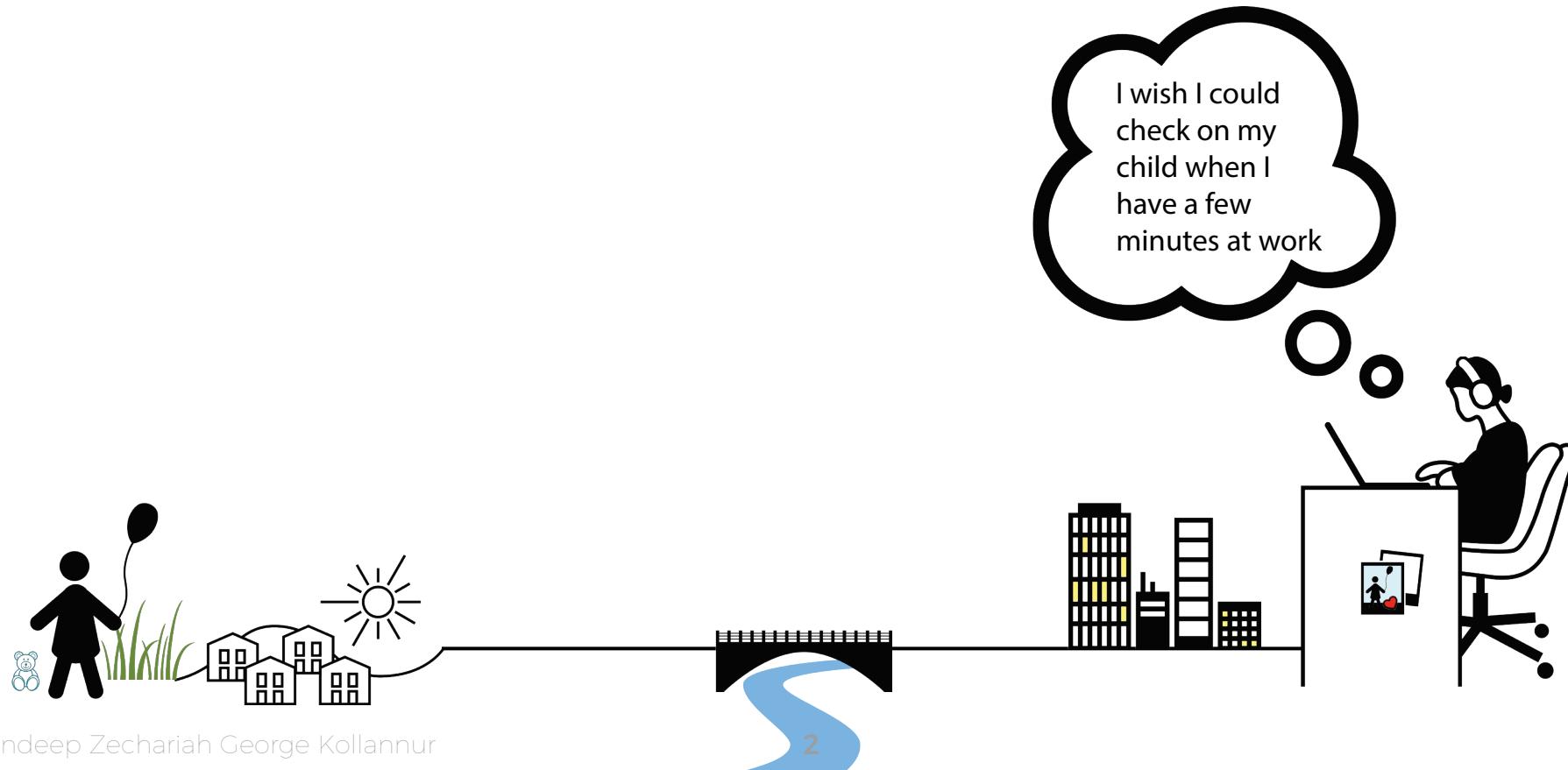


User Requirement and Motivation



To create a device that will enable :

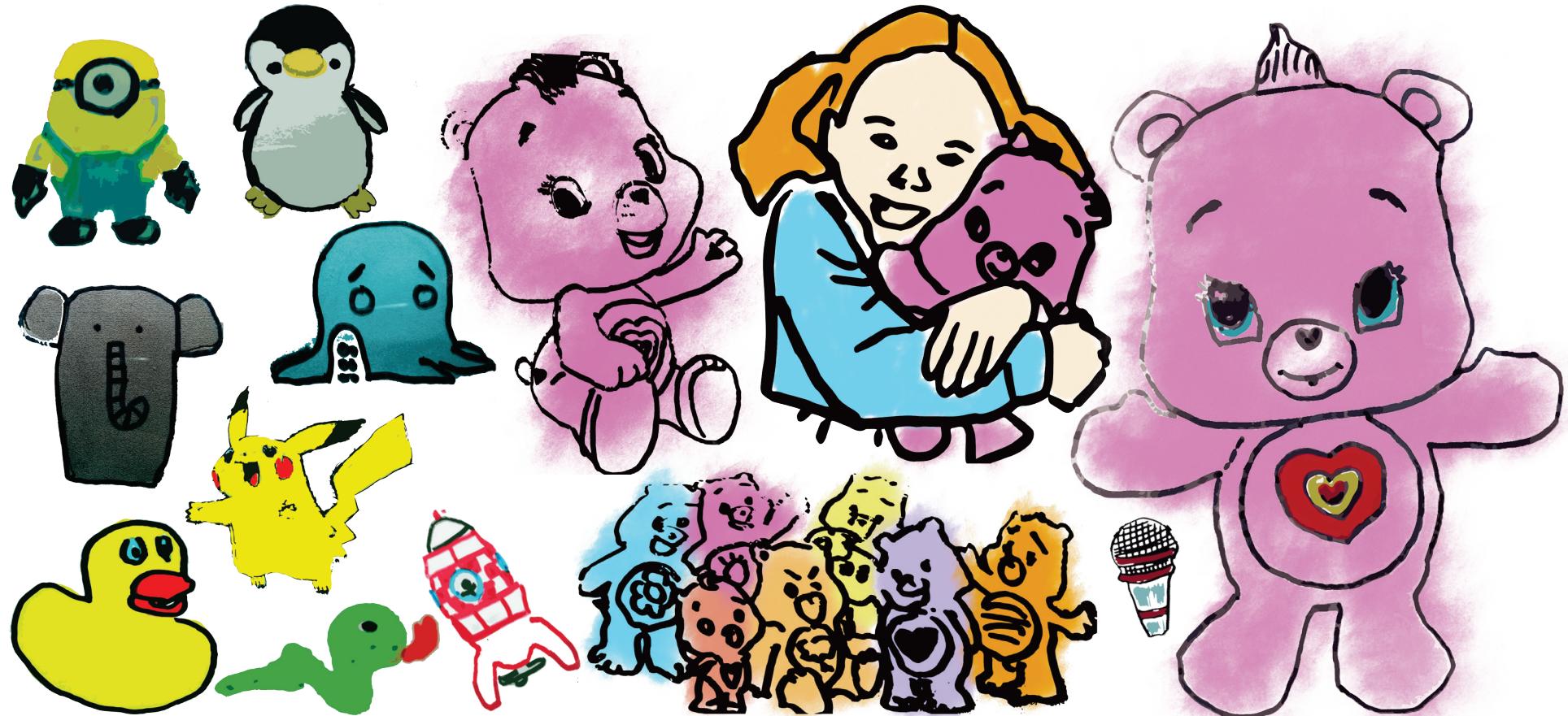
- The parent to monitor their child and its health
- Parents to engage their kids in a meaningful play from a distance
- To connect with their child and share special moments
- Enable the child to reach out to their parents when they need
- To share a virtual hug ❤️



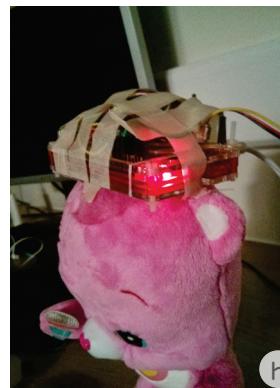
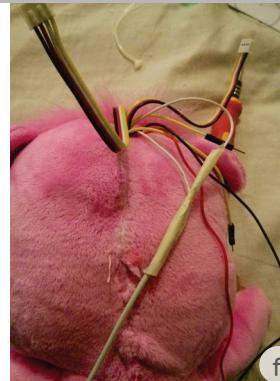
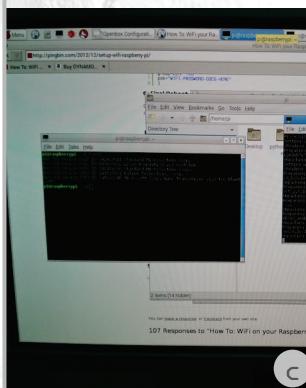
Design Alternatives

The project initially explores various toys and artefacts that are aimed for children, with different levels of game play. On the left a wider sample of plausible artefacts are explored and eventually narrowed down (towards right) to the Care Bear family of toys which is popular among kids.

Note: All elements in this page have been sketched by the author, scanned, vectorised and recoloured.

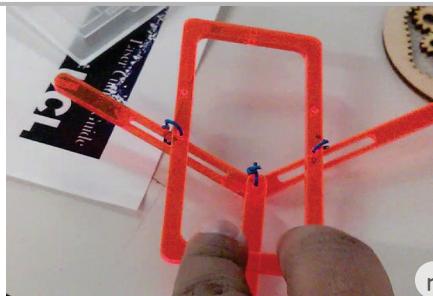
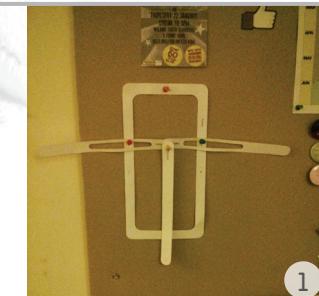
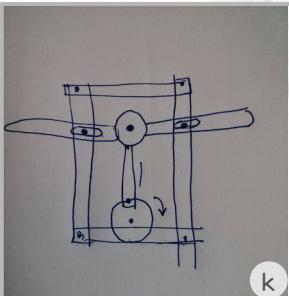


Iterative Design



Exploring technologies, implementing electronics with code.

Iterative evolution of bobo, merging the physical artefacts with electronics & j the final product.

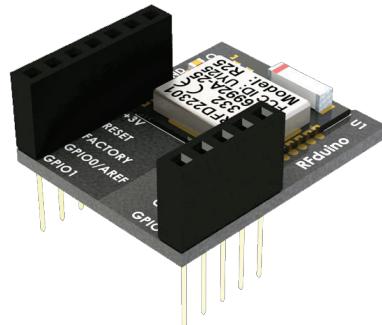


Progress of creating actuating arms for bobo from sketches, to paper prototype to laser cut acrylic, with m being a failed 3d print of the same.

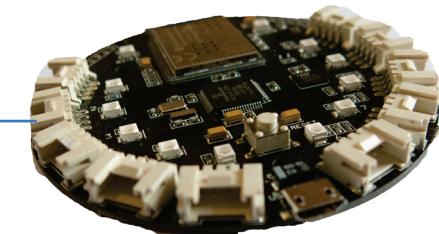
Exploring Hardware



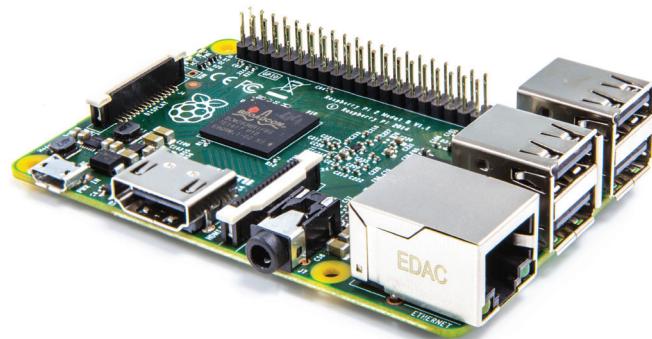
Teensy USB 3.1



RFDuino 22301



Smartables Beta

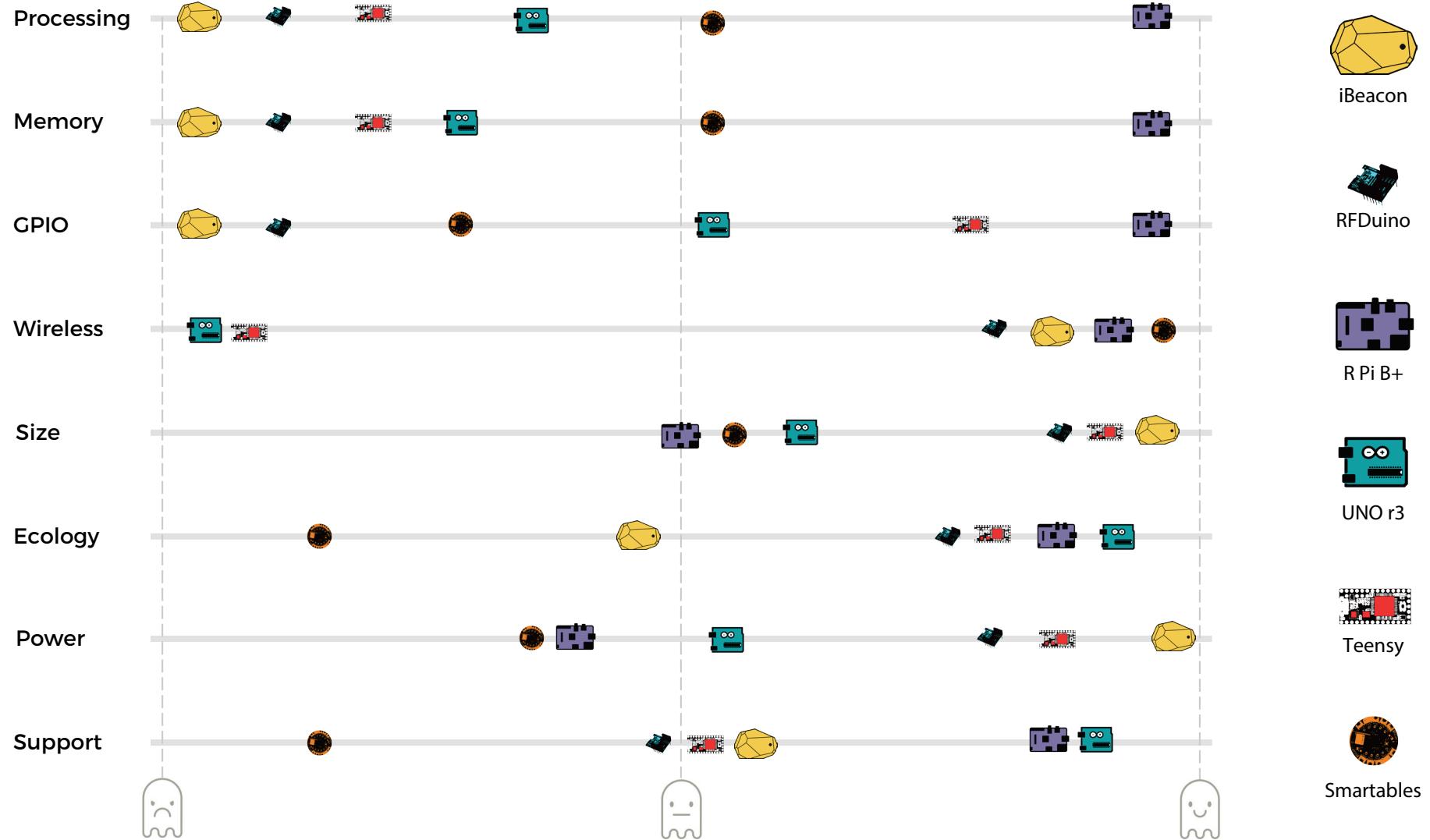


Raspberry Pi B+



Arduino Uno r3

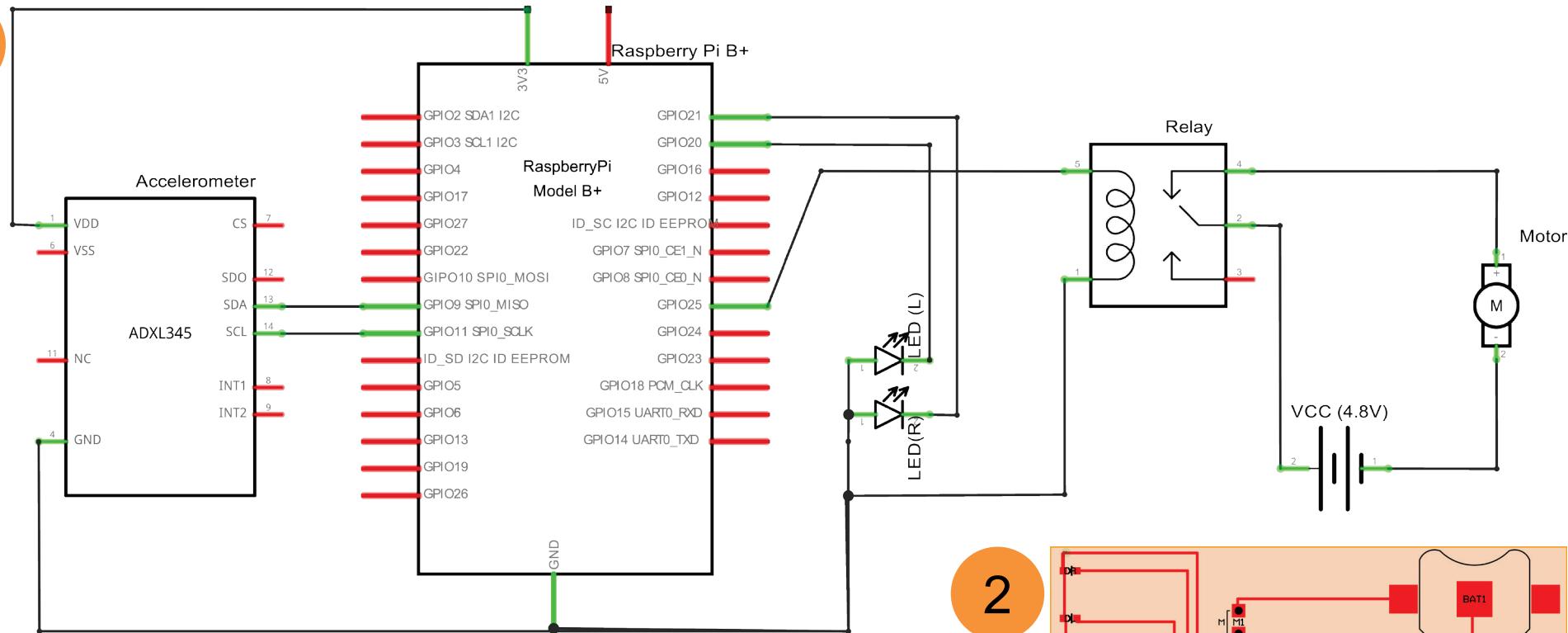
Platform Selection



Different electronic components and prototyping tools have been evaluated for their use in this project. They have been evaluated across various parameters. In this chart, for example Memory, GPIO or general purpose IO pins have been evaluated as higher the better, whereas Size, Power consumption has been evaluated as lower the better. After careful evaluation R Pi B+ was chosen as the platform for this project.

Electronic Prototyping

1



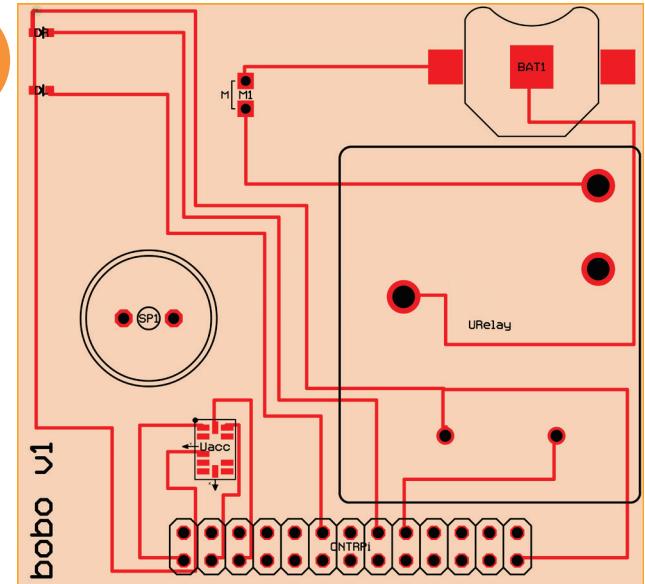
2

Schematic Diagram

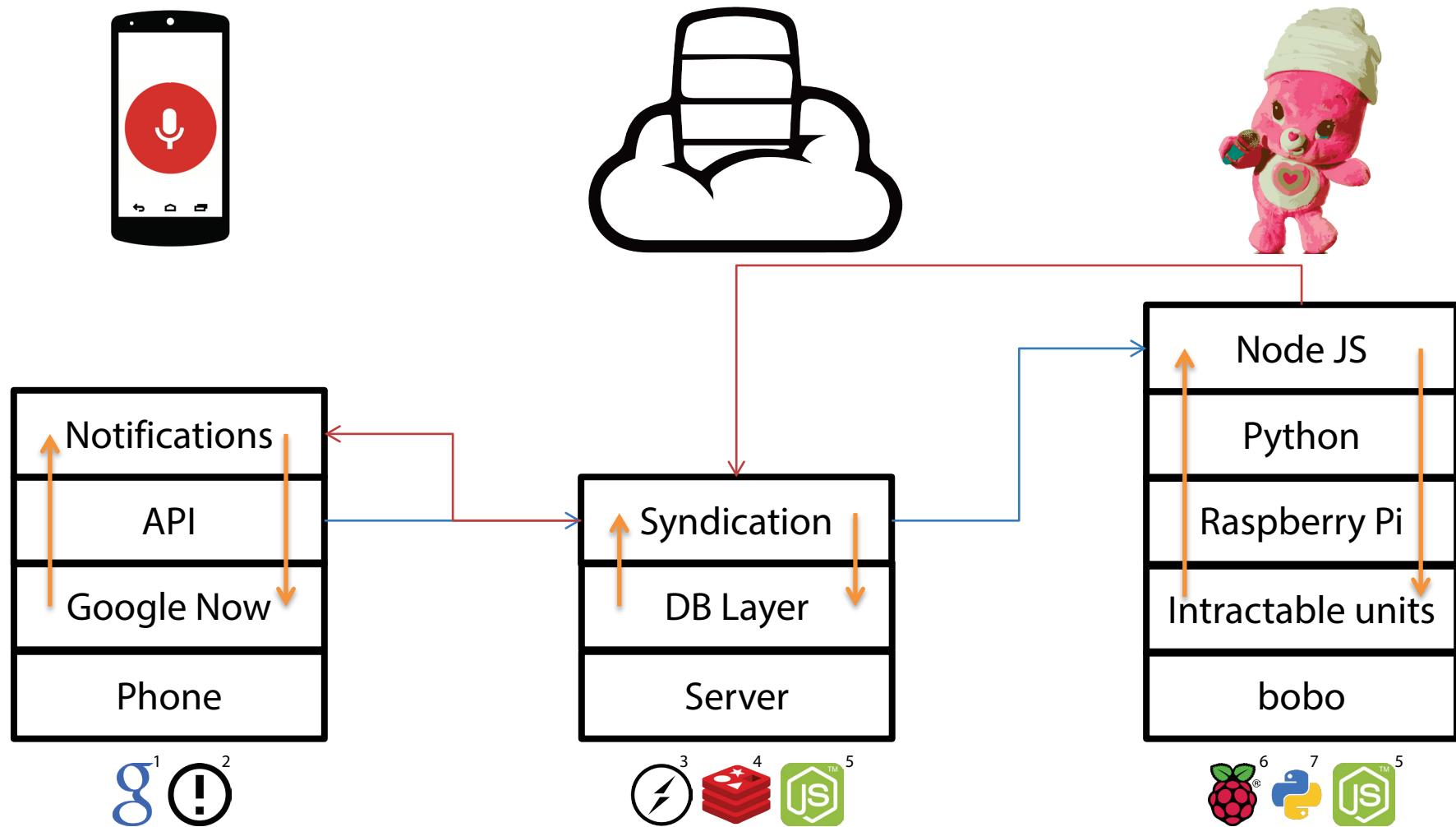
The schematic diagram showcases all the components of the prototype including Raspberry Pi, Accelerometer, LEDs, additional power source and a relay controlled motor.

PCB Layout

Printed Circuit Board Layout is a format which was used to fabricate the PCB, the first version of PCB fabrication was done by hand. Later this can be done with etching methods of PCB Design.



Code* + Magic



1. Google Now
2. Notification
3. Socket.io
4. Redis
5. NodeJS
6. Raspberry Pi
7. Python

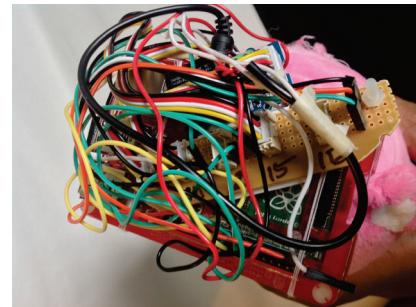
*Code is available at <https://github.com/sandeepzgk/bobo>

Packaging



Stitching & Access

The primary mechanism for accessing internal components and embedding them inside the doll was done by cutting it open and stitching them up back together.



Key Electronics

For the prototype it was important to have easy access to the key electronic components for easy tweaking and fixing. For this reason, Raspberry Pi B+ along with the main board was stacked atop the bear's head.

Final Assembly

The final package includes the key inner components, electronics that were affixed atop the bear, this was concealed with a night cap that was specifically selected for its colour.



Demo Video



<https://www.youtube.com/watch?v=JslGH7EPn48>

Next Steps

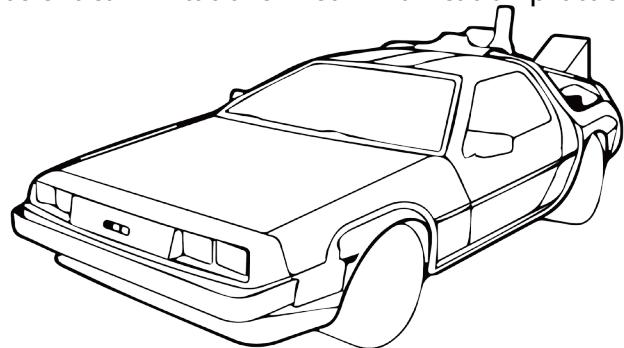
The current prototype of bobo :

- Can be considered as a Minimum viable product (MVP)
- Basic health information (movement) can be communicated wirelessly, activated via voice commands with virtual hugs



Critical Reflection & Alternatives:

- R Pi B+ is an excellent prototyping board, the main drawback is that it supports only Digital GPIOs. Alternatives like Arduino would be useful but has critical limitations in communication protocols.



What Next:

- User testing with real participants
- Interviews with GP to figure out the right health information to track
- Create a revised prototype
- Evaluate the best source for powering the toy.
- Test the revised prototype with real participants.

Credits

Some images like product shots, and icons have been used, here are the list of images used from different sources. Other than the ones listed below every other image has been drawn, photographed or created by the author.

1. http://blog.valtech.fr/wp-content/uploads/beacon_section_no_logo.png
2. http://www.rfduino.com/wp-content/uploads/2014/03/RFD22102.Prospective.Top_.png
3. https://www.raspberrypi.org/wp-content/uploads/2015/01/Pi2ModB1GB_-comp.jpeg
4. http://cdn.shopify.com/s/files/1/0174/8616/products/DSC_0164_1024x1024.JPG?v=1391310688
5. <http://upload.wikimedia.org/wikipedia/commons/7/71/Arduino-uno-perspective-transparent.png>
6. <http://media.digikley.com/Photos/RF%20Digital%20Corporation/RFD22102.JPG>
7. <http://www.lostintechology.com/wp-content/uploads/2014/08/Google-Voice.png>
8. <http://icons.iconarchive.com/icons/cornmanthe3rd/plex/512/Other-python-icon.png>
9. https://www.raspberrypi.org/wp-content/uploads/2012/03/Raspi_Colour_R.png
10. <http://www.freedomjs.org/img/nodejs.png>
11. <http://www.pubnub.com/blog/wp-content/uploads/2014/07/SOCKETIOICON.gif>
12. <https://d3ui957tjb5bqd.cloudfront.net/images/screenshots/products/3/33/33667/preview-0-f.png?1376802964>
13. http://fc02.deviantart.net/fs16/f/2007/212/f/4/Delorean_BackToTheFuture_ver__by_BloodyMoogle.jpg
14. <http://cdn.vectorstock.com/i/composite/35/76/office-stamp-now-vector-3576.jpg>
15. The Noun Project Icons: 43870, 43869, 43874, 55197, 125961, 45497, 17146, 61605, 14958, 54948, 2732, 5329, 100614, 4918, 36244, 1734, 8538, 16078