
Interactivity: Looking at the Vagina through Labella

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Abstract

Labella is an augmented system designed to support pelvic fitness in women. It combines a pair of underwear for embodied intimate interaction and a mobile phone as a tool for embodied discovery. In this abstract we outline the motivation behind Labella, before explaining how the interaction is experienced and the technology behind our mobile application.

This demo accompanies our Labella paper and contributes a further understanding of the Labella augmented system to an audience interested in *on-body intimate interactions*.

Author Keywords

On-body interaction; women's health; women's experiences; pelvic floor muscles; mobile technology; humour.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

Background

Labella is an augmented wearable and smartphone system that uses non-traditional on-body interactions to enable discovery and learning about hidden parts of the body. Labella combines a pair of underwear for

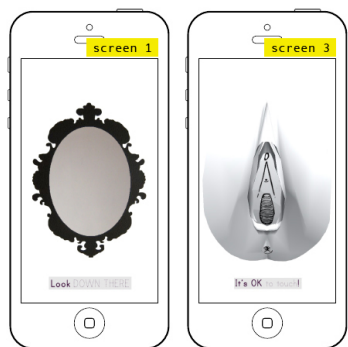


Figure 1: Screen designs

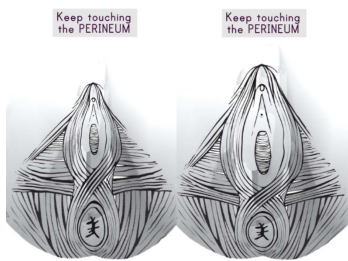


Figure 2: Illustration of pelvic floor muscles

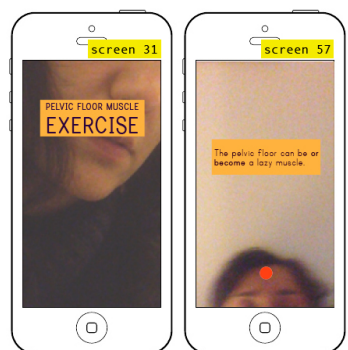


Figure 3: What is the pelvic floor?

embodied intimate interaction and a mobile phone as a tool for embodied discovery.

In developing Labella we drew from our previous research, where we designed a kit that integrates e-textiles as the core material to teach and learn about intimate parts of the self and support body literacy [1]. Observations and results from this study provided insights into perceptions of the body and sensibilities toward wearable and embodied learning held by the participants; revealed that qualities of body knowledge can be affected by topics of taboo, misinformation, and lack of self-awareness. The deconstruction of the female body in light of these qualities and the evidence that an on-body interface supports situated learning about the intimate body inspired Labella. Moreover, this earlier work showed that participants in the research were comfortable in blending humour and laughter with the discussion, which made it less embarrassing to ask questions and to express curiosity about their intimate bodies. We employ humour as a method to support learning of sensitive topics and to diminish the taboo nature of the interaction [2,3].

Experiencing Labella

After putting on a specially tailored piece of underwear a user will open the Labella app on their mobile phone. The Labella application begins by asking its user to 'Look DOWN THERE' (figure 1; screen 1). Labella looks for the printed bespoke visual marker on the underwear to be recognised by the camera phone. This initial step reveals the female external genitalia (figure 1; screen 3) shown as a three dimensional model which is mirrored on the screen. Labella then asks the user to explore this model as an interactive illustration guiding her through different parts of the anatomy and locating

against the model. Labella prompts her to touch the perineum on a visualization of the female pelvic floor muscles (figure 2). This model is animated to show the pelvic floor contracting and relaxing with continued touch (figure 2), while momentary touch shows a quick 'squeeze/relax' movement of the area. This part of the experience offers a new perspective on how this muscular structure works while learning about 'the subtleties of the technique'. Lastly, the mobile application invites her to exercise and it turns to front camera mode. It explains the pelvic floor to show how relevant it is for women's health and wellbeing, and it suggests ideas on when and where to try out this fitness activity (figure 3).

System Overview

The Labella application was designed to function with underwear specially designed with a printed fiducial marker. This marker is recognized by the Labella application using the mobile phone's camera. Rather than using a publically available Augmented Reality system e.g. ARToolkit [4], we created our own marker recognition algorithm and a bespoke visual marker design. We choose this approach because underwear often stretches when worn conforming to the shape of the body of the person wearing it. This can warp any printed shape and therefore is outside the working parameters of regular marker software. We embed these patterns at the bottom of the underwear (figure 4). This pattern faces directly forward when worn and is picked up by the mobile phone as it is held between the legs (approx. 6 inches from the underwear). The recognition algorithm was built on top of the Open source computer vision library, OpenCV [5]. In contrast to existing algorithms that might fail to recognize the marker because of stretched fabric, our solution deals



Figure 4: Sample of screenprint on underwear with marker

with the opposite problem – we have to limit the number of false positives. To do this, we run our algorithm over a number of frames and use this to adjust our idea of what is the most likely candidate for our pattern. In order to remove likely false positives we use our knowledge of the textile color to reject shades that lie outside our range. In isolation this recognition algorithm is not perfect.

However, we can improve accuracy by setting up the interaction so as to reduce the computational problem space. We do this by asking the participant to position the phone approx. in the right position as we frame the algorithm. We can then use further timing within the application to ensure that the phone starts to look during the right point in the embodied interaction.

In addition to the bespoke marker system Labella uses Morph target animation (as is used in facial animation in games) to illustrate how the female pelvic muscles contract. The morph target animation allows the contraction to correspond precisely with her touch on the mobile phone, making her feel she really is in control of the female muscles represented. Touching the displayed perineum slightly will contract the muscles a little (rapid contraction and release), while continued touch will simulate a longer, slow contraction.

Summary

Labella demonstrates how the integration of an on-body interface into an augmented reality system can contribute toward learning, expand body knowledge, and furthermore promote intimate care. Our findings show that Labella contributed to engaging women in gaining insights into their own bodies and believe it contributes to making an impression on an underexplored topic in HCI and women's health.

Acknowledgements

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References

1. Teresa Almeida, Rob Comber, Patrick Olivier, and Madeline Balaam. 2014. Intimate Care : Exploring eTextiles for Teaching Female Pelvic Fitness. *In Proceedings of the 2014 companion publication on Designing Interactive Systems (DIS Companion '14)*, 5–8.
<http://doi.acm.org/10.1145/2598784.2602768>
2. Virginia Braun. 1999. Breaking a Taboo? Talking (and Laughing) about the Vagina. *Feminism & Psychology* 9, 3: 367–372.
3. H. Arleen Johnson. 1990. Humor As an Innovative Method for Teaching Sensitive Topics. *Educational Gerontology* 16, 6: 547–559.
<http://doi.org/10.1080/0380127900160605>
4. Philip Lamb. ARToolkit. Retrieved January 12, 2016 from <http://www.hitl.washington.edu/artoolkit/>
5. OpenCV. Retrieved January 12, 2016 from <http://www.opencv.org>