NaviiCompass: An Exploratory Feedback System for an Urban Farm Community

Abstract
The benefit of urban community farms to crowded cities, such as London cannot be overstated. The Spitalfields City Farm community offers a peaceful escape from busy city life and provides access to learning opportunities. To maintain its daily activities the farm depends on funding, yet due to insufficient feedback data funding opportunities are often missed. We present NaviiCompass, an interactive, handheld device (Figure 1). It enables the Spitalfields Farm community to collect feedback in a seamless, playful manner, while providing educational content to the community. The design was inspired by observations and semi-structured interviews with members of the Spitalfields farm community, revealing their struggle to acquire feedback from visitors. Portable smart compasses direct visitors to stations around the farm where they are asked to give feedback. NaviiCompass empowers the community by enabling them to access the funding they need to support the farm’s activities.

Author Keywords
Community engagement; urban farms; feedback; seamless technology; tangible interaction; education.

ACM Classification Keywords
H.5.2. User Interfaces (e.g., HCI): (D2.2, H.1.2, 1.3.6): User-centred design. H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous
**Introduction**

Urban farming communities have become central to growing metropolitan areas. A garden plot of just one square meter can provide up to 20 kg of food a year [1]. Their impact expands beyond food production, as they can provide learning opportunities, create a sense of belonging, and offer an escape from city life to connect with nature [2].

Spitalfields City Farm [8] is an urban community farm in Central London. The farm grows vegetables throughout the year and farm animals, including rare sheep, reside in the farmyard. The community is made up of farm staff, volunteers, and visitors who come to this space to partake in workshops or for leisure. The community is very diverse as it engages people from different backgrounds; an example is a gardening club predominantly made up of Bangladeshi women [4]. Despite the apparent value of such a community, the farm faces challenges due to inadequate funding.

Occasionally audio quotes and photos would be great. Especially for personalized feedback.” P3

“Currently we don’t have any feedback of non-scheduled visitors. We don’t even know how many of them come” P2

“Occasional audio quotes and photos would be great. Especially for personalized feedback.” P4

“We struggled to get people to complete current feedback forms, like paper questionnaires and online surveys. The response rate is very low.” P1

“It’s especially useful to know that our events are attracting visitors from the local community” P2

“If we were less worried about money all the time, then things would be much easier.” P1

Traditional methods for eliciting feedback tend to rely on questionnaires, however, these are often ignored by the crowd [7]. Recently, there has been a trend towards design systems that gather feedback in-situ. For example, Sling Shot is a touchscreen-enabled digital slingshot which encourages users to share what they feel and slingshot the message onto a large digital message board [5]. Similarly, the Opinionizer is a large display designed to encourage socializing and interaction [10].

Engaging participants in playful activities has been shown to increase their willingness to share their thoughts [6]. However, such solutions tend to demand a certain degree of technological proficiency and are often “flashy” by design in order to capture the crowd’s attention. In contrast, VoxBox is a tangible system which does not require users to be tech-savvy [3]. It employs a range of physical input and output devices to gather public opinions on a range of topics [3]. We took inspiration from the VoxBox, as we sought to design a device that is playful and appeals to a community that wants less screen time. Although the Voxbox aims to capture the crowd’s attention [3], we aimed to create a design that would be inconspicuous to not detract from the experience of visiting the farm.

NaviiCompass is a feedback data collection system that encourages exploratory learning within the urban farm environment. The system consists of portable smart compasses (Figure 1a) and their corresponding question stations (Figure 1b). Community members can navigate to the stations by following a directional needle and light signals. Once at the station, an audio message will provide a fun fact about the farm and will ask the user to answer questions in return.

NaviiCompass is wirelessly connected, configurable, and low-maintenance. It can effortlessly be set up at various points-of-interest within the urban farm.

**Initial Research**

We conducted extensive secondary research at six urban farms in London. Based on the accessibility of
community members, we narrowed our research focus down to the Spitalfields City Farm community.

Through ethnography and speaking informally with the farm community, we identified seven recurring themes which are presented in an affinity diagram (Figure 2).

We decided to focus on the determining factors that influenced funding decisions at Spitalfields City Farm. Four semi-structured interviews were conducted with open-ended questions to gain insights into staffs’ experiences on the farm. The interviewees spoke about the events hosted by the farm to boost engagement and receive funding, the barriers to accessing funding, the role of feedback in obtaining funding, and how feedback is currently collected (Figure 3). One of the interviewees pointed out that the farm is intentionally low tech, as people come to the farm to escape hectic city life (Figure 4). From these interviews, we learned that Spitalfields City Farm was experiencing a staffing crisis due to cuts in funding. As a result, they were forced to reduce some of their activities. We were motivated to focus on the funding issue because we recognized that it was having a significant impact on the community.

In addition to the two semi-structured interviews we conducted with two staff members on the farm, we ran a focus group with three farm staff members, and reviewed existing research on Spitalfields City Farm. The focus group shared more about how feedback is currently obtained on the farm and what kind of information is needed to obtain funding. We asked participants to generate design ideas to address some of these challenges whilst incorporating the values of the farm. We learned that many of the visitors on the farm do not use smartphones, which was a finding that was also reflected in our secondary research [4].

Through triangulation, we identified a set of user requirements that called for a design that would support the farm in collecting feedback from their visitors. The design should be inconspicuous so as not to detract from the experience of visiting the farm (R1), be usable by a set of users who might not be proficient in technology or own a smartphone (R2), and foster individual as well as collaborative interaction (R3).

**Initial Design**

We created personas (Figure 5) and ideated using 10 x 10 sketching techniques and storyboards based on the requirements gathered from our ethnography and interviews. An in-depth task analysis was also created (Figure 6) to visualize how staff currently collects, analyses, and uses feedback data to apply for funding. We assessed the feasibility and impact of each of the potential solutions and narrowed our focus using a dot voting method (Figure 7). During a focus group session, we presented our top three ideas, which included a feedback playground, an interactive, touch-projection system, and an interactive handheld feedback device which could be carried around and used to explore the farm.

The focus group gave us feedback on their preferences, the suitability of the devices and what improvements they would make. This feedback motivated us to refine our requirements to be more adaptable (R4), time-saving (R5), and educational (R6). Using this feedback, we assessed each design alternative via an evaluation matrix based on the requirements established earlier in our research. As a result, we decided to pursue the
handheld feedback device concept because it scored highly in the innovative, accessible, and low-tech criteria.

Figure 5. In depth task analysis.

**Design Iterations**

**Phase 1**

Community members noted that “flashy” smart technology at the farm is not encouraged because visitors want a break from digital screen time. To address this, we aimed to create a device that would resemble an object that might be found or used outdoors. We pursued the compass concept because the experience of using a compass is analogous to the experience of exploration and discovery at the farm.

We designed a “distributed” system of question stations throughout the farm because focus group participants expressed enthusiasm for a concept that would encourage the community to explore and engage with the farm on their own terms. We created a low-fidelity cardboard prototype of a station (Figure 8) and laser-cut plywood models for the compass device (Figure 9). We chose the plywood prototypes for usability testing because they most accurately reflected the size and weight specifications of the compass.

**Phase 2**

We conducted eight low-fidelity interface evaluations using cardboard prototypes (Figure 10). We utilized Think Aloud and Wizard of Oz techniques, as well as informal interviews in our usability testing. We recruited eight participants (four female, four male; mean age = 32; SD = 11.3) of which six participants spoke English as a second language. We analysed data from our thematic analysis (Figure 11) on the interview transcripts and our field notes and identified several themes.

We modified the compass design based on the evaluation results. During user testing the users wanted to turn the compass needle towards the direction they wanted to go. To prevent this, we added an acrylic cover to the compass’ top face, which also functions as protection from the elements. Additionally, we added an LED ring and audio to support and enhance the following compass functionalities:

Figure 8. Low fidelity cardboard and compass prototype.

Figure 9. Close-up of low fidelity compass made from plywood.

Figure 10. Think aloud evaluation with cardboard prototype.
Indicating on/off state – light patterns were incorporated as an affordance, indicating that the compass is a digital device, and wouldn’t function like a standard magnetic compass.

Indicating proximity to station – in addition to the pointing needle, the LED ring illuminates directionally to communicate to the user that they’re nearing a station.

Feedback saved status – a quick light animation flashes in green and coincides with a chime to indicate that a response was recorded.

**Final Design**
The final design was refined through an iterative process to include the feedback and findings that we gathered. The key features are outlined below (Figure 12):

**Compass**
The design blends seamlessly with the surroundings of the farm (R1) and encourages individual as well as collaborative interaction (R3). The portability of the device encourages the user to explore the farm and interact with stations at specific points of interest. While audio messages provide the user with fun facts about the area surrounding the station (R6), an LED ring embedded within the compass interface indicates proximity and responses recorded. The data is stored in the cloud and transferred to a web page each evening.

**Question Station**
The stations are designed fully analogue to make them weather-resistant and low-maintenance (R4) (R5) (wood construction and Plexiglas protective panel for question sheet). All electronics reside in the compass. Question and answer sheets are printed off, templated on the web app, and placed under the Plexiglas cover.

**Web Application** (Figure 13)
Data generated by visitor answers is automatically displayed in a spreadsheet and bar chart format (R5), easily accessible by farm staff on any web browser (R2). Using the web application staff can quickly create questions and answer options (R5) based on their needs for qualitative feedback (R4). Audio recordings can be created on the web app and uploaded wirelessly to compasses (R2).

**Discussion**
NaviiCompass is an interactive, tangible device that expands beyond the current capabilities of data collection on the farm. The device empowers the community by enabling them to obtain demographic data and feedback from their members in an interactive and educational manner. The feedback can then be used to support funding applications as well as to enhance and adapt the workshops and educational programs that are offered to the community. The community was eager to be involved with our project and was involved throughout the design stages (Figure 14). As such, NaviiCompass benefits from a strong user-centred design process informed by feedback from the community. Our final design provides valuable support and reflects the community’s values.

**Future Considerations**
In its current form, the NaviiCompass has only been designed for and tested with adult users. We received considerable feedback on how the digital compass would be appealing to children. Unfortunately, due to the ethical constraints imposed on the project, we were unable to conduct research with children. Further research and usability testing with younger users can bring to light new features that can be incorporated.
Additional features to explore include tactile feedback from the device and stations, as well as gamifying the concept to make it more exciting. Given that the farming community highly values education, including a quiz component to the stations can help to solidify the new facts the children learn at the farm.

To continuously sustain engagement with the device, stations could be refined to have varying interfaces, such as sliding scales or buttons. Moreover, stations could require audio input from the user to obtain more qualitative feedback. Such data would be very valuable as quotes can be incorporated into funding application essays. Finally, future work might consider adding a deposit scheme or sensor system that could aid in theft prevention of the product.

Acknowledgements
We would like to thank Frederik Brudy for his valuable support. We would also like to thank the Spitalfields City Farm, our interviewees and those who participated in usability evaluations. Finally, thank you to Nicolai Marquart and the rest of the UCLIC department.

References