

Know Your Street

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Video: <https://web.microsoftstream.com/video/1e9e7eb4-a0b5-4120-9660-d96a45b71ede>

Motivation

Currently, loneliness is a growing epidemic with possibly fatal consequences [1] [2]. As the world is more interconnected than ever and moving residence is commonplace, people struggle to find a sense of belonging in their local communities. Evidence suggests that being acquainted with people in the neighbourhood can reduce depression and other risks associated with loneliness, especially in older people [3] for whom travel is more difficult. Fostering positive relations with neighbours can also make them a reliable source of critical assistance during emergencies [4] [5]. Therefore, it is apparent that neighbourhood interactions are extremely beneficial for safety and wellbeing.

However, this problem is not easily solved as relatively short tenancies in urban centres [6] give rise to “transient and reactive social networks” [7] [8] that reinforce loneliness, making people less open to interaction [9]. Such residential infrastructures, coupled with anxieties [10] and expectations [11] make it difficult for people to approach their neighbours. This is especially challenging for international migrants [12] who may not be accustomed to the local social rules. As a result, it is unsurprising that over half the participants in a British survey reported not knowing their neighbours’ first names [13], showing that there is a severe lack of interaction within neighbourhoods.

While existing social media and messaging platforms are extremely useful in allowing people to maintain pre-existing friendships, they often provide little incentive to initiate a conversation with someone new, especially in the context of one’s local neighbourhood. Users are encouraged to explore perspectives originating far from their own countries and are nudged to spend more time online [28]. While this can serve a valuable purpose, it does not encourage interaction in the real world within neighbourhoods. Other products such as smart security intercoms also fail to address the issue as they are designed primarily for surveillance, which stems from distrust and division [29] rather than an aim to foster sentiments of community and belonging. As a result, the barriers between neighbours persist.

To help break the ice, we created Know Your Street. Our solution provides a convenient way to make introductions in your own time without the motivational barrier and anxiety of knocking on a door. It uses NFC technology and a voice interface to create a simple neighbourhood interaction system that is accessible to all. Through the normalisation of casual communication, neighbourhoods can foster a renewed sense of community and bustle, leading to an improvement in overall wellbeing.

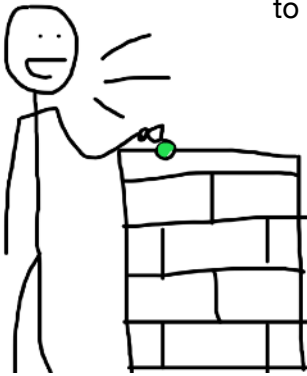
Storyboard

Our product consists of three parts; a key fob, a door device, and a mobile app.

To leave a message to a neighbour, the user would hold their key fob to the door device and record a voice message. This prevents people from outside the neighbourhood from using the system without accountability. The key fob has separate parts for leaving messages and listening to messages. Since the mobile interface is much easier to use, users have the option to detach the listening piece and not carry it.



The colour of the door device light would change to indicate its status as shown below.



Blue indicates the device is neutral and ready to receive messages.



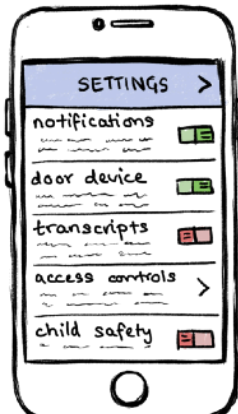
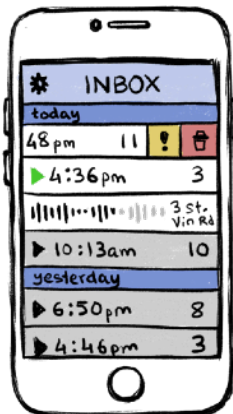
Green indicates a messages is currently being recorded.



Red indicates the device is not accepting messages, which may be because it's switched off or because the key fob being presented doesn't have the right permission.

To listen to received messages, a user could use the listening piece on their key fob, or the mobile interface. The mobile app has a simple inbox and settings so older people can learn to use it with ease. Since our system largely relies on a voice-based interface, we added an option to add transcripts into the inbox so that people with hearing impairments can still receive messages.

Since there may be households without any smart devices, our inbox system can also be integrated into landlines in a voicemail-style interface. This is primarily to support older people.



Related work

Currently, one way to communicate with neighbours is through social media apps such as Facebook and Instagram. These are known to be effective at maintaining pre-existing friendships [14] as well as giving people access to new friends from around the world [15]. However, online communities tend to be centred around shared interests, experiences, and the facilitation of transactions [16] which are factors completely unrelated to physical proximity. This puts neighbourhood communities in dissonance with the designed purpose of social media apps, as they take pride in unbinding people from their locations and “bring(ing) the world closer together” [17]. People may also refuse to use certain social media platforms due to privacy concerns. For example, Facebook has had 5 data breaches within 2019 alone [21]. Such distrust in a platform can alienate individuals from their local community if that platform is used as the primary means of communication and coordination.

Other products solely used for messaging also exist, such as WhatsApp and Line. WhatsApp in particular is an incomparably popular medium for group messaging, as it presents a simple and detailed user interface [18]. However, studies show that people primarily perceive it as a place for “intimate communication” [19] with close family and friends [20]. As a result, WhatsApp provides an excellent platform for communication amongst people who are already well acquainted with each other, but does not provide any incentives or methods for initiating contact with new people. In the app, people can only send messages to those already in their contacts, and informal group chats are often only accessible through invitation. Such features make it impossible to access communities without knowing anyone in them, and thus similar messaging products also fail to address neighbourhoods.

A specialised social media product aimed at fostering neighbourhood communities is Nextdoor, which has a similar interface to Facebook. It displays posts made by people in the local area, but also has practical features to facilitate transactions, view events, share local safety information, etc. However, there are numerous noted criticisms of Nextdoor, including harsh boundaries that isolate neighbourhoods, privacy concerns [22], enabling racism [23] [24] and discrimination against other marginalised communities [25]. This makes the product exclusionary at best, and extremely unsafe at worst for many people. Moreover, being an online product with a complicated interface makes it inaccessible to people without smart devices or poor intuition for technology.

Lastly, the Ring Doorbell by Amazon is a “combination doorbell and motion activated video recording device” designed to keep neighbourhoods safe. It is accompanied by the app Neighbours, which has an interface comparable with traditional social media sites [26]. While neighbours may use the product to leave video messages and connect with each other, its primary function is security. This frames the subject of a video as a threat first and foremost, which can promote distrust and discrimination [27]. It is also only accessible to wealthier people as expensive subscriptions and hardware are needed to maintain it [27], thus it would be prone to deepening class divisions even if it was used with friendly intentions. As a result, the product is not likely to bolster sentiments of community and belonging as our product aims to do.

HCI Processes

For our design process, we followed the Double Diamond framework outlined by the Design Council [30]. This is an iterative framework that allowed us to incorporate feedback and place our users at the centre of our design. We began by scouring through secondary research that allowed us to identify a problem that was unaddressed. Further insight on it was gained through primary research, leading us to the generation of multiple ideas. We iterated through these to produce Know Your Street, which we felt adequately addresses concerns and incorporates an unconventional interface that emulates physical contact.

The Double Diamond consists of four phases; Discover, Define, Develop, and Deliver. In the Discover phase, we explored numerous existing issues and chose to focus on neighbourhood isolation as it was relevant to us and was not well addressed by existing products. Aiming to produce an “accurate and complete depiction” of the problem, we utilised a mixture of quantitative and qualitative research methods [33]. Interview participants were selected so as to be representative of different age groups, and were asked about their interactions with their neighbours. In order to gain deeper insight into causes of behaviour, we used the Five Whys technique to frame follow-up questions [34]. Interview responses validated the existence of the problem and brought forth particular cases of its occurrence. This allowed us to account for a wider range of perspectives in designing and modelling the use of our product. Simultaneously, our survey helped us prioritise through quantification, the most pertinent reasons people

did not reach out to neighbours, and prevalent thoughts surrounding the issue. Therefore, the survey helped us understand our typical user while interviews encouraged us to cater to a variety of people.

In the Define phase, we analysed the results of our research to arrive at a problem statement that would define the boundaries of our product. Results suggested that people would prefer to interact with neighbours face-to-face rather than telephone or social media. We also found that most people did not approach their neighbours due to “feeling awkward.” Uneasy feelings among participants largely spurned from the fear of knocking on a door while not knowing if they would be answered, and not knowing the reason for which they could be ignored. Such a fear was more apparent in participants who had lived in their neighbourhood for a shorter period. Therefore, our problem statement was centred around creating a system that would allow people to initiate interactions with neighbours by alleviating factors causing fear.

Beginning the Develop phase, we generated numerous ideas. Through rigorous discussion and feedback within the team, our final concept emerged. As we wanted to encourage people to approach their neighbours physically, we decided that we should create an interaction close to their front door. Following the same vein of emulating human contact, it was appropriate that voice messages should facilitate the interaction. However, the fears of approaching a neighbour were largely alleviated as users no longer had to await response at a front door, but could be assured that the neighbour would answer messages in their own time. Using a low-fidelity prototype sketch of the product, we received feedback from friends and family, which allowed us to make changes and improve our product. We also utilised the Tarot Cards of Tech [35] to critically consider ethical concerns that could be addressed. This led to the addition of several features, including restrictions on leaving messages to minimise harassment, and child safety locks that would prevent them from deleting messages, among other features.

In the Deliver phase, we would create high-fidelity prototypes of the product to simulate interaction. Following this, feedback could be gathered through questionnaires and interviews, which would optimise results through a mixture of quantitative and qualitative data [33]. At this stage, semi-structured interviews would be optimal as they would allow us to guide the discussion towards relevant areas, while giving participants the opportunity to offer additional information [36]. Hence, points of improvement could be reported in an efficient way. The product can continue to be improved over time through iterative feedback cycles.

Societal & Ethical Dilemmas

However, there will be people who will use our product in the wrong way they are supposed to be used. People might send spam messages or harass you in some way. We have created solutions to minimise these unwanted scenarios. A user can only send a limited length and number of messages at an instance. This is so that the receiver’s inbox is not overwhelmed with unread messages by a single sender. The receiver is also able to see who left messages in their inbox based on the sender’s ID on the NFC key fob used to send the messages. A reporting system is also included in our product to make it easier for users to submit complaints.

Our product is focused to be used in neighbourhoods and communities. Consequently, neighbourhood boundaries are set by us. Our concern is on the overlapping neighbourhood or community boundaries. This results in a feedback system feature where we allow users to join a community on request. Hence, if a household is not in the neighbourhood system when it should be, the users can request to join the community manually. In addition, if the sender is from a different neighbourhood nearby, they can also send message requests. On the receiving end, the user can see who is sending the ‘request message’ and which neighbourhood the sender is from.

Other than that, we would also like to address the accessibility issues that may arise. Because our device uses voice messages as the main way to communicate, it would be an issue for people with hearing and speech impairments to use. Therefore, we have added an accessibility feature where they can type in messages and as a receiver, our device will transcribe voice messages received into text to help those with disabilities. Besides people with disabilities, elderly people often get excluded. Although almost two thirds of those aged 65 above now own a smartphone [31], there still exists a digital divide between the older and younger generations [32]. Thus, we have made our product easier to use with simple interfaces. You can also connect your device to your landline. This feature will help people who are more accustomed to listening to voicemails. However, we hope that the normalisation of neighbourhood interactions will encourage the public to reach out to their neighbours in other ways.

It is critical that we improve our citizens' security, but we must do so without jeopardising fundamental liberties, such as the right to privacy of personal data. The legal difficulties surrounding the collection, use, storage, and exchange of personally identifiable information are referred to as data privacy. In our product, all communications are end-to-end encrypted and are done locally, so only the sender and receiver will receive any messages between the two. Furthermore, we have no need to store data except for when users send reports. Messages are only shared with the company when they are reported for us to evaluate the message. Messages are also wiped from the database immediately once the user decides to delete it. Other than that, whenever a household moves in or out, we will perform a full reset of their devices. Finally for active users, there will always be an option to opt out of Know Your Street.

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