

GeeBot: A Robotic Platform for Refugee Integration

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ABSTRACT

The refugee crisis is one of society's leading challenges. After a journey for survival, refugees and host institutions face barriers that hinder the integration process. To design solutions, we interviewed two groups: host institutions and past refugees. We identified critical issues, from legal concerns, like unfamiliarity of their Refugee Status, to grocery shopping. Our envisioned solution is GeeBot, a low-cost egg-shaped robot that institutions would lend to arriving families for eighteen months. GeeBot will be a translator with teaching functions, an information provider, and an active promoter of interaction between native and refugee populations.

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1 INTRODUCTION

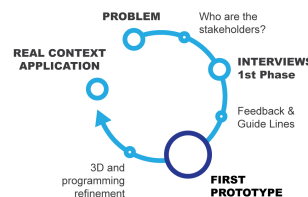
Large scale migration of refugee populations represents one of the biggest issues that modern societies have to face [2]. In the past few decades, civil conflicts have been one of the major drivers behind this phenomenon, with severe social, economical and political consequences for the host countries.

The reintegration of migrant refugee and asylum seeker populations, poses multiple challenges [5] to hosting societies. In particular, language and cultural differences cause natural barriers that seriously contribute to increased crime rates, precarious employment among many other humanitarian problems. Furthermore, native populations who see their access to public services, natural resources and infrastructures negatively affected tend to further support exclusion measures and adopt xenophobic behaviors. However, the large influx of younger populations should not be seen as a threat, but instead, as an economic opportunity to renew an aging workforce and counteract a declining birth rate [3].

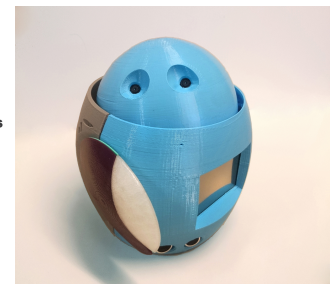
Currently, the support provided by human resources in host institutions tends to be insufficient and unspecialized. Therefore, leveraging recent advances in artificial intelligence and robotics is of the utmost importance for augmented assistance and to better



(a)



(b)



(c)

Figure 1: Design process and resulting early prototype: (a) shows a render of GeeBot's first prototype; (b) presents the overall design process; (c) GeeBot's first physical prototype.

understand and hence help bridging the cultural and linguistic gap between refugee and host populations. In this article we describe the ideation and user-centric design processes behind the creation of *GeeBot*, an autonomous robotic teaching platform intended to facilitate social inclusion and integration of refugee families in host societies, while mitigating cultural and language differences.

The remainder of this paper goes as follows: in Section 2 we describe the initial ideation and development process. In Section 3 we present our proposed solution and briefly describe its hardware and capabilities. Section 4 describes ways our proposed solution will interact with the end-users. Finally, in Section 5 we wrap up with some conclusions.

2 USER CENTERED DESIGN

We took a user-centered design approach to include the stakeholders during the development process. This strategy allows us to understand and identify the current procedures, needs, and concerns

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of the various stakeholders as well as opportunities for technological assistance [6]. These, were obtained through semi-structured interviews with two groups. The first group comprises two institutions that host and support refugees upon arrival. The second group, consists of refugees already settled in the host country. Regarding the first group, the interviews were recorded in audio, transcribed and performed thematic analysis through coding. With the second group, field notes were taken and analyzed later. The interviews in the institutions were taken with two clinical psychologists, a human resources professional, and a childhood educator. The refugee group consisted of three people from middle east.

Interviews Results. The services provided by the interviewed institutions are focused on the reception of refugees and assistance with legal and bureaucratic questions. Outside institutions, refugees adults are largely on their own. The clinical psychologist says that *"their main difficulty is the lack of autonomy due to the language"*. These difficulties raise problems even in routine tasks such as grocery shopping, hospitals, and legislative issues.

Contrary to adults, language does not represent a significative barrier to the interaction and integration of children. However, it represents a problem in learning, which is conditioned by a language that they do not dominate. As pointed out by an interviewed educator: *"Refugee children end up being held back since they do not have enough literary skills to move through the year (...) Our alphabet is very different from theirs."*

3 PROPOSAL - GEEBOT

We propose a mobile robotic platform called GeeBot. GeeBot is low-cost small-sized differential drive robot with moving head and simple arms. Having a physical robot has several advantages over a smartphone application and/or a virtual agent. Human-Robot Interaction (HRI) studies have shown that a robot is perceived as more trustworthy and likable entity than a virtual agent [1]. According to the interviewees trust and likeness are specially important aspects when designing a solution for vulnerable populations. Furthermore, a robot with navigation capabilities can guide people on their new homes, and both gaze and arms gesture allow richer and more dynamic interaction. Also, studies point that physical objects can provide psychological benefits [4].

On its early prototype, GeeBot is an egg-shaped robot with a *pan & tilt* head and two moving rigid arms. The reasons behind this initial design are portability, children's safety, and the preference of curved objects by humans [?]. It can perceive the environment around it with a camera and sonars. A touch display allows the robot to show visual information to humans and receive inputs. A speaker will make GeeBot capable of providing verbal information and playing sounds useful for the envisioned activities. The robot's base is a differential drive for easy navigation on flat surfaces. Finally, GeeBot relies exclusively on OpenSource software.

4 ENVISIONED INTERACTION

GeeBot is a platform which can provide full-time assistance to refugees in areas or situations where human assistance would be too costly or ineffective. In the following sections we will discuss some of the possible scenarios where GeeBot will facilitate the integration in the refugee's life.

The first and foremost important thing when it comes to integration of a refugee is his/her well being and his/her family. As so, understanding the health conditions of each one is crucial for a successful re-integration in a society. Concerns related to which hospital or medical facility to attend, what to do when something unexpected happens, or who to call. It can be a first responder and avoid unnecessary trips to the doctor.

Upon arrival refugees are granted Refugee Status, which can be one of three special status. Most people are not aware of their status and their current situation in the host country. GeeBot can provide a complete description of all the different refugee status to keep them informed and aware of their rights as an asylum seeker.

The language barrier is probably the greatest struggle of all refugees. This is our work's primary focus and all the other topics are dependent on. Providing a translation from the host country language to their native language (Sumi, Arabic, Kurd, or Farsi) is key for an effective integration to the society and daily tasks.

For most people living in the same country for an extended period of time it might not be important, but for those who just arrived and are from different background can be a challenge in the beginning. The cultural differences between their country of origin and the host country. Be it the language, legislative system, judicial, health services, but also clothing styles, culinary routines, religious beliefs, musical preferences, social events, or even the value of the currency. All of this questions refugees face and there is no little or no help in answering them. This is why a robotic platform like GeeBot can intervene in those moments of complete unfamiliarity.

5 CONCLUSIONS

The creation of GeeBot was motivated by the challenge of insertion and integration of refugees into the host countries and the support that they can offer. Currently, the help refugees are getting is insufficient in all the cultural and linguistic needs. This problem led us to an user-centered robotic tool that will allow for quicker and more personalized assistance to the needs of refugees.

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REFERENCES

- [1] Wilma A. Bainbridge, Justin W. Hart, Elizabeth S. Kim, and Brian Scassellati. 2011. The Benefits of Interactions with Physically Present Robots over Video-Displayed Agents. *International Journal of Social Robotics* 3, 1 (01 Jan 2011), 41–52.
- [2] Jonathan Clayton, Hereward Holland, and T Gaynor. 2015. Over one million sea arrivals reach Europe in 2015. *Lesvos: United Nations High Commissioner for Refugees* (2015).
- [3] Heaven Crawley. 2017. Migration: Refugee economics. *Nature* 544, 7648 (2017), 26–27.
- [4] Lucas A. Keefer, Mark J. Landau, Zachary K. Rothschild, and Daniel Sullivan. 2012. Attachment to objects as compensation for close others' perceived unreliability. *Journal of Experimental Social Psychology* 48, 4 (2012), 912–917.
- [5] Jean Pierre Maniraguha. 2011. *Challenges of Reintegrating Returning Refugees: A Case study of returnee access to land and to basic services in Burundi*. Master's thesis. Universitetet i Tromsø.
- [6] Donald A. Norman and Stephen W. Draper. 1986. *User Centered System Design: New Perspectives on Human-Computer Interaction*. L. Erlbaum Associates Inc., Hillsdale, NJ, USA.