

# Magic Machines for Refugees

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## ABSTRACT

This paper presents findings from a set of ‘magic machines’ workshops with newly arrived Iraqi refugees in Australia. The aim was to allow a broad range of response in designing innovative and creative technologies that can help refugees deal with specific challenges. To bring the ‘future’ into the present and to understand their needs and experiences, we asked 12 participants to create low-fi objects from different materials and to enact them in different scenarios. The magic machines workshops helped access refugees’ voices and provided future contexts for them to deal with their challenges. The data analysis of the two workshops revealed three broad themes: information provision barriers, security and ethical challenges, and mistrust and cultural aspects. Our findings show that adopting a speculative design approach has encouraged refugees to have a strong voice—creatively articulated in the form of a set of magic machines. The study offers insights into refugees’ perceptions of the future and current technology. It also informs policymakers of the issues around current policy hurdles newcomer refugees face in their settlement in the host community.

## CCS CONCEPTS

•Human-centered computing-Human computer interaction (HCI)-HCI design and evaluation methods

## KEYWORDS

Refugees, Magic Machines, Design, ICT, Co-Design Workshops

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## 1 INTRODUCTION

The ongoing conflict in the Middle East has forced millions of people to flee their countries and live in exile. As stated by the UNHCR [47], in 2015, more than 63 million people, mostly from the Middle East, fled their lands to save their lives from persecution and the ongoing violence. In responding to this global crisis, between 2013 and 2018, Australia received 74,080 refugees from Syria and Iraq [30]. In addition, Australia granted 139,398 humanitarian visas for refugees from several countries to resettle between 2001 and 2010[2]. Large numbers of newly arrived refugees in Australia in the last ten years are socially isolated, have limited language skills, and feel displaced and frustrated about their futures [50]. In most cases, the information-seeking problem, finding a job and a lack of social support exacerbate refugees’ experience in the host community, often causing social isolation and health problems[19].

Previous studies have proposed that information technology has the potential to support vulnerable communities such as disadvantaged immigrants[31], disadvantaged job seekers [24], and people with literacy difficulties[29]. They suggested that information and communication technologies (ICTs) could assist in connecting these populations to different networks such as non-profit organizations (NGOs), communities and volunteers, thereby accessing new resources. Although refugee studies in human-computer interaction (HCI) have investigated how technology can help refugees in camps to access health services [44], help newcomer refugees to communicate with their mentors [16], and assist newly arrived refugees to navigate and learn within their environment[13], there has been a lack of research in HCI to investigate the role of technology in supporting refugee settlement.

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This paper is a part of a larger project that focuses on designing ICT for refugees in the host community. We built on previous works in refugee studies in HCI that used the speculative design approach in the early stage of the design process [8,15,27,28]. We present a co-design method, an approach to build magic machines that can support refugee settlement in the host community. We engaged 12 refugees from the Iraqi community in two co-design workshops to make magic machines that can cope with the challenges that they face in Australia. We used the notion of designing magic machines [9] as an approach that can help refugees to voice their concerns and challenges, and to explore their imagination and envision the design of future technology.

This research has extended previous studies [1,4,5,7,18,19,22,45] that summarized three main challenges that refugees face in the host community, namely, the information-seeking problem, the job-seeking problem and connecting with the host community. Information provision is a key factor for social inclusion [19]. However, few studies investigated the practices of newcomer refugee communities to find the information they need “in forms that are understandable and usable to them” [19]. In terms of the job-seeking problem, a longitudinal study conducted in Australia which involved a total of 2399 newcomer refugees from 35 countries, found that 94% of newly arrived refugees (6 months after arrival) were jobless. This percentage had reduced to 84% one year later and 77% after two years [37]. Regarding connecting with the host communities, newcomer refugees face real challenges in connecting with local people [38]. Previous studies that focused on the refugee context in Australia found that newcomer refugees face real issues to integrate into the Australian community [23]. We built upon these results by conducting two co-design workshops with 12 refugees to design magic machines that deal with these three challenges.

The contributions of this research are three-fold: 1) Adopting magic machines workshops provides a better understanding of refugees’ perceptions about the use of future technology, their criticisms of current technology and the concerns of refugees regarding the use of technology. 2) Using the magic machines design method throughout the research encouraged participants to generate debate and engagement about design ideas and gave rise to three main themes that they considered to be important factors playing a role in refugee resettlement. 3) The debate around magic ideas revealed constructive criticism regarding existing government policies in terms of translation services, availability of job opportunities and training sessions, and engaging refugees with the host community. Thus, the study informs policymakers of issues that this demographic group faces in resettlement.

## 2 RELATED WORK

### 2.1 Speculative design in HCI research

There are many methods in HCI to involve participants in design that use the speculative approach. In general, these methods encourage imagination and brainstorming of ideas based on

current experiences. Vavoula and Sharples [49] investigated a future technology method with children and adults to design and envision the interaction between current and future technology. Based on participants’ interaction and experience with the current technology, this workshop was successfully conducted by encouraging participants to envision the future from the perspective of socio-technical systems. In a similar vein, Knutz et al. [34] investigated the role of fiction as a source of inspiration in participatory design workshops. Auger [12] argued that the success of any speculative design proposal needs to meet the following requirements: the careful management of speculation; aesthetics; behavior; and the interaction and function of design artifacts. A key concept of the speculative method in this study is the perceptual bridge - “the means by which designs engage their audience”. The perceptual bridge is a guideline for designers providing ways to balance speculation and reality in different ways. Ylipulli et al. [52] investigated how the metaphor of magic can be used as a means to fuel creativity for laypeople within the context of a participatory design workshop. The main aim of their research was to encourage stakeholders to come up with new ideas for a “Hybrid Library”, a library that supports virtual reality with services and physical amenities. In addition, the authors claimed that the metaphor of magic is useful to design technology without constraints. Andersen and Wilde [11] conducted a participatory workshop that encouraged participants to think about future technology and to create a radical design for future technology. Participants were provided with materials that afforded a large range of structural possibilities and aesthetics. The study aimed to highlight nuanced, imaginative, and unreasonable responses that challenge and stretch what is considered possible.

These studies that used the speculative approach to generate design ideas have argued that fiction could offer the potential to increase participants’ involvement in participatory design processes. While existing technologies did not provide radical solutions for the challenges that refugees face in the host community, it is vital to seek alternative methods such as a speculative approach in the refugee context to explore design ideas from the perspective of the refugees themselves.

### 2.2 Magic Machines

Magic machines workshops have been used in several studies in HCI as part of the speculative design approach as alternative method that encourages imagination for future technology. According to [10], magic machines workshop involves several process “of considerations, ingredient lists, and points of attention. It can be used to form a starting point for making the workshop fit into a particular context or set of concerns”. Andersen [9] used a magic machine workshop with children. The study aimed to encourage the participants to share their technological desires and requirements through making magic machines. The study presented the workshop process and the findings of the resulting objects and recommended guidelines for conducting this kind of workshop format. Blythe et al. [14] conducted two magic machine workshops where participants were urged to abandon the realistic construction of imaginable

technological interventions and to come up with silly propositions from lo-fi materials. The study reviewed simplistic solutions in city planning and described concerns regarding the speculative approach in the design process. Muñoz et al. [40] used magic machine activities to encourage participants to design magic technology from the perspective of others that can support their communications. Long et al. [35] conducted a magic machine workshop to investigate the social and community support practices of carers. Participants were asked to imagine they were traveling from the future to the present, carrying with them a magic device that would be used by carers to communicate with each other. A range of materials was given to participants to make their magic machine (cardboard, stickers, shapes, wire and stick-on buttons).

We followed these studies that used the magic machine workshops to encourage participants to actively engage in a participatory design approach with the marginalized community. While the traditional method could not help this particular demographic group to actively participate in a qualitative study, it is vital to seek an alternative method to achieve better understanding of complex social issues from the perspective of the refugees themselves.

### 2.3 Designing for Refugees in HCI

In recent years, many researchers in HCI have focused on the refugee context as a global humanitarian crisis and considered how ICT can support the challenges that refugees face in war zones and in the host community. Many studies have started to create platforms and applications to assist refugees and asylum seekers. Fisher et al. [28] adopted a new approach called the youth-focused method to examine the role of youth Syrian refugees in assisting other refugees inside their camp in Jordan. To achieve this, the researchers adopted participatory design workshops at the UNHCR refugee camp. The participants were asked to make visual devices using paper prototypes to assist their community. The findings revealed a set of designs that showed a high level of creativity and hope for the future.

Almohamed and Vyas [3,4,6] conducted an ethnographic study with refugees and asylum seekers to understand the challenges that this demographic group face upon arrival to the host community and the role of ICT in rebuilding their social capital. The study consists of two stages, in the first stage, the qualitative study was conducting involved a semi-structured interview followed by cultural probes. Based on the findings from stage one, participatory design workshops have been conducted in stage two to examine how refugees and asylum seekers used their social capital in the host community to access a variety of social resources in their new environment and possible avenue for technological implications. The study provides theoretical, practical, and technological implications that can support refugees and asylum seekers in rebuilding their social capital.

Tachtler et al. [42] investigated the role of technology in supporting specific basic needs of refugees who suffered from mental health issues. A qualitative study has been conducting involving a semi-structured interview followed by co-design

workshops. The study argued for the value of a social-ecological model of resilience through providing a framework of technological interventions to promote resilience, and a conceptual structure to inspire novel design solutions. Weibert et al. [51] examined the challenges that refugees faced to find the related information of language learning courses. The study aimed to design a digital wizard assisting refugees to ease the administrative challenges in language courses allocated by the Germany government for newcomer refugees. A mixed-method approach has been adopted in this research involving a field study observation, workshops and online survey. The data analysis revealed four main themes that were guiding the design process: “orientation, temporality, diversity, and regulation”. The study also provided lessons learned of the challenges that researchers have faced during the field study with refugees. Tauhou et al. [44] explored the opportunities presented by ICT in supporting antenatal care providers for Syrian refugees in rural Lebanon. The research offers an insight into the challenges involving the participation of the Syrian refugees in design activities. Maitland et al. [36] explored the role of information sharing among stakeholders in responding to the humanitarian crisis of refugees. Sabie et al. [41] explored the role of digital technology in collecting memories and support nostalgia for refugees who recently resettle in Canada. The findings highlighted, firstly, the social memory embodied in the design. Secondly, the link between the participants’ experience of the materiality of space and the conducted layouts. Lastly, the study discussed “the mental stands that were provoked by the design process”.

The above studies focus mainly on challenges that refugees face in the short-term during displacement, camps and after arrival to the host community. Our study focuses on the role of technology to assist refugees in the long term in the process of settlement in Australia by involving them in the ideation and design of ICTs that they created themselves to deal with these challenges.

## 3 METHODOLOGY

### Setting and Participants

We conducted two co-design workshops with 12 refugees who arrived in Australia in 2016. Each workshop lasted approximately 2.5 hours. All our participants were from the Iraqi community who fled their country due to the war and internal conflicts. One member of our research team entered Australia as an international student in 2014. He has a similar cultural background and can speak the mother tongue of the participants, which is Arabic. He has been working as a volunteer for more than three years with non-profit organizations (NGOs) that aim to help refugees, which gives him a great opportunity to observe refugees, build a strong rapport with them, and recruit participants.

Based on previous works, three major issues were identified as the main challenges that refugees face in the host community, namely: the information-seeking problem, the job-seeking problem and connecting to the host community. Hence, we

organized our co-design workshops around these issues to seek design opportunities from the perspective of the refugees themselves. The participants' details are provided in Table 1. Recruiting such a refugee population to become involved in our study was a hard task, as most of them had been traumatized and terrorized by displacement experience, leading to trust issues. To recruit participants in this study, we contacted the leader of the Iraqi community in Brisbane who helped us in the process of recruitment. This process took two weeks to finalize. We later contacted the refugees and organized the date and venue of the workshops. Study research has been cleared by the office of research ethics and integrity at Queensland University of Technology (QUT). All our participants received a \$20 gift card in appreciation for their participation in the research. Our co-design workshops consisted of two phases: 1) Introduction to workshop, and 2) Design magic machines and enactment.

#	<b>Workshop 1:</b> Participants (Gender, Age) & (Previous and current employment)			<b>Workshop 2:</b> Participants (Gender, Age) & Previous and current employment		
1	(M,38)	(Engineer)- (Job seeker)	7	(F,35)	(Teacher)- (Job seeker)	
2	(M,26)	(Builder)- (Casual Building worker)	8	(F,44)	(Teacher)- (Job seeker)	
3	(M,28)	(Builder)- (Job seeker)	9	(M,26)	(Builder)- (Casual Building worker)	
4	(M,32)	(Electrician)- (Uber driver)	10		(Electrician)- (Uber Driver)	
5	(F,35)	(Accountant)- (Job seeker)	11	(F,25)	(Housewife)- (Housewife)	
6	(F,25)	(Housewife)- (Housewife)	12	(M,33)	(Farmer)- (Uber Driver)	

Table 1: Participant Information

### 3.1 Phase one: Introduction to the workshop

As we were aware that privacy and personal information are very important factors for refugees, we started our workshop by emphasizing that their privacy was our priority and no names would be revealed to a third party as written in the consent letter. We started our workshop by providing a brief explanation about the aim of our research and all activities that would be carried out during each workshop. We explained to them that the findings of this research would bring technological and practical implications to inform technology designers and service providers to deal with challenges that refugees face in the host community.



**Figure 1:Kit materials of our probes**

As the main aim of this research was to engage participants in the design of magic technology, we started the workshop by defining the metaphor of magic and its relationship to technology. We started our workshop by stating that magic in our workshop was not some kind of delusive thing that has no rational explanation. What we meant by magic was that we take things that are existing in nature and we create something abstract, which has a full range of functions that we then define. Finally, we discussed with the participants the main challenges that they faced in the host community and how magic technology could deal with these issues. At the end of this phase, participants were given a range of materials (boxes, cardboard, stickers, shapes, playdough, color pens, etc.) and asked to assemble their magic technology (Figure 1).

### 3.2 Phase two: Design magic machines and enactment

This phase involved two activities. The first was designing magic machines. We asked participants to choose the first issue that they faced in the host community and to brainstorm of design ideas. The participants were encouraged to use their imagination to think about magic technology that could help them to solve their current issues. We also advised them that any magic device that they made should have functions and an interface. The workshop was conducting in the Arabic language as all participants came from an Arabic country and they were not fluent communicating in English. One of our research team members who speak Arabic fluently translated the main points of participants' discussion for other researchers so that they can take notes and facilitate the process of the workshop. To encourage the participants to use their imagination and to think about future technology based on their experiences and knowledge of existing technology, we provided them with examples of emerging technology such as Google Home (a smart speaker developed by the Google company), Siri (a virtual assistant in Apple devices), wearable devices and social robotics.

The purpose was to encourage the participants to envision the future and to make models of useful and meaningful technology. After generating ideas, participants were asked to draw a model of their ideas on paper and then to move on to making their magic machine. We also asked them to write a short description of their magic technology and to present the final design and its functions to the whole team.

The second activity was Enactment (role-play). After designing a magic machine and presenting their design and its function, participants were asked to write a short scenario about enacting their magic devices in reality. Participants were encouraged to discuss each scenario within the group and to choose one or two persons to act out the scenario. In this session, we aimed to use future technology in the present through enacted scenarios that were designed by participants. Engaging in such activities would make their ideas more actionable and tangible. The outcome of this stage was a rich experience from the enactments and a set of enacted scenarios on video. In this session, participants enacted three scenarios for three different magic machines.

### 3.3 Data Analysis

The first author transcribed and translated all the co-design workshop data into English, as workshops were run in the Arabic language. The preliminary analysis involved the discussions, ideas, inspiration, brainstorming and creativity that participants expressed when designing magic machines. Facilitators' notes taken during the workshops (including interesting ideas, arguments, and stories, as well as photos and recordings) were analyzed. The research team discussed interesting observations, specific issues, and important arguments, points, and interesting facts made by the participants themselves during the workshops. The data analysis process was conducted by the research team without engaging the participants in the interpretation of the results. All data, including transcriptions, photos of two workshops, researchers' notes and videotapes, were distributed among the researchers and investigated individually. Subsequently, a cross-analysis was implemented to compare the results. In addition, discussions were conducted among the research team to deal with conflicting interpretations of data. Thematic analysis [32] was used to identify key themes from the two magic machine workshops.

## 4 CO-DESIGN WORKSHOPS FINDINGS

Two workshops were conducted with Iraqi refugees to design magic machines. During these workshops, participants built a set of magic machines that dealt with specific challenges identified in previous work. The two magic machines workshops generated debate among participants of issues associated with current technologies and government services in the host community. In this section, we present debate topics generated by participants themselves through making magic machines.

### 4.1 Information provision barriers

In workshop 1, participants worked on a supernatural device (Figure 2) that could help them to find the information they needed to access social resources in the host community. Participants started with current issues that they faced, and how it was difficult to find information related to pursuing their education, find an appropriate job, and understand immigration law in Australia. They all agreed that the main issue which prevented them from getting the information they needed was the English language.

For instance, P1 discussed this issue with his group, and he said: *"I think the main issue is the language, you know even the information is available online or somewhere but how we can find it without good English skills?"*. P5 suggested designing a website or smartphone application to deal with the information-seeking problem, saying: *"let's work on the website or mobile application contains all information that newcomer refugees need upon arrival to the host community in their native language so that we solve the English language issue."* Her suggestion was not accepted by other participants as they argued they had to think of other magic ideas, as the suggested technologies already existed and did not help them to find the information that mattered to them.

For instance, P3 commented: *"most government services that available online contain multilanguage including the Arabic language, but the problem is the language is not accurate and does not match the meaning in English"*. To solve the English language problem, participants discussed the main functions that need to be available in this device such as languages, documents, education, health records, immigration details, bank accounts, calendar and events, and community.



**Figure 2: Supernatural device to connect refugees with government services and community**

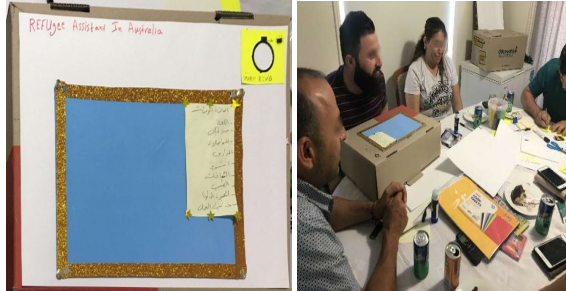
The device would work using voice commands to make it easier for refugees to request services in their language. In addition, the device had an English interface and worked by touch to access different services.

After finishing their device, we asked participants to imagine that they used this device and to tell us about their experience in using it. Participants engaged in a discussion about how this device might change their lives in Australia. At the end of the discussions, they choose P4 to present their experiences of using the device. He said: *"All our documents would be safe and we would not worry if they got lost. Because all our certificates would be on the device, this will make it very easy for us to apply for any course that we need. In terms of health, if we go to the hospital, doctors or nurses would not need to ask us about our health records because everything would be there on the device"*. Regarding immigration, if we need to travel, we could ask our device to contact immigration about what sort of documents we need if we need to travel overseas. The calendar could remind us about an appointment in our language and could read all the emails in our language. The community function could help us to receive notifications about any social activities near us and to make contact with other communities."

In the same vein, participants in workshop 2 discussed the language issue when they designed a magic machine to deal with information-seeking. Participants started their discussion by focusing on the English language issue that prevented them to reach the information that mattered to them. For instance, p8 commented on this issue, stating: *"of course the government provided translation services to deal with the Language barrier, but the problem is our experience with this service is not good at all"*. P9 added to that: *"you know if you ask for translator, you will get someone who speaks in Arabic but not from our country [Iraq], you may get one from Somalia or other Arabic countries who speak in Arabic but in different accent that we cannot understand and they*



also don't understand our culture". P10 said on this issue: "One day I asked for a translator at Centrelink (welfare services), you know because I have some basic English skills, so I know he provided me with wrong information, but I was embarrassed to tell him. So, imagine this translator would go with me to the doctor what would happen if his translation wasn't accurate?"



**Figure 3: Magic machine "Refugee Assistant in Australia"**

Finally, participants started by modeling their device on paper and identified its functions. They decided the following features would be available in the interface of their magic device, namely, language, Centrelink services, transportation, school services, shopping, community, health services, booking and job regulations. After building their magic device, participants called it, "Refugee Assistant in Australia" (Figure 3). To solve the English barrier, the magic device worked using voice commands in the refugee's language through a magic ring that worked by receiving the commands from the user and transferred them to the magic device. To bring the future to the present and make their device more tangible and plausible, we asked participants to write and enact a scenario about using their magic device. We also requested them to choose two persons to enact the scenario. After a short discussion, participants chose the problem of enrolling their children at school (Figure 4).



**Figure 4: An enacted magic machine for information-seeking scenario**

Two participants, who were husband and wife, suggested that they had issues about finding information to enroll their kids at school. They did not know which school would be better for their children. Another participant decided to play the role of the device. The husband wore the ring on his finger and started asking the device about his issues. *The husband (P2) asked the device how to enroll his son at school? The device (P6) replied by asking another question: how did you arrive in Australia? P2: We came here by plane as a refugee. P6: What is your language? P2:*

*Our language is Arabic. P6: Does your son have the ability to engage with other children from a different culture? P2: Yes. P6: There is a public school near your house, you can go to enroll your son. P2: could you please arrange a booking? P6: Yes.*

## 4.2 Security and ethics challenges

Participants were very concerned that their personal information might get hacked when they used the supernatural device (that they designed in workshop 1) to deal with the information-seeking problem. There was a debate among participants about the best way to protect their information as this device contained personal information about all participants. They suggested including four levels of security protection: fingerprint, biometrics, voice recognition, and password.



**Figure 5: Magic Machine "My dream Career"**

P5 explained why they adopted this level of security in their device, she said: "all information about us and our family members would be available on this device, such as health record, bank account, and our documents and so on. For this reason, we have to ensure that it cannot be hacked". P2 said: "what if we got to sleep? So, someone may open my eyes and try to open the device. We have to add another feature that eye recognition works only when we are awake". In addition, participants in workshop 2 were concerned about another aspect of security. They had concerns dealing with translation services. For instance, P6 expressed her concern about asking for a translator if she needed to go to hospital, interviews and government services. She said: "I don't feel comfortable asking for the translator, because I believe some information is very personal and isn't appropriate to reveal in front of strangers, but we don't have other option we have to deal with this". P8 commented on this issue "I wish if we get a robot as a translator so that we don't need to a person to listen to our personal information and know a lot of things about us. A translator robot would be better, and we would feel more comfortable to share our personal information with it".

Participants were also concerned about ethical aspects. After finishing their design, participants raised ethical questions about the use of their magic device. They asked questions about the fairness of their device and how people without skills would become professionals without any effort and experience. For instance, in workshop 1 participants designed a magic machine called (My dream Career) (Figure 5) that helped them to find their dream job by providing them with the necessary skills for that job. P2 raised a question about the ethical aspects of this device, saying: "So, in this case, no need to study for a long time to get more knowledge and experience about what you want to work in future? Anyone could have easily asked this machine to get skills

about dream job?”. P5 asked another question about how the use of this device could put the community at serious risk. She said: “What if I want to become a professional thief so no one can catch me, but please don’t misunderstand me, what I meant, I am not saying, I would become a thief, but I want to say how this device could be used in a wrong way?”. P2 responded to her comment, saying “Unfortunately, nowadays people called the hacker is IT expert and the thief is a smart person, the justice has been disappeared from our life”.

Their needs for a training program and engaging in the workplace in Australia were obvious through their discussion. Such needs motivated them to think about a magic machine that could help to provide the training program and gain the skills for their dream job. Finally, they decided that such devices would have to be used in special cases with refugees who already had qualifications and experience in their job in their home countries and who needed to gain skills in Australian workplaces. In another example, participants designed magic glasses to communicate with people in the host community. The magic glasses machine could analyze the personality of any person and notify the user if that person is friendly or not. The magic glasses had simple features, a happy face for people who are friendly, and an angry face for unsociable and unfriendly people (Figure 6).



**Figure 6: My magic glasses to connect with the host community**

After finishing their design, ethical questions were raised about this magic device. P4 shared his concern with other participants about the magic glasses, he said: “Reading people’s mind could be dangerous and not ethical. I think such technology makes me scared about technology in the future. Using such technology means there is no privacy, but it could be beneficial for refugees to connect with the host community”. P3, on the other hand, does not agree with him, he said: “Like any other technology there are advantages and disadvantages, it is depending on us how we would use it”.



**Figure 7: Enacted magic glasses Scenario**

To make their device more actionable and realistic, we asked participants to write a scenario to be enacted about using this magic device in real situations. Their scenario was about a husband and wife who went out shopping, but they got lost. They wanted to ask people about the location. When the husband wore the glasses to identify a friendly person to ask, the magic glasses identified a woman near them with a happy face. They approached the woman and asked her about the shop location. The woman helped them to find the location of the shop (Figure 7).

### 4.3 Mistrust and cultural aspects

Mistrust issues were pointed out by participants as a barrier to communication with people in the host community. During both workshops to design magic machines, there were instances where participants described situations where it was difficult to build a relationship with people in the host community.

For example, P5 commented on his experience to connect with local people, he said: “The problem that we face here is that some local people do not want to connect with us because they thought we are bad people or some of them are don’t like or trust refugees”. P6 agreed with this comment, she added “unfortunately, I think people don’t trust us because we have been judged based on our appearance and our background. They think that all Iraqis are bad people because of the negative message in the media. They don’t know what we have been through to arrive in Australia”.

They all agreed that, without connecting with the host community, they would not improve their English language, they would not find an appropriate job and, most importantly, they would not feel they belong to Australian society. P5 also commented on trust issue, saying: “I think trust issue could be easily solved if the government create a new program for newcomer families and individuals to live temporarily with families from the host community who willing to receive refugees, by doing so, all cultural barriers would be removed and trust and the feeling of belonging would be generated between us”.

In workshop 2, participants designed a magic vest (Figure 8) that would help them to gain the necessary skills to find a job.

After finishing their design, there was a debate about why as refugees would get this vest? Many participants believed that even if this magic vest was available, they could not get it because they were refugees and the government would give such magic vest to their citizens but not to refugees. P7 commented on this issue saying: “I think if this magic vest is real, it would be not affordable, it could be very expensive, and why the government would give it to us? You know most job opportunities are for Australian people, not for us, if they really want to help us, they have to provide us with more training programs to improve our skills to be able to find a job in Australia”.

In terms of the cultural aspects, the two workshops engaged participants in deep discussions of their beliefs and culture which were reflected in the magic machine design preferences.

In their discussion to design a magic machine device to find information, participants came up with the idea of implanting devices in the human body and how they might help as a means

of communication or monitoring health conditions. Participants rejected the idea of implanting a device inside the human body for religious reasons. P8 commented on this idea, she said: *“In our faith making changes to our bodies that created by God is prohibited but we can use wearable devices instead of an implant”*. Other participants agreed with her, and then one female suggested to replace the implant device with wearable devices such as a bracelet. This idea was also rejected by male participants because males in their culture usually do not wear a bracelet. Finally, participants agreed to replace the idea of an implanted device with a magic ring as the ring can be worn by both males and females.



**Figure 8: Magic Machine “Smart Vest for Refugees”**

In addition, working on magic machines triggered positive memories among participants about their past, and their dreams for the future. For newcomer refugees, such nostalgic recollections provided meaning for their lives by connecting their past with their present. P2 talked about his learning experience with the subject of English when he was in high school in Iraq, saying: *“ I remember once, I had English test and the question was to define “Mesopotamia”, so I did not know how to explain it in English but I know in Arabic so I used “transliteration” which writing the definition in Arabic but using English letter, of course, I got zero in that exam, (all participants laughed), I still used this method in English course here in Australia to improve my pronunciation”*. Participants responded on this memory and said they also used this method especially in the early stage of learning English. Other memories that were mentioned by participants while they were working on their magic machines were their dreams about the future and what kind of a job they would like to have. For instance, during their work on ‘my dream career’ magic machine, participants talked about how their dreams would come true through this magic machine. P5 worked as an accountant in her country, but her dream career was to become a pharmacist. She said: *“Finally my dream will become true, this magic device will give me all the skills and certifications to become a professional Pharmacist”*. P2 said: *“let us be more ambitious, I want the top job; I want to be a prime minister”*. P3 asked him *“please be specific, do you want to be prime minister in Iraq or in Australia?”* He replied *“Australia now is my country and I want to be a prime minister for Australia. In my home country, we can’t even have a dream to become a prime minister, you may put your family and your life at real risk. I will*

*invite you for a dinner on a boat if I elected!! ”* All the participants were laughing. Such dreams to find an appropriate job in Australia were reflected in the enactment of their magic devices in the real world.

To enact their future in the present and to make their device more realistic, we asked participants to write an enacted scenario about using their device in a real environment. Our intention in this activity was to collect more information and experience from the participants about using their device. We asked them to write a short-enacted scenario about using the magic vest. After a short discussion, participants chose a scenario about how this magic vest could help a refugee to find a job (Figure 9). P9 decided to enact the scenario of an electrician who was searching for a job. When he wore the magic vest, he received several notifications on his mobile phone and his laptop about people who were looking for an electrician. Notifications included information about the job, the location, contact numbers and prediction of hazards.



**Figure 9: Enacted magic vest scenario**

## 5 DISCUSSION

Through the magic machine approach, we learned about challenges that refugees face in a creatively articulated manner which may be difficult to achieve through traditional ways of engaging with individuals and communities.

In this section, we discuss lessons that emerged from using magic machine workshops with this particular demographic group. Finally, we discuss the refugees’ needs through the magic machines approach.

### 5.1 Reflections on Magic Machines Method

#### 5.1.1 *Balancing the role of researcher and empowering participants*

The magic machines’ method was intended to create an atmosphere of freedom and open conversations in which their issues could be expressed without any consequences. For example, during the workshops, participants were free to talk about any topic they wanted: they could talk about how they spent their last weekend; what they ate at breakfast or, sometimes, make jokes and laugh about it. While the approach of the magic machine seemed successful in engaging and empowering refugees, mitigating the tension between researchers and participants is challenging. This is similar to other studies in HCI that conducted a participatory design



approach with vulnerable communities [17,43]. Therefore, to create a safe space of freedom and creativity for participants and to give them more control without affecting the nature of activities, our roles were, solely, to 1) ensure that participants followed the general structure of the workshops; 2) raise questions to boost brainstorming and the imagination of participants, and 3) carefully manage the magic machine method to ensure that participants did not get carried away in their imagination and to remind them to focus on the challenges in existing technologies. As mentioned in Auger [12], “In effect, design speculation requires a bridge to exist between the audience's perception of their world and the fictional element of the concept. Inspiration and influence for this ‘perceptual bridge’ can come from diverse fields”.

### 5.1.2 Practices of empowerment, cultural preferences, creativity and freedom of participants

During the workshops, participants showed optimism for their futures in the host community. The creativity, inspiration, and moral principles of their magic devices also emerged. For instance, in designing a magic machine to find information, P2, who suggested *the supernatural device*, asked us for intellectual property as a result of his creativity. In another example, when participants designed the “*My dream career magic device* (Figure 5)”, participants told us if this design came to reality, they wanted it to be the same shape and colors. Another example showed how this method offered freedom and empowered participants. For instance, when participants designed “*My dream career*”, they felt empowered that they had the choice to choose their dream career. For example, we saw how P5 would achieve her dream of becoming a Pharmacist by using this magic machine.

There were also many instances of the interaction between participants and their magic devices, where participants discussed the security and ethical issues arising from using their magic machines. In the magic machine ‘*My Dream Career*’, participants raised questions about the ethical issues arising from their device and how it might be used in the wrong way. In another example, participants discussed the ethical dilemma of using their *magic glasses* that could identify friendly people in the host community. Such examples showed the success of this method to access the voice of refugees and their beliefs about magic technologies that may not match their ethical principles.

The cultural preferences and beliefs of participants were also explicit in the process of designing magic machines. It is noticeable how this method triggered positive memories of refugees’ past lives and, at the same time, initiated positive conversations among participants of their dream job in the future, as mentioned in the theme of mistrust and cultural aspects. This perhaps shows us that such an approach has successfully engaged participants in having a say about their past, criticizing the present and expressing their dreams for the future. In another example, we saw how participants rejected the idea of designing an implant device to transfer the instructions to their magic device (Figure 3) to obtain the information they needed. An implanted device was rejected for religious reasons

as they did not want to make a change in their bodies that they believed were created by God. These findings confirmed that religion can be considered as a psychological resource that could strengthen or weaken individuals [33].

## 5.2 Refugee Needs through Magic Machines

Elsden et al.[26] state that “speculative methods and Design Fiction, in particular, have been successful in fostering critical and alternative design discourses in HCI”. Similarly, our magic machines approach with refugees revealed nuanced discussions and debate, not only about the limitations of current technology but also about the lack of policies and services for refugees in the host community.

For instance, when participants designed a magic machine for the information-seeking problem, they proposed a supernatural device that could connect directly with authorities to solve their issues. The possible interpretation of their motivation to design such a device is that the information-seeking problem cannot be solved by technology alone, but it must also be linked to other solutions. The biggest challenge that refugees face to find information is language, as they discussed when they made a supernatural device. Hence, innovative technology is still found to be wanting regarding the issue of language for this population. According to UNHCR [48], a large number of innovative technologies have emerged around the world in response to the humanitarian crises of refugees. However, in most cases, these technologies were not successful and attracted only a small number of refugees. Hence, it is important for researchers in HCI to better coordinate with refugees and stakeholders to seek different opportunities, including technological and non-technological solutions, in improving the services provided to refugees in the host community.

The problem is not only with current technology but also with the resources available in the host community. We found that, in the information provision theme, negative experiences with the translation services require greater consideration and review by the policymakers. For instance, engaging refugees in literacy practices would be an effective approach. Most newcomer refugees do not have the literacy skills in English to navigate the information institutions in Australia. Chu [20] argues that improving literacy practices will successfully improve social empowerment. As we have seen in our workshops, refugees do not need to use a supernatural magic device to find adequate information. What they do need, however, is to engage in courses supported by the government that provide them with the necessary skills to seek information.

In another example, that of designing magic machines for job seekers, we observed how participants focused on gaining skills and vocational training sessions by using their magic devices. While 10 of 12 participants had professional jobs for a long time in their home country (see Table 1), finding a suitable job was their priority in Australia. ‘*My dream career*’ magic machine and the ‘*Magic vest*’ presented what was really required for refugees to find jobs in the host community. Our interpretation of such findings is that refugees are not expecting magic technologies to assist them in finding jobs, but they need

to become engaged in government-supported programs that enable them to obtain the qualifications they require to find a job that suits them. Technological solutions could also be beneficial in supporting refugees to improve their skills by involving them in voluntary jobs in the host community. In fact, such an approach has been successfully used in a field study of underserved communities in the USA by designing a technological tool that identifies the skills job seekers need to help them find their dream job [25].

In our findings regarding the design of magic machines to connect with the host community, participants built magic glasses that helped them to identify friendly people who they could contact to build friendships. The possible explanation for designing magic glasses is not necessarily that refugees need such a device, but it is an attempt by participants to find a way to break down various barriers that prevent them from communicating with local people. Examples of these barriers are mistrust, differences in culture, racism, and hate speech regarding refugees in the media. Unless these barriers are broken down, they will not feel welcome in Australia. Connecting to the host community is the best social resource for refugees to obtain social support and accurate information [21]. ICTs cannot help to connect newly arrived refugees to the host community unless an appropriate environment exists that can promote diversity, compassion, and cultural acceptance, and raise awareness in society about the issues that forced refugees to flee their countries. In fact, there is a growing number of studies in HCI that adopted the activist approach for design to address issues of social justice that ultimately influence sensitive social issues in vulnerable communities [39,46]. We also encourage policymakers in Australia to adopt a shift in government policies to support refugees to integrate into the host community.

## 6 LIMITATIONS

Our field study had several limitations when dealing with the refugee population. For instance, the refugee community in Australia is very diverse, coming from different backgrounds and cultures, so, involving one community (the Iraqi community) may not reflect all the challenges that all refugees face in Australia. Such an issue needs to be addressed by connecting with NGOs to build rapport with and to gain the trust of refugee communities to make sure that different cultures and backgrounds are represented. We believe that a few studies cannot achieve a comprehensive understanding of the challenges that refugee communities deal with in the host community. A longitudinal study of the humanitarian crises faced by refugees is required. That will require a large sample to draw a holistic picture and to achieve a greater understanding of this population to inform service providers, policymakers and designers about the challenges that they face in Australia.

## 7 CONCLUSION

This paper has presented a set of magic machines created by 12 participants to deal with three main challenges that refugees face in the host community, namely, lack of information provision,

the job-seeking problem, and connecting to the host community. Creating magic machines in two workshops raised critical issues that have criticized the effectiveness of current technology, services, and policies. The magic machines approach provides an avenue for participants to discuss their challenges in an atmosphere of freedom and creativity and to envision future technologies. We have argued that it is not necessarily the case that refugees need to build such magic machines, but it presented an indirect way from the perspective of participants to criticize refugee policies in Australia. We offer implications for service providers, policymakers and technological implications for future works that can help to deal with the challenges that refugees face in the host community.

Newcomer refugees face immense challenges upon arrival in Australia. They share a dream to call Australia home and to be part of the Australian community. They want equal opportunities to pursue their education, find their dream job, access health services, and buy their dream houses. To achieve this, much work needs to be accomplished in collaboration with stakeholders including NGOs, government agencies, refugee communities and other ethnic groups to deal with the challenges that refugees face in Australia. In the future, we want to engage more refugee communities from different backgrounds and other stakeholders in participatory design using a community-based approach to gain more insights to help this marginalized group.

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