
Using Lo-Fi Experience Prototypes for Co-Designing Conversational Speech Interactions for Public Settings

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ABSTRACT

In an on-going smart city development project, we are exploring the potential of distributed conversational speech interfaces in the public context of a city. By using the well-known Wizard of Oz method in combination with a lo-fi prototype, we involve participants in co-design with the focus on potential use cases, social acceptability, and privacy aspects of interacting with a speech interface publicly. The work taps into the gap of design-oriented work in the domain of speech-based HCI [2].

KEYWORDS

Speech interfaces; Wizard of Oz method; smart cities; social acceptability; privacy; exploratory research

Research questions:

Do people perceive a talking lamppost as an intrusion of their privacy?

To what degree are people willing to share personal information to the lamppost?

What kind of use cases can people think of for the lamppost in their neighbourhood?

Is it possible to produce a closed dialogue-based scenario for the lamppost in confined use cases?

Can a simple, lo-fi prototype facilitate fluent interaction?

Figure 2. Prototype used in the experiment.

Figure 1. Prototype used in the laboratory experiment.

OVERVIEW OF CONTEXT AND METHOD

Speech interactions are often associated with virtual assistants and smart home devices [5], designed primarily for private contexts. A less developed domain is speech interfaces in public contexts [2]. In an ongoing smart city project, we explore the potential of distributed speech interfaces mounted in lampposts around in the city [4]. This network of talking lampposts is being designed as a means for citizens to interact with the municipality, e.g., to report problems in the neighborhood, suggest ideas for city development, and ask for information. The expected value of these location-dependent speech interfaces is lowering the barrier of getting in contact with the municipality; people can just walk to the nearest lamppost to talk about their needs in the context.

These situated interfaces pose a number of research questions related to the user experience and use cases of talking to a lamppost (see sidebar). To explore these questions experimentally from the citizens' perspective, we have followed a research through design approach with the Wizard of Oz technique [3,6]; a low-cost method to explore opportunities, user needs, experiences, and public reactions to innovations. To facilitate co-design, we combined Wizard of Oz with a lo-fi prototype to provide people with a point of reference of interacting with an unfamiliar technology.

Our first exploratory prototype consisted of a loudspeaker that acted as the speech interface (Fig. 1). We prepared a number of dialogues between the lamppost and the user and used a text-to-speech engine to trigger the responses of the lamppost. We conducted two experiments in controlled conditions and experimented with three scenarios: 1) the user has lost her cat and asks the lamppost for help; 2) the user sees litter on the street and reports this to the municipality; and 3) an open-ended dialogue, in which the lamppost initiates the discussion. The dialogues were designed to investigate limits of privacy, with progressively more intrusive questions from the lamppost (e.g., name, upload a photo of your cat, give phone number for further contact, etc.).

The experiments provided qualitative insights on the research questions and the value of the method. People immersed themselves effortlessly in the dialogue, which proceeded fluently. Experiencing the interaction helped people envision potential use cases and reflect on privacy issues: the dialogues revealed subjective limits of what kind of (personal) information people were willing to share with the lamppost. Some participants were concerned about being perceived as informants by other residents and others stated that it might feel 'creepy' if the lamppost would initiate the discussion, unless it is clear that the lamppost is a representative of the city, relating to the trust factor [1]. Our next iteration is to bring the prototype to a semi-public space to investigate how the presence of other people and environmental noise affects the user experience.

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