Extended Bluetooth Naming for Empowered Presence and Situated Interaction with Public Displays

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Abstract. The paradigm of proximity-based discovery and communication enabled by Bluetooth technology can be very relevant in Ambient Intelligence as an enabler for situated interaction. In this work, we explore the use of Bluetooth naming as a key driver for situated interaction around public displays. Our approach to the use of Bluetooth naming extends beyond self-exposure and introduces support for simple commands in the name that can trigger actions on the displays. Our specific objective is to evaluate the usability of this interaction technique and uncover any guidelines for its usage. We have conducted a study combining a trial in a public bar and a set of usability interviews. The results obtained confirm Bluetooth Extended Naming as an easily adoptable technique for situated interaction and suggest some recommendations to improve its effectiveness.

Keywords: Situated interaction, Bluetooth, Presence, Public displays.

1 Introduction

The paradigm of proximity-based discovery and communication enabled by Bluetooth technology is particularly well suited for situated interaction. In this work, we explore the use of Bluetooth naming as a key driver for situated interaction around public displays. Bluetooth devices have a user-defined name, created primarily for defining how Bluetooth devices present to each other, but which can be set and changed quickly. In the discovery process, these names become visible to nearby devices, enabling a simple proximate self-exposure mechanism, which has been enabling an increasingly strong culture around the social uses of Bluetooth naming [1]. Our approach to the use of Bluetooth naming extends beyond self-exposure and introduces Bluetooth Extended Naming as a technique in which the system can recognise parts of the Bluetooth device name as explicit instructions to trigger actions on the displays.

Bluetooth Extended Naming is necessarily a limited technique that does not aim to support any complex interaction dialogues with situated displays. There are several obvious limitations that may undermine its potential, such as the short size of Bluetooth

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names, limitations in text entry, and also the delay in the detection of name change updates introduced by the timings of the discovery process. It is however, in its technical simplicity, a promising technique for situated interaction. Firstly, because it has an extremely low entry barrier. Bluetooth is a widely available technology and setting new Bluetooth device names is normally a relatively simple task that can be accomplished with the base functionality of any mobile phone and without the need for any specialist software. This easy availability is of an huge importance in enabling social practices around the technology and represents a major difference to other sensing and interaction approaches that, albeit more sophisticated, require specific hardware or the installation of specialist software in personal devices. Secondly, the use of Bluetooth presence for situated interaction combines very well implicit and explicit forms of interaction, in fact blurring the distinction between them. Simply by having a discoverable Bluetooth device, people are already part of the situation and implicitly engaging with the system. This low bandwidth, but continuous, flow of presence information can be fundamental in the aggregation of situated content for the display and may act as an important catalyst for more explicit forms of interaction. This is what mainly differentiates interactions based on Bluetooth presence from interactions based on SMS, another widely available technology that is also very relevant for situated interaction with public displays.

1.2 Research Goals and Overview

Our research objective is to evaluate the effectiveness of Bluetooth extended naming as a technique for communicating commands for situated interaction around public displays. In the process, we also expect to uncover guidelines that may help to maximise the efficiency and potential uses of Bluetooth Extended Naming. In this study, we do not address the motivations and practices associated with the use of Bluetooth Extended Naming.

The methodology we chose combines a trial in a public setting and usability interviews. The trial provides important insight on the practical implementation of the technique and on its usability within the complex set of social phenomena that characterize situated interaction in a public setting. The interviews aim to inform the design with insight on the procedural mechanisms associated with this particular use of Bluetooth naming. The results obtained from this study confirm Bluetooth Extended Naming as an easily adoptable technique for situated interaction and suggest some recommendations to improve its effectiveness.

In the remainder of this paper, we will start by reviewing in Section 2, the most relevant pieces of previous research that relate with our own work. In Section 3 we describe instant places, the system that served as an infrastructure for presence-based situated displays. In Section 4, we describe the trial we deployed in a bar and its results. In Section 5 we outline the main results from the usability interviews, and finally, in Section 6 we summarise our conclusions.

2 Related Work

The use of Bluetooth scanning has been extensively explored as a mechanism for sensing presence and uncovering all sorts of patterns, such as the familiarity level of