Beam-Mobile Robotic Telepresence System Review

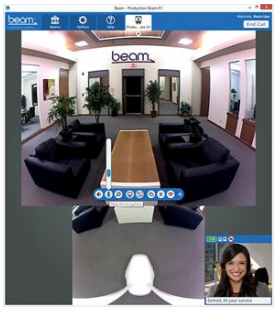
Purpose

Beam is a mobile robotic telepresence (MRP) system from Suitable Technologies. MRP systems incorporate video conferencing equipment onto mobile robot devices which can be steered from remote locations. These systems are primarily used in the context of promoting social interaction between people. In this review, we first look at the product overview of Beam, including its main functionality and price plan; we will then further discuss the potential application areas and the product design challenges; finally, we make some recommendations to adopt MRP system within the University.

Product Overview

Mobile robotic telepresence (MRP) systems concentrate primarily on enabling social interaction via a video conferencing system which provides the added value of being able to move the system to various locations as required. A typical MRP system includes: an LCD screen, a web camera, a microphone and speakers to allow communication between two parties. The unit can be steered around by a user operating on a user interface remotely.

Beam Pro from Suitable Technologies consists of:

	**The Smart Presence Device (SPD):** SPD consists of a 17 inch LCD display with two wide-angel video cameras, a microphone, a speaker and dual brushless electric motors driven by an integrated car battery. Its brain is a 1.3Ghz Intel Core i3 CPU. Users or "pilots" see where they're going via two Logitech HD webcams -- one's front-facing, and one points down for easy navigation in tight spaces. Four WiFi antennas (two 2.4 GHz and two 5GHz) ensure a solid connectivity, and the seven microphones provide good voice quality and noise cancellation.
	**Dock:** It is where the SPD charges between uses. The battery of Beam fills up in around six hours using the Dock.
	**Pilot Software Client:** Users or "pilots" operate the software on the computer to "see" the remote site and control the SPD device. Software requires Windows 7 (or higher) or OSX 10.6 (or higher) for use. A wired internet connection is highly recommended.

Cost

Beam Pro costs a one-off charge of $16,000 plus $950 for the charging dock. Beam+, a simplified version of Beam Pro targeted for home use costs $95 for reservation, the total cost is $1995. Suitable Technology aims to release Beam+ by the end of 2014. Initially Beam+, the pre-order will only be available in the US.

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Potential Application Areas

MRP systems are suitable for a range of different applications, although there seem to be three predominant uses: office environment, health care and accessibility/independent living for the elderly.

- **Office environment:** MRP systems have been tested in the office environment in situations where there is geographic distance between teams collaborating on a project. Since there is an increase of this type of remote collaborations, there are two benefits of using MRP systems in an office environment:
  - To decrease the amount of travelling for the employees and the cost for travelling for the companies;
  - To provide immediate access to another site and to allow remote users to visit their local colleagues and attend formal and informal meetings.
- **Health Care:** MRP systems have been extensively evaluated in health care. Studies show the use of MRP systems has reduced the length of stay not only after minor invasive surgery but also at intensive care units (ICU). It has also reduced response times in emergency situations. Doctors can use MRP systems to remote visit their patients. It not only saves time, but also patients tend to feel more comfortable when remotely visited by their own doctor rather than being seen by another doctor.
- **Accessibility/ Independent Living for elderly:** MRP systems could be used for the purposes such as health surveillance, social interaction, and safeguarding for elderly.

Within the university, it would be more relevant to try its use in the office environment including remote meetings, people working from home, etc.

Product Design Challenges

Based on our research, there are some challenges that need to be addressed regarding the product design.

1. MRP systems rely on access to the wireless network. The stability of the wireless signal is the key to steer the MRP system steadily.
2. MRP systems can be steered freely in open spaces. However in areas where there are barriers like doors or lifts, its use may be more problematic since MRP systems do not include the equivalent of arms or hands to push doors, or press lift buttons. In such situations, help is required from users in the remote site.
3. Another challenge is to understand people's feeling and acceptance of the MRP systems. The social effect of MRP systems is different from the interaction between normal people. Pilot users reported that it was difficult to focus on the social interaction while moving MRP systems around.
4. Another challenge has to do with sound perception and sound disturbance. In an open space, a pilot should be able to adjust the volume of the MRP system so that it is not too loud to disturb other people and it is clear enough for the conversation to be heard. There are no sound issues in confined spaces.

Conclusions and Recommendations

1. Mobile robotic telepresence (MRP) systems are in rapid expansion with an increasing number of commercial and research systems available. They have potential to be used in certain areas such as health care environments, independent living for the elderly and office environments.
2. The use of MRP systems requires a level of robustness, security and data integrity. It will not only require the stability of the MRP system but also the robustness of wireless network in the remote site.
3. It is important to consider people's social interaction acceptance towards MRP systems, the features, interface, and the appearance of MRP systems are highly domain dependent.
4. In our university environment, MRP systems could be used in a few different ways. For instance in remote meetings, remote lectures - lecturers can still teach students even when they are out for conferences, and for staff who working from home etc.
5. Beam+, a simplified version of Beam Pro costs $1995, will be released on December 2014 in the US. The IT Innovation Centre recommends that any interested party in the university to try out Beam+ when it is available in the UK.

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