

High-tech Chocolate: Exploring 3D and mobile applications for factories

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ABSTRACT

TCHO, a chocolate manufacturer in San Francisco, and FXPAL, a research lab in Silicon Valley, have been collaborating on exploring emerging technologies for industry. The two companies seek ways to bring people closer to the products they consume, clarifying end-to-end production processes with technologies like sensor networks for fine-grained monitoring and control, mobile process control, and real/virtual mashups using virtual and augmented realities. This work lies within and extends the area of research called mixed- or cross-reality [1].

INTRODUCTION

This research collaboration focuses on new methods for collaboration and control in industrial environments, in particular methods using multi-user 3D virtual worlds. We import real-world sensor data (such as temperature and machine state) and multi-camera imagery from the real factory and chocolate lab. We are also looking at appropriate uses for mobile devices such as cellphones and tablet computers, and how they intersect with virtual worlds. For example, inside the newly developed TCHO Factory 3D virtual world, you can click on a machine to read its sensors' status, or move closer to it to trigger an in-world video overview of its function. The virtual environment will import real-time data from hundreds of sensors on the factory floor, and will be capable of tracking processes in detail. This multi-user collaborative space can be used for tasks like remote factory observation, virtual inspections, customer visits, education/training of employees, process monitoring and inventory tracking.



Meanwhile, an experimental iPhone app provides mobile laboratory monitoring and control. In the TCHO development lab, where intricate processes are developed to bring out the best in each bean, accurate tracking of time and temperature are essential. The app allows a real-time view into the lab (via PTZ steerable camera) and individual control over machines and sensors. Data from the lab is also represented in the 3D virtual world.

Finally, a network of high-definition cameras installed around the chocolate factory streams live video via web, virtual world, or iPhone. These three systems were deployed at the TCHO factory and lab in late 2008 and 2009, and are now in beta development. Through this mashup of mobile, social, mixed and virtual technologies, we hope for enhanced collaboration between physically remote people and places – for example, factories in China with managers in Japan. In the process, we are finding new applications for existing technologies, as well as insight into real-world needs in globally distributed systems. More information on this research can be found online at <http://www.fxpal.com/VirtualFactory/>.

PRESENTATION

The presentation at SIGGRAPH is designed to be very interactive, and will include a chocolate tasting for attendees (as will the accompanying poster). Presenters both have considerable prior SIGGRAPH experience. Bios:

Timothy Childs, founder and chief chocolate officer at TCHO Inc., is a successful chocolate entrepreneur. Prior to his initiation in the chocolate industry, he worked on machine vision with NASA's Space Shuttle program, and launched several early-stage companies in the internet and computer graphics industries. Timothy was a cofounder and MC of the Web3D RoundUP at SIGGRAPH. Maribeth Back is a senior research scientist at the FX Palo Alto Laboratory (FXPAL). Her work is focused on smart environments, whether real, augmented, embedded, or virtual. Her work has appeared several times at SIGGRAPH in the Emerging Technologies, Art, and Education tracks.

REFERENCES

1. PARADISO, JOSEPH, LANDAY, JAMES, and VERBECK, SIBLEY. IEEE Pervasive Computing Call for Papers, Special Issue on Cross-Reality: <http://tinyurl.com/con9yq> (link checked 5/5/2009).