Technology Demonstration: Augmented Design Ideation

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ABSTRACT

This technology demonstration showcases augmented design ideation tools that have been developed to explore *hybrid design environments* [1] using novel prototypes that use ambient informatics and ubiquitous computing approaches. The tool aims to enhance the creative scope of multi-participant design ideation by providing contextually relevant visual design prompts to enhance design ideation processes and conceptualisation [1]. This demonstration explores the feasibility and effects of tools that can be built now using ad-Hoc arrangements/meshes of the following:

- **Application Programing Interfaces (API's)** from popular web platforms: that offer up various types of culturally/contextually relevant content – i.e. historical, contemporary or live – images, text and sound.

- **Internet search technologies:** This includes the 'mashing' together of Internet search technologies such as speech-to-text (IBM's Watson) to both provide live queries to culturally/contextually relevant content, and importantly, live feedback through word clouds and image text relationships fed into the ideation environment.

- **Multimodal data:** gathered through the use of gesture mapping (using stereoscopic 3D cameras such as the LEAP Motion [2]) and video analytics. This data is then used to create ideation metadata that can be used in comparative analysis of ideation 'events'. This metadata is also used to provide live informatics in the ideation environment in order to explore performative aspects [3] of such environments and design ideation.

Author Keywords

Augmented design tools; design ideation; ambient informatics; augmented sketching; design cognition

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

INTRODUCTION

Our culture has become increasingly indexed online as we have poured our sentiments, visual culture and photographic records onto blogs, social media and – as our cultural and scientific institutions have moved to models of open access – curated cultural repositories. Developers of these repositories have in response developed advanced systems of metadata (tagging, mark-up, page ranking etc.) to facilitate search, advertising and latterly machine learning via semantic relationships. This technical demonstration presents an early version of what we call augmented design tools which form the basis of current practice based PhD research within the Information Experience Design programme at the Royal College of Art.

TECHNICAL DESCRIPTION

The prototype uses multiple inputs to observe multi-participant ideation (two people). Two cameras - one per participant - are connected to face tracking software which analyses the movement and orientation of their heads, as well as the movement of their mouths. A LEAP motion is used to track the motion of one participant's hands and a microphone listens to the conversation and converts the speech to text via IBM's Watson Developer Cloud [4].

The resulting metrics from these inputs are used to query online datasets. These datasets are created through scraping sources such as blogs via the import.io [5] service, as well as querying Twitter via its API [6]. The textual part of these queries comes from the text to speech transcripts, categorising the words via a part of Speech tagger specifically the wordpos module [7] for node.js and selecting a subset. They are modified, where possible, by searching within a particular geographic distance from the tool which is set by the expansiveness of the participants gestures as measured by the LEAP motion.

The central server is built using node.js [8] and communicates with an application built in Open Frameworks [9] which perform the face tracking. Communication between these is handled via OSC [10] and the server communicates in real time with the output screens via websockets [11]. Visualisation of the input metrics and results on the output screens is handled with a mixture of the JavaScript Canvas API [12] and d3.js [13].
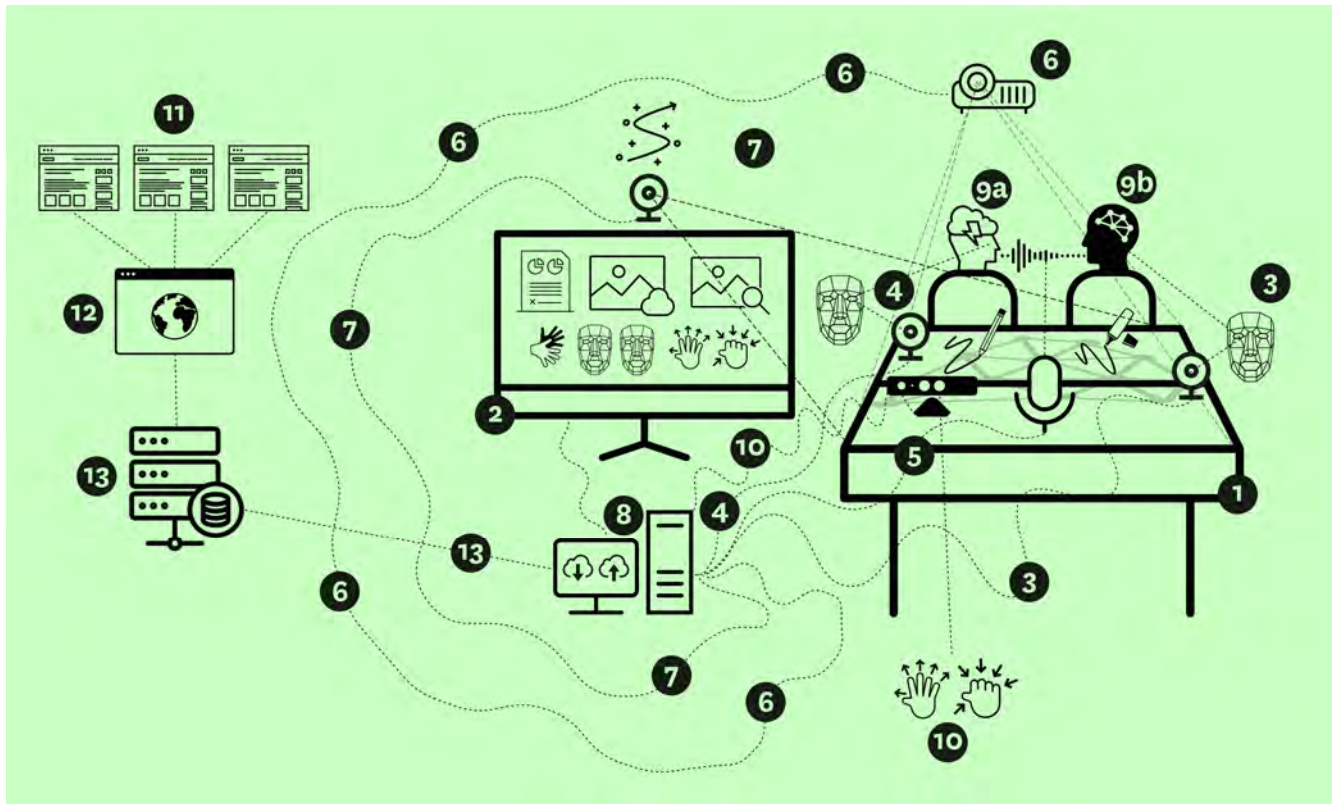
Figure 1. Diagram of indicative design ideation tools setup showing key relationships between participants and technical components of the system. Diagram by Authors, icons from the Noun Project[15]

SET-UP AND COMPONENT PARTS

Below is list that refers to *figure 1* above and acts as a key to the component elements that make up the prototype augmented ideation tool showing key relationships of the system.

1. **Ideation notation surface (table /desk).** A table upon which participant sketch notes during design ideation. During the ideation event, live feedback (images, text and visualisation of voice transcription) is projected into the surface to augment the ideation sketching and the conversation.

2. **Ideation live observation screen (HD / TV).** This HD TV provides a visualisation of what multimodal data is being gathered and what results are being returned to the table. This provides and extra reference point but also allows participants to understand that they are providing data and so can act with this process.

3. **HD Cameras gathering multimodal data.** These cameras are faced at specific participants and gather face tracing data and video data that is used to correlate multimodal data with events during design ideation.

4. **HD Cameras gathering multimodal data.** (As above.)

5. **Microphone for voice recognition and multimodal transcripts.** This captures the conversation of the participants and parses it using IBM's Watson Developer Cloud [4]. This is in turn is used as search

query data to provide live feedback to the notation surface.

6. **LED Projector. Projection of live feedback** (images text and visualisation of voice transcription) to augment sketching during design ideation.

7. **HD Camera.** Captures live sketching for conversation records and analysis.

8. **Mac/PC** that operates as I/O for the system and takes in data and runs ideation tools in browser and provides the live feedback.

9. a and b. **Participants** in ideation task.

10. **3D Cameras.** Capturing gesture data. These are LEAP motion but Microsoft Kinect icon has been used.

11. **Data sources** i.e. images, text, quotes and diagrams from web pages & social media.

12. **Semantic Web-pages** that are mined for relevant content by my bespoke curation tools.

13. **Sever side curated data sets** and curated search tools.

DESIGN IDEATION SKETCHING AND TECHNOLOGY

Sketching has long been a key conceptual tool of design process [14] but its integration with rapidly advancing technologies is understudied from the domain of design research and practice. This demonstration explores key trajectories in network augmented ideation.

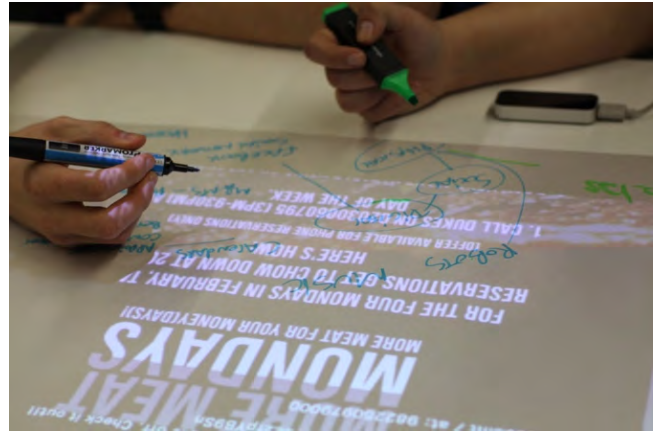**Figure 2. Participants do augmented sketching (wide).**

Figure 3. Participants do augmented sketching (close).

CONCLUSION

This prototype has shown that it is possible to assemble a range of technologies that enable networked *hybrid design environments* [1]. Furthermore, it demonstrates important trajectories of assistive technologies in the design ideation space that have the important distinction of an approach to *hybrid design environments* [1] that "*allows for a continuous exchange between modes, design information being handled by the computer or by hand according to what is relevant at any point*" [16]. It also shows approaches to leveraging semantic web content in ways other than finding common design patterns through brute force emerging from HCI [17]. It also aims to leverage emerging approaches to metaphorical search specifically aimed at creativity such as Yossarian Lives "The World's First Creative Search Engine" [18] and offers insight into how these new online tools could contribute to augmented design ideation tools and processes.

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