Center for Future Storytelling at the MIT Media Laboratory

Storytelling is fundamental to being human: it's how we share our experiences, learn from our past, and imagine our future.

With the establishment of the Media Lab's Center for Future Storytelling, the Media Lab, together with Plymouth Rock Studios, is rethinking what "storytelling" will be in the 21st century. The Center will take a dynamic new approach to storytelling, developing new creative methods, technologies, and learning programs that recognize and respond to the changing communications landscape.

The Center builds on the Media Lab's more than 20 years of experience in developing society-changing technologies for human expression and interactivity, and will now take this to the next level. It will examine ways for transforming storytelling into social experiences, creating expressive tools for the audience and enabling people from all walks of life to embellish and integrate stories into their lives, making tomorrow's stories more interactive, creative, democratized, and improvisational. It will seek to bridge the real and the virtual, creating tools for both adults and children that allow stories to incorporate synthetic characters and actors such as robots. It will also pioneer new imaging technologies, from new systems for movement capture, to "morphable" movie studios that allow one physical space to represent a variety of settings.

The research program, which begins immediately, will be centered at the Media Laboratory in Cambridge, moving into the Lab's new Fumihiko Maki-designed building when the building opens late in 2009. Researchers at the Lab will work closely with the artisan community at Plymouth Rock Studios, and when the Plymouth Rock campus is completed in 2010, the Center will share locations both at MIT and Plymouth Rock, with the studio becoming a site for workshops, teaching, inventing, testing, and displaying new ideas in sound and motion storytelling.

Three Media Lab principal investigators will serve as the Center's co-directors: V. Michael Bove, Jr., head of the Lab's Object-Based Media group and CELab (consumer electronics) consortium; LG Associate Professor Cynthia Breazeal, head of the Lab's Personal Robots research group; and Associate Professor Ramesh Raskar, head of the Lab's Camera Culture group.

Research Initiatives

Research will range from developing low-cost holographic TV, to new imaging technologies for movie studios, to emotionally engaging synthetic actors. Initially, the primary research areas are:

Object-Based Media
V. Michael Bove, Jr.
http://obm.media.mit.edu/

This Center's research in object-based media will focus on creating connections between people and technologies by developing systems to help objects gain an understanding of the content they carry. This understanding can be used to enhance our abilities to describe the world around us, and the things we do every day. It will also explore ways to capture information about us, so that our stories can be personalized to reflect who we are and what we care about. The group's projects include:

Viper 2.0: Traditional video is one-size-fits-all: editing is fixed, and viewers from different contexts all see the same thing. An earlier Viper system was a tool for creating video programs that can re-edit themselves, allowing video producers to create responsive programs that can change during viewing in response to preference or profile information, presentation equipment or conditions, or real- time sensor feedback. Viper 2.0 will build on this for everyday storytelling, so that ordinary people–not just those with experience in professional video editing tools and scripting languages–can create reactive stories.

Holographic TV: Holographic video has a long history at the Media Lab, but current work aims at changing it from an expensive technology used by a very few to a widespread consumer product. This involves building specialized, inexpensive electro-optic chips that can serve as the basis for a holographic TV that costs about the same as an ordinary TV. It also involves software that enables generating moving holograms in real time using the graphics processors that are already in PCs and video game consoles.

Everything Tells a Story: Imagine if our things–from running shoes, to bicycles, to plush toys, to luggage–could keep a "diary" of everything that had happened to them, collecting, sorting, and interpreting our regular activities for re-use in a multitude of ways, such as personal story creation. For this to work, objects need to incorporate enough sensing to gather rich information about environment and activity, enough storage to remember everything sensed, and enough intelligence to derive useful meaning from it all.

Cynthia Breazeal
Personal Robots
http://robotic.media.mit.edu

The Center's work will also focus on developing new autonomous and semi-autonomous interactive character technologies for more emotionally engaging, more nuanced performance of synthetic actors. Applications include movies, live theater, gaming, and other forms of interactive storytelling, and learning and creativity toolkits/artifacts for the general public. Projects include:

Next-Generation Synthetic Performers: This work builds on technologies developed during the Lab's collaboration with Stan Winston Studios to develop next-generation robotic performer technologies–from better tools and interfaces, to

introducing levels of autonomy into the synthetic performer (such as eye contact, facial and gestural movement, and lip sync), enabling more flexible, interactive, engaging, and directable robot-mediated performance on the set.

Character in a Bottle: This research involves developing technologies for capturing and computationally modeling the "essence" of a character from the original performance produced by artists, animators and performers. These computational models could then be used to automatically generate new content for that character that is consistent with its original style (quality of movement, mannerisms, and other defining characteristics).

Storyteller: Tools and technologies being developed by the Personal Robots research group will be put into toolkits for children to empower them craft their own compelling stories and characters to foster creativity and learning goals. Researchers will also leverage synthetic performer technologies to create compelling robotic or virtual characters that serve as learning companions for children for areas such as second language acquisition, early childhood readiness skills, or potentially as therapeutic aids to help children with autism improve communication skills.

Nexi, Huggable and **Tofu** are early projects in this direction.
http://robotic.media.mit.edu/projects/projects.html

Nexi: This new project pushes the limits of existing social robotics technology to support next-generation synthetic performers research. It combines mobility (a compact mobile base capable of human-speed movement), dexterity (hands and wrists designed for both manipulating objects and gesturing expressively), and sociality (a highly expressive face capable of a wide range of human-style facial expressions).

Tofu: This expressive robot will foster new types of interaction with children through the use of cartoon-animation-style movement. Potential extensions of this technology include creating a squash-and-stretch robot character kit (imagine crossing LEGO Mindstorms™ with the Muppets) whereby children can design, program, and remotely puppeteer their own characters' performances to create and share their own stories with friends and family.

Huggable: The Huggable™ is a new type of robotic companion being developed at the MIT Media Lab for healthcare, education, and social communication applications. It features a full body sensitive skin, quiet back-drivable actuators, video cameras in the eyes, microphones in the ears, an inertial measurement unit, a speaker, and an embedded PC with 802.11g wireless networking. An important design goal of the Huggable™ is to make the technology invisible to the user. You should not think of the Huggable™ as a robot but rather as a richly interactive teddy bear. For instance, in a social communication application a grandparent who lives far away could play with their grandchild "as the bear"–controlling the semi-autonomous robot via a Web site and seeing and hearing the child through the eyes and ears of the Huggable™. In an education application, the remote adult could be a teacher who is helping the child learn a second language.

Camera Culture
Ramesh Raskar
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The Center's work will also focus on creating tools to improve the ways that we capture, share, and display visual information. Projects include:

Computational Cinematography and Display: This group of projects encompasses future cameras for movies and news, creation of a universal software platform for sharing visual content, and creating 4-D and 6-D displays for richer collection and presentation of information.

Performance Capture: This work will enhance motion capture. For example, Second Skin is a project to build a wearable fabric that supports millimeter-accurate location and bio-parameter tracking at thousands of points on the body. Such a fabric can compute and predict 3-D representations of human activity and use the information to augment human performance. The Shield Field project is a shadow-based method to scan 3-D objects in a single shot.

Morphable Studios: This technology allows one physical space to represent a variety of things. Projects involve techniques to augment and programmatically change the appearance of physical objects: for example, it can make a white clay object sitting on a table in front of you appear to be made of gold or plastic. The physical object is illuminated with a data (or video or slide) projector. The images to be projected are computed with a 3-D graphics-rendering program. This allows you to change the appearance of real objects, adding special effects to the world around you.

Being There: This projector-based approach provides a way to visualize re-creations of real and imaginary sites that are both visually and spatially realistic. Users have a strong sense of immersion and natural interaction as they walk around a virtual site.

Programmable Movies: This research explores new ways to create movies that change with context (observer, emotions, place, or time). Projects such as Long-Distance Barcodes work to make both cameras and the world more intelligent, by allowing users to piece together and merge separate images using metadata encoded into the image. This work will allow for the merging of multiple viewpoints to create richer stories from varied storytellers.

For more information on the MIT Media Lab's Center for Future Storytelling contact: cfs-info@media.mit.edu.