

# Computer Vision Technique for Measuring Motion in a Video: **Motion Energy**

Image differencing:

$$\text{Diff}_{\text{output}}(\mathbf{x}, \mathbf{y}, t_2) = I_{\text{input}}(\mathbf{x}, \mathbf{y}, t_2) - I_{\text{input}}(\mathbf{x}, \mathbf{y}, t_1)$$

Motion Energy:

$$I_{\text{energy}}(\mathbf{x}, \mathbf{y}, t) = \bigcup_{i=0}^T \text{Diff}_{\text{output}}(\mathbf{x}, \mathbf{y}, t-i)$$

where  $T$  = window in time,  $\bigcup$  = union of pixels





# **The KidsRoom:**

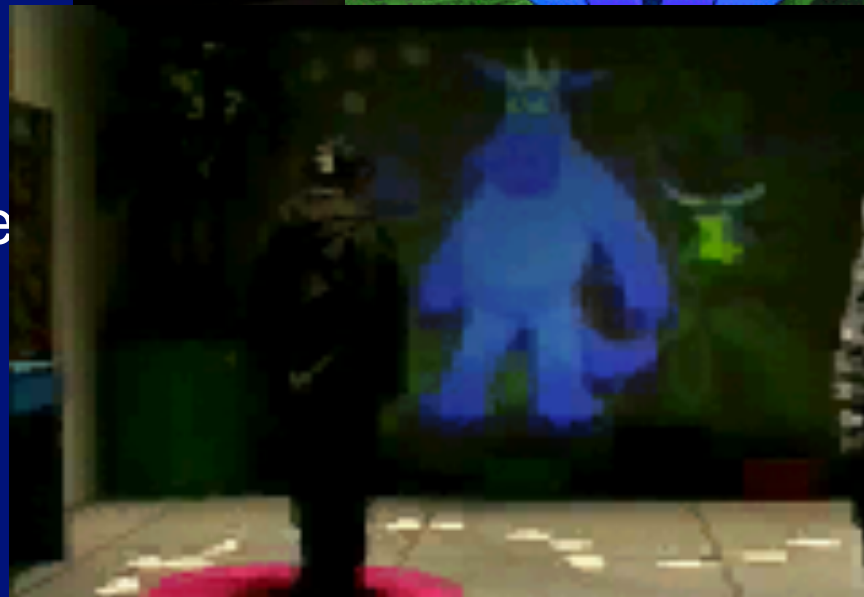
## **A Perceptually-Based Interactive and Immersive Story Environment**

**An MIT MediaLab Experiment**

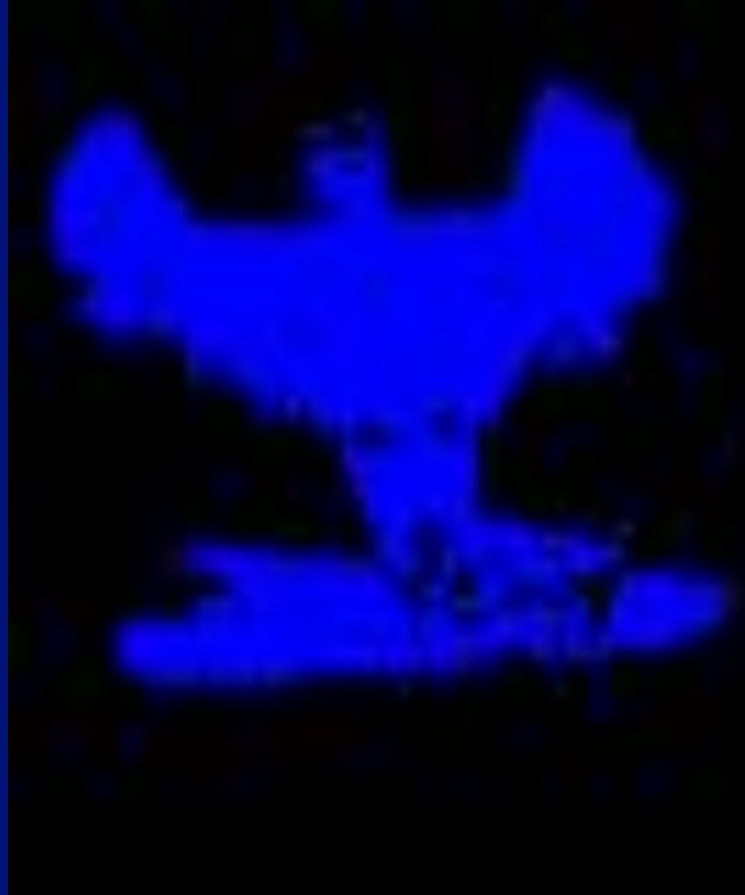
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C. Pinhanez, L. Campbell, Y. Ivanov,  
A. Schutte, and A. Wilson**

# The Monster World

- “Yell! Keep the monsters away!”
- “Let’s Dance!”
- One child per rug (non-occluded view of child)
- Four dances
- Interaction with animated monster monitor
- Imitation



# Object Detection & Interpretation



# The Wing Flap and Spin Dances

Match Temporal Templates:



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