

# Glowing

--fluorescence installation  
with physiological sensors



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# Introduction



- ↻ Visualization of bacteria on human skin
- ↻ Fluorescent glowing
- ↻ Glowing color and glowing rate
- ↻ Bacteria database



# Outline



- ❧ Key words
- ❧ Technology
- ❧ Device
- ❧ Exhibition
- ❧ Experience

# Key words



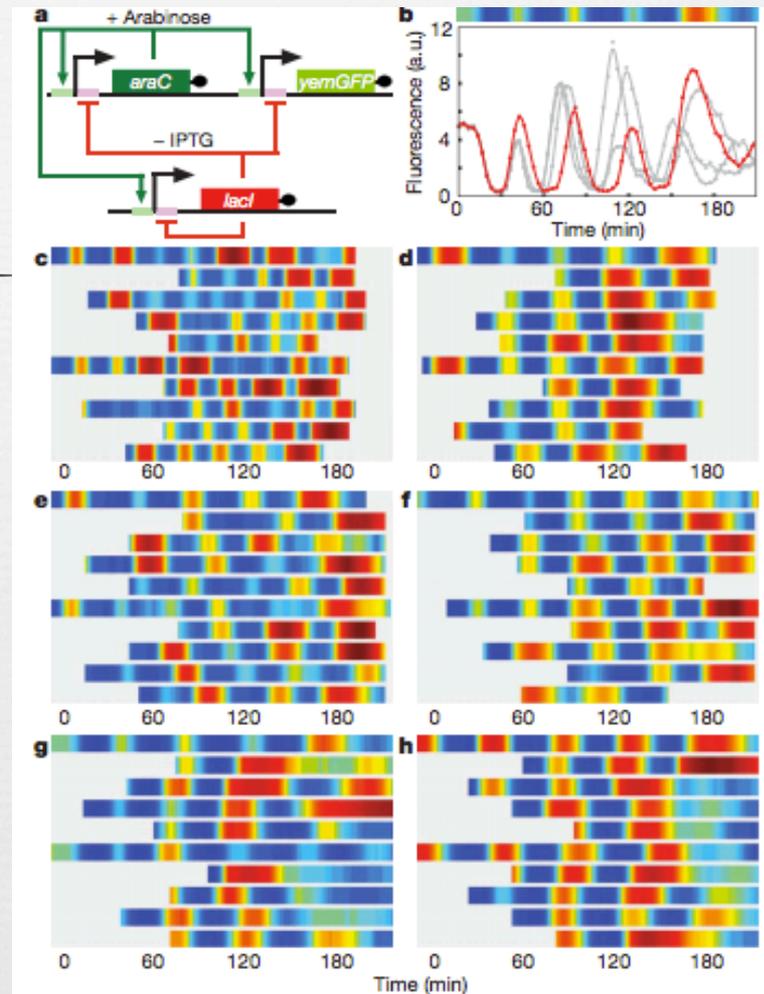
- ∞ Synthetic gene oscillator
- ∞ Wearable wireless physiological sensor
- ∞ Fluorescence highlighting installation

# Technology

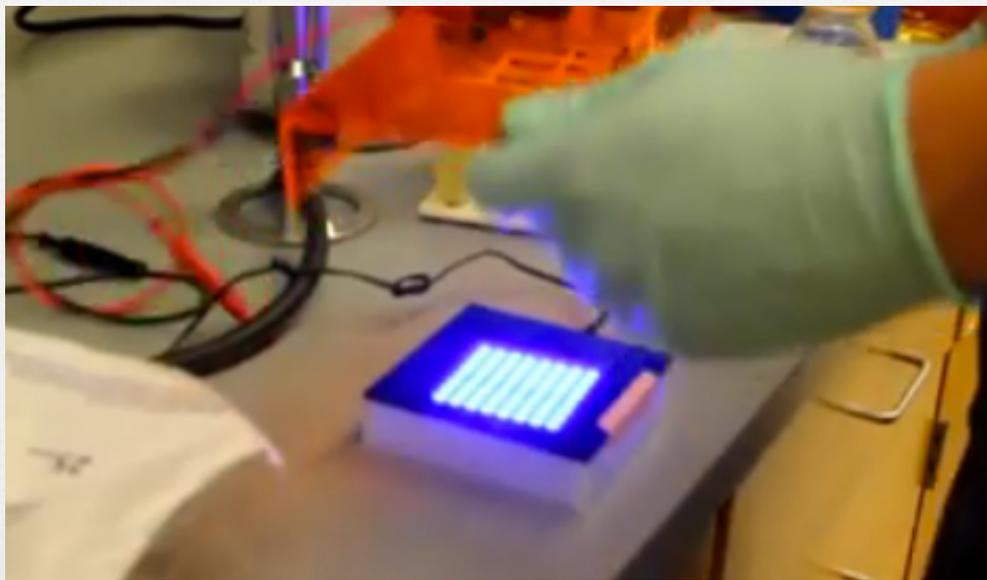
## ∞ Synthetic gene oscillator:

A cell, such as a bacteria, oscillates in certain rate. A fast and tunable oscillator was created in 2008.

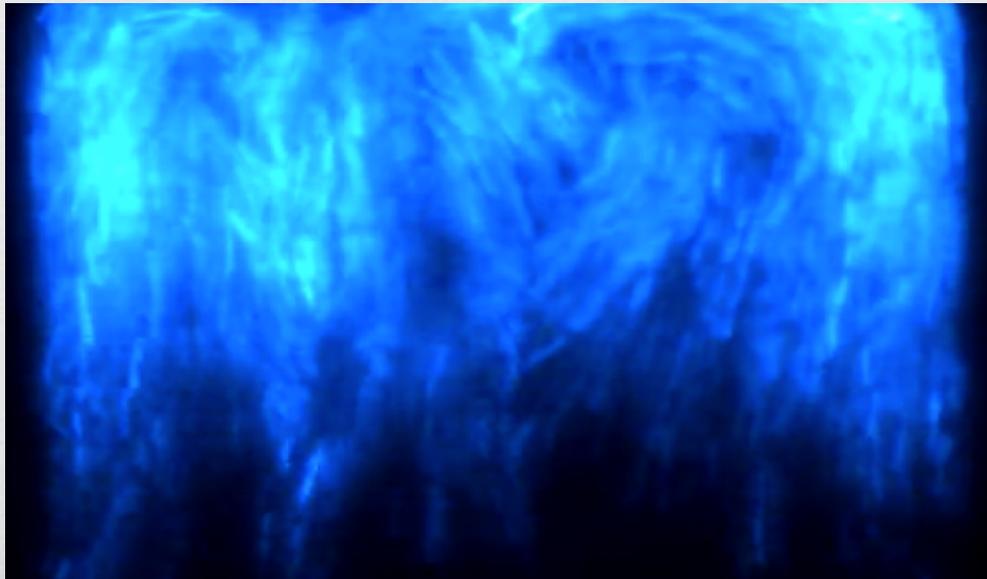
The oscillator consists of a circuit which can activate the fluorescent protein inside the cell. This fluorescent protein can activate the circuits in its surroundings. As a result, millions bacteria will glow together in certain rate.



**Figure 1 | Oscillations in the dual-feedback circuit.** **a**, Network diagram of the dual-feedback oscillator. A hybrid promoter  $p_{lac/ara-1}$  drives transcription of *araC* and *lacI*, forming positive and negative feedback loops. **b**, Single-cell fluorescence trajectories induced with 0.7% arabinose and 2 mM IPTG. Points represent experimental fluorescence values, and solid curves are smoothed by a Savitsky–Golay filter (for unsmoothed trajectories, see Supplementary Fig. 3). The trajectory in red corresponds to the density map above the graph. Density maps for trajectories in grey are shown in **g**, a.u., arbitrary units. **c–h**, Single-cell density map trajectories for various IPTG conditions (**c**, 0 mM IPTG; **d**, 0.25 mM; **e**, 0.5 mM; **f**, 1 mM; **g**, 2 mM; **h**, 5 mM).



Sample of E.Coli Bacteria

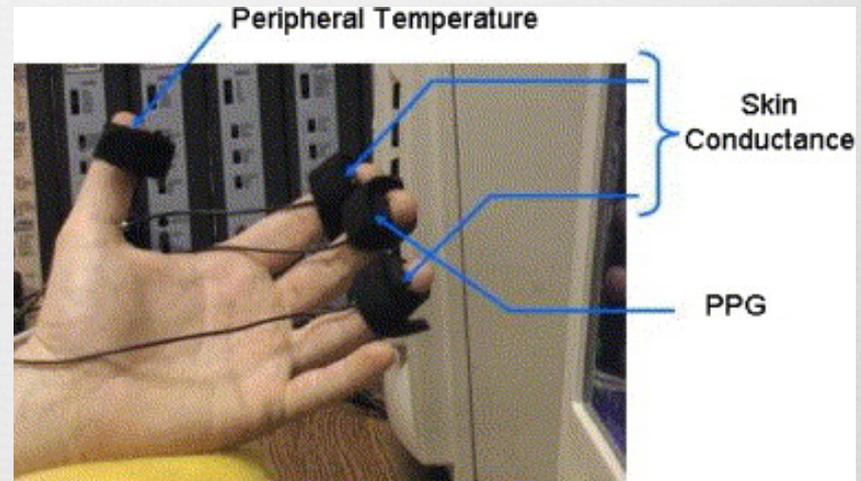


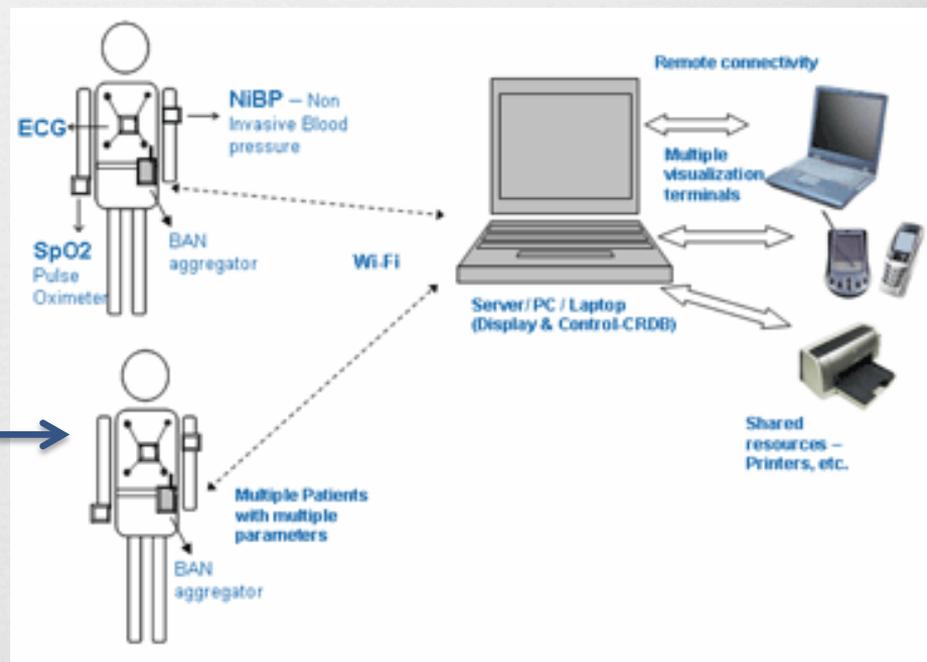
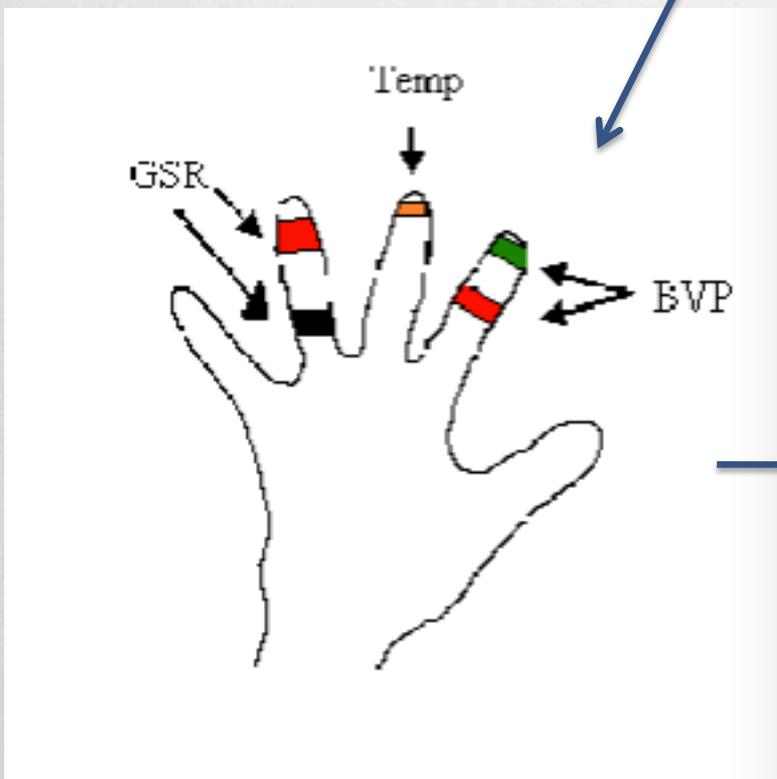
# Technology



## Wearable wireless physiological sensor

The device can read the skin temperature, conductance and blood oxygen level of the individual wearing the device. It can then connect directly to a computer, where it outputs the results of the data gathered from the subject.

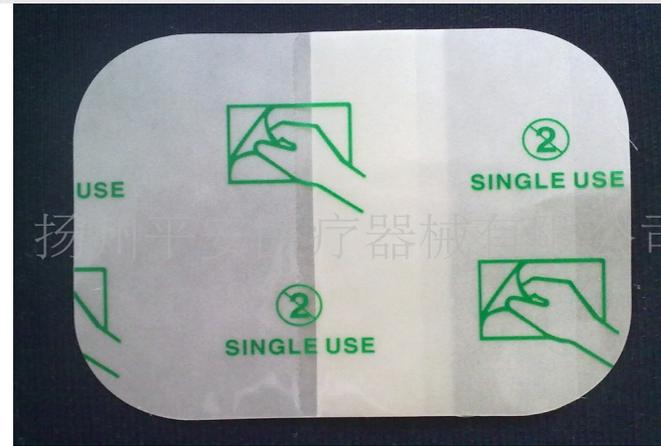
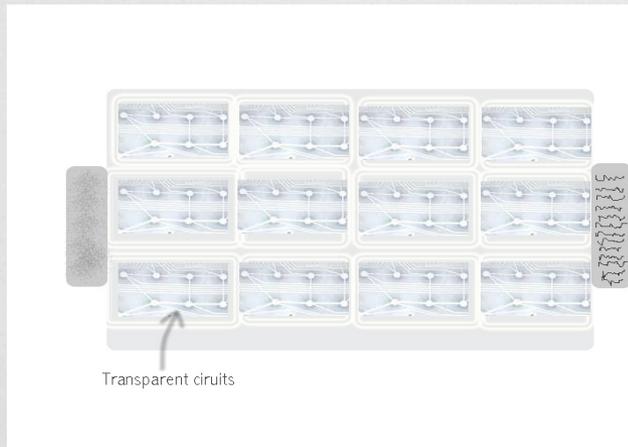




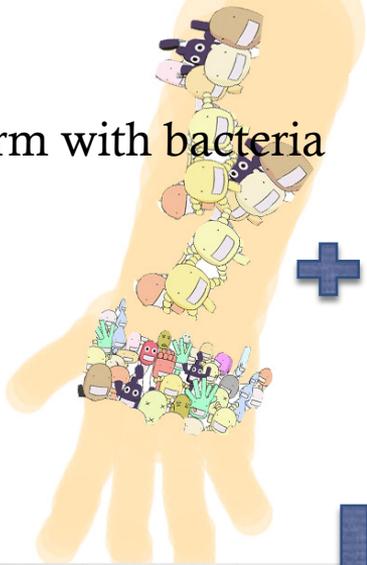
# Device



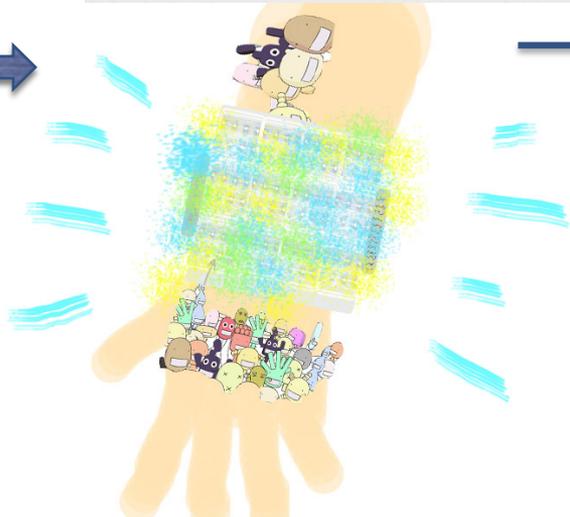
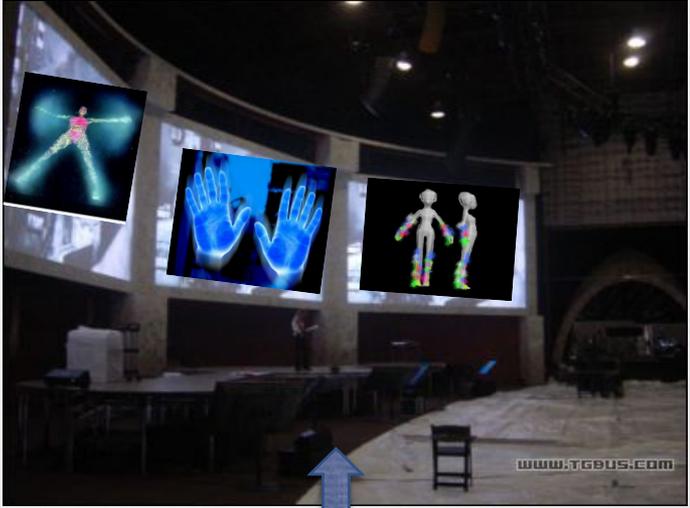
- ⌘ A transparent device consists of circuits. Accelerate the generation of the fluorescent protein inside the bacteria.
- ⌘ The physiological sensors on the device can adjust the skin temperature of the viewers. The glowing rate and luminance will be controlled.
- ⌘ The wireless device could be stuck to people's arms and legs.

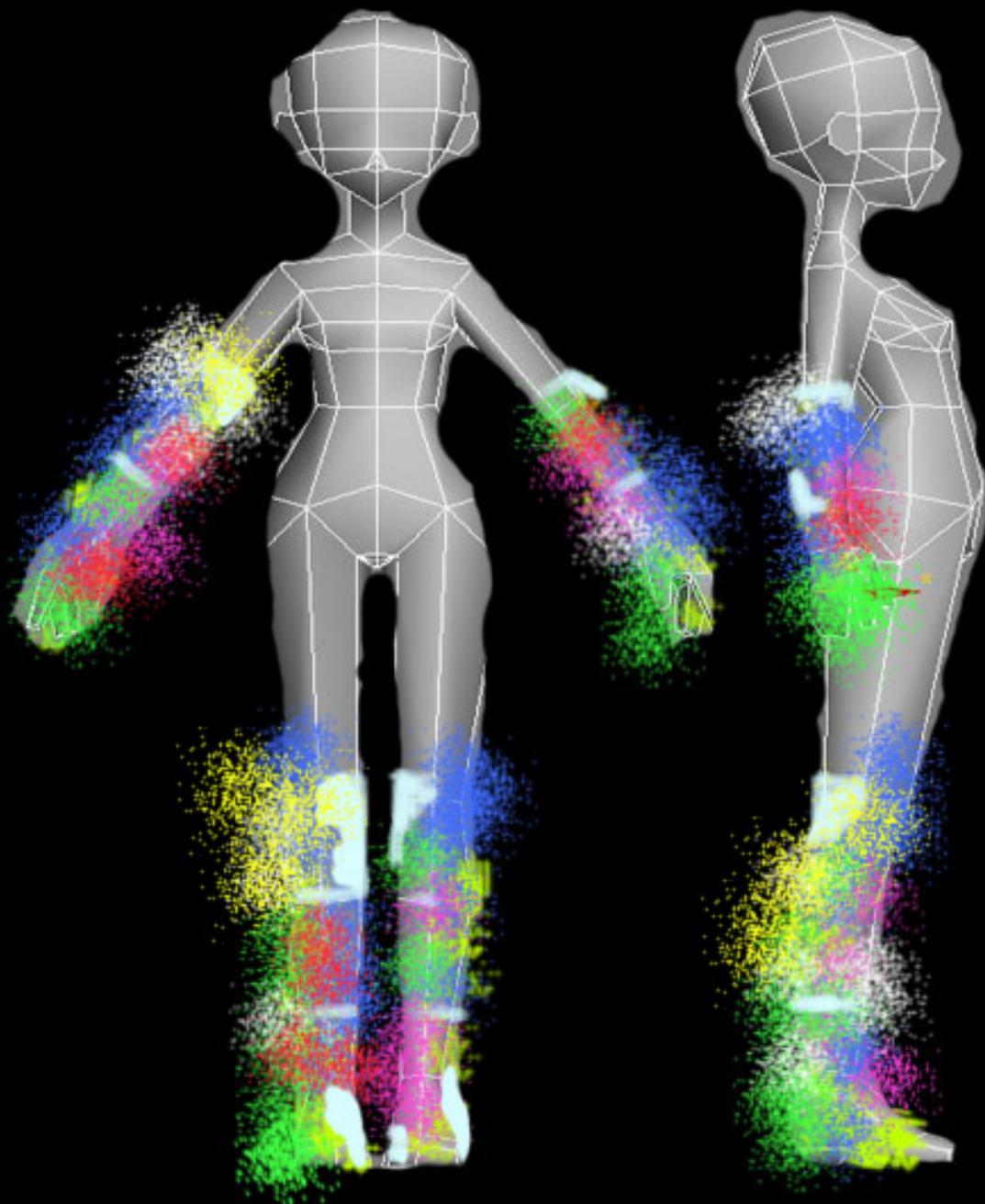


Arm with bacteria



Transparent Circuits  
with physiological sensors

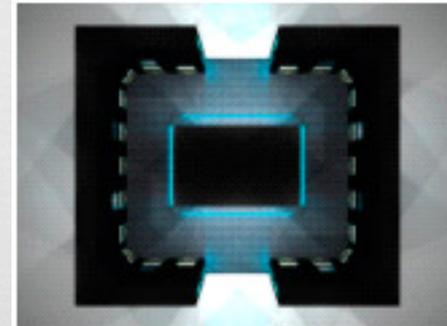




# Exhibition



∞ Project will be presented in science museum.



In the dimmed exhibition space there will be five large, round screens.

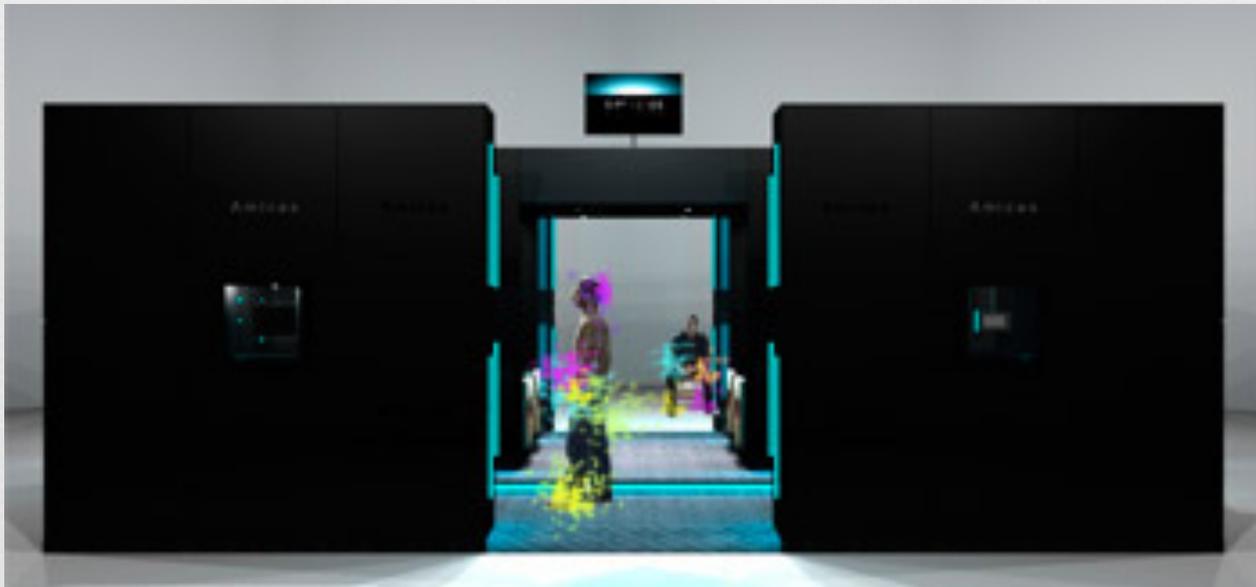


# Experience



- ❧ The image of viewers will be projected on the left side of the screen.
- ❧ When touch the glowing area, information about certain bacteria will be shown on the right side.
- ❧ When press the buttons controlling the skin temperature , viewers can observe the changes of glowing rate and luminance.





# Sources:



- ⌘ <http://biodynamics.ucsd.edu/pubs/articles/Stricker08.pdf>
- ⌘ [http://courses.cs.tamu.edu/rgutier/cpsc483\\_s04/reports/wearable-final.pdf](http://courses.cs.tamu.edu/rgutier/cpsc483_s04/reports/wearable-final.pdf)
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