How might we imagine a space that can develop an understanding of its users through their hand/bodily movements and respond accordingly? This installation is an attempt to address this question through the design of an interactive kinetic wall (Figure 1).

One of the main contributions of this work is to explore how a physical environment can change its shape in response to user’s movement. Mobile devices already use techniques based on touch- and gesture-based languages—swiping, clicking, dragging and so on—as a natural, intuitive mechanism of control. But can these techniques be used to control entire environments? (Figure 2)
This project has two main objectives; firstly, it explores the potential for a gesture-based interaction with our dynamic architectural space through the use of a Leap Motion device. Secondly, and more importantly, to explore the relationship between materials, form and interactive systems of control in order to generate an empathetic relationship between users and their environment.

The installation consists of wood, stretchable fabric and PVC pipes control with Arduino micro-controller connected to a Leap Motion (Figure 3–6). The Leap Motion recognizes specific gestures, which will control several DC motors to operate several types of movement into the surface.

Also there was an attempt to emphasize on the surface topography by adding real time projection mapping onto the surface of the wall. The depth camera captures topographic data of the surface in real time by using an Ausus Xtion PRO depth camera. It then processes this information in order to generate a series of topographic contour lines, which are projected on to the surface.

In a way, audience generate various physical movement of the wall surface by their hand gesture while the new surface data information is processed and projected on to the surface. What is interesting here is the fact that projection and physical movement are locked into a feedback loop (Figure 7).

In the future it may even be possible to design a direct interface, which allows users to interact with their environments without any intermediary mechanism. Such interfaces will make control of our physical environment much easier and intimate (Figure 7 & 8).
This diagram shows having two parallel walls and Kinect device, which capture all data from user bodily movement in real-time and transfer those data to the surface movement.

3. Flexible PVC tubes (1/2") for changing the surface.

4. Four-way stretchable fabric (Span-dex) and understanding the force required for surface manipulation.

5. Eight DC motors run with 12 volt power supply (Motors are Honda door window motors).

6. Kinect/Depth Camera capture information of surface and then project topographic lines into the surface.

7. This diagram shows having two parallel walls and Kinect device, which capture all data from user bodily movement in real-time and transfer those data to the surface movement.
BEHNAZ FARAH is a designer, architect, and Annenberg Fellow and PhD student at the University of Southern California. She is interested in interactive architecture. Behnaz has an Undergraduate and two Masters degrees in Architecture. Her work has been widely published and exhibited. It has been selected for Skyline2014 in Downtown Los Angeles, ACADIA 2013 conference in Canada, “Sight+ Sound+ Space”, “Design Intelligence” in Beijing in 2013, the “Encoding Architecture” exhibition in Carnegie Mellon University in 2013. In 2013, she was awarded first prize for the Kinetic Art Organization international competition.