**SRN1**

What ideas did you find most compelling from Professor Boyden's lecture and why?

The objectif of Prof. Boyden is to understand and try to answer the question: *How will neuroscience and AI converge ?*

In order to answer this question, he stated that the first step was to get a precise understanding of the brain, in order to be able to create **True AI.** This is what I found compelling about Prof. Boyden’s lecture: in order to create the real Artificial Intelligence, he points out the uncommon idea of the lack of understanding of the human brain and therefore human intelligence: *how can one create Artificial Intelligence if he is not even able to understand Intelligence ?*

The objective of the work he presented was to map, report and try to control the brain. Another compelling idea from the lecture was the introduction of the several complexities that arise when trying to study something as complicated as the human brain. It clearly explains why creating Artificial Intelligence is so difficult: the brain contains 100 000 cells with connection within 1: this is a very complex structure that is theroitically and computationnally had to understand and apprehend.

In the remainder of his work, I found compelling the areas of research explored in order to tackle the inherent difficulties arisen with the study of the brain.

He presented us three main objectives:

* Map the molecules, wiring and connections using Expansion microscopy. The idea of Expansion microscopy was very compelling: since the wires and different connections in their natural state were too difficult to discriminate, they created a means to artificially separate different complexes, thus resulting in an enhancement of the capabilities of the models trying to discriminate brain complexes.
* Control the high-speed dynamics via optogenetics: In order to tackle the imprecision of electrical impulses, they had the clever idea to spot the movement of different particles via tracking the loght-sensitive particles.
* Observe the high-speed dynamis thanks to tools for fluorescent imaging of dynamics: Observe the pattern/activity of a precise cell.

The future areas of research are also very compelling: the objective is to watch the brain in action, see what patterns are created during a decision or an emotion and then use the optogenetics to see which part of the activity is the most important. This would allow to deduce brain activity and human-decision making, creating a step further toward the understanding of how *Human Intelligence* works and therefore eventually reproduce it Artificially.

The most compelling idea from Prof. Boyden was when he compared the brain with a Neural Network reproducing the map of the brain (and its neurons) and inferring the parameters via the dynamics of the cells inside the brain (with a parallel with the dynamics of parametersin a Neural Network).

Several computational concerns need to be solved before being able to implement such a Neural Network, that would require 100 000 000 000 neurons and a lot more of parameters.