

## **Skill training on “Enhancing Human Potential through Brain, VR & Learning” By Dr. Miriam Reiner, Technion, Israel**

**Resource Person:** Dr. Miriam Reiner, Technion, Israel

**Venue:** Shraddha Hall, Amrita Vishwa Vidyapeetham, Amritapuri Campus

**Date:**

### **Workshop Introduction:**

AMMACHI Labs hosted Prof. Miriam Reiner, head of the Virtual Reality and NeuroCognition lab at Technion (Israel Institute of Technology) following a meeting between Prof. Bhavani Rao and Prof. Reiner and Dr. Uri Leron at Technion.

### **Objective:**

The aim of Dr. Miriam’s visit to Amrita Vishwa Vidyapeetham was to promote inter-university cooperation and networking to enhance institutional capacities through knowledge sharing and collaborative work. She met with key members at Amrita and had group discussions with the AMMACHI Labs Technologies Group at the 2nd Foundation Makerspace. She gave a talk titled “Enhancing human performance- Integrating virtual and augmented reality with physiological measures to study cognitive-affective responses.”

### **Outcome:**

One focus of the seminar addressed the instructional design methods to optimize the value of working memory capacity and to avoid cognitive overload. Dr. Miriam explained how educational neuroscience offers innovative processes and methodologies to analyze cognitive load based on physiological measures. Observing psychophysiological changes when they occur in response to the course of a learning session allows adjustments in the learning session based on the individual learner’s capabilities. In other words these methods can help to identify the particular needs of different students, thus matching the form and style of teaching with the capacity of the learner. One relatively easy measure of a learner’s physiological changes during a learning task is through the easily available non-invasive electroencephalogram (EEG)-based devices. This device is used with advanced near-real-time analysis techniques to improve our understanding of the underlying mechanisms of learning. She said this can impact the way instructional methods are designed, and it can also enable them to change according to the learner’s cognitive load and valence states.

Dr. Miriam’s presentation was very interesting, with a multitude of examples and exercises done with the group to help us grasp the concepts being addressed. She demonstrated research being done in her University’s Lab that show how the brain is tricked at times into believing something that is not true. For example, a person is seated at small table with their right arm on

the table to the right of a dinner plate, and the left arm on their lap. On the left side of the dinner plate is a fake, but realistic looking arm. The experimenter suddenly stabs the fake arm with a fork, and the person, quite startled, quickly jerks her or his own left arm rapidly away believing that it is their arm being struck with the fork. Thus, even though the person clearly understood that the arm to the left of the plate is not their own, but a fake arm, the brain, in a moment of experienced threat, has the body react as if the arm is part of the body.

Group discussions about how AI might of service to social problems also took place during the seminar. Dr. Miriam showed innovative, thought-provoking AI images, such as of a completely real looking and moving human, that is only created through AI. As a group under her lead and guidance, we explored the possibilities of AI technology being used with rural village populations in various ways.

### **Conclusion:**

The staff and faculty present gained invaluable knowledge in the application of biofeedback and neuropsychology techniques to enhance learning during motor skill training scenarios in virtual simulations.

### **Resource Person:**



Prof. Miriam Reiner is the head of the Virtual Reality and NeuroCognition lab at the Technion-Israel Institute of Technology. Her work focuses on applications of Virtual and Augmented reality to enhance human performance, by inserting cues in the VR/AR that activate the relevant brain mechanisms. Examples are enhanced memory consolidation, spatial reasoning, insight and similar. Her work applies brain research to virtual and augmented reality to enhance human

learning, training, communication and performance. She served, in the EU Future Emerging Technologies committee to develop human-centered Presence in VR in Europe -- and has studied this since then.

The purpose of her work today is to identify neuro-behavioral mechanisms of enhanced learning and apply the findings to emerging virtual and augmented reality technologies for enhanced neuronal activations of learning.

Miriam is Associate Professor at the Technion and visiting Professor in Stanford CA.

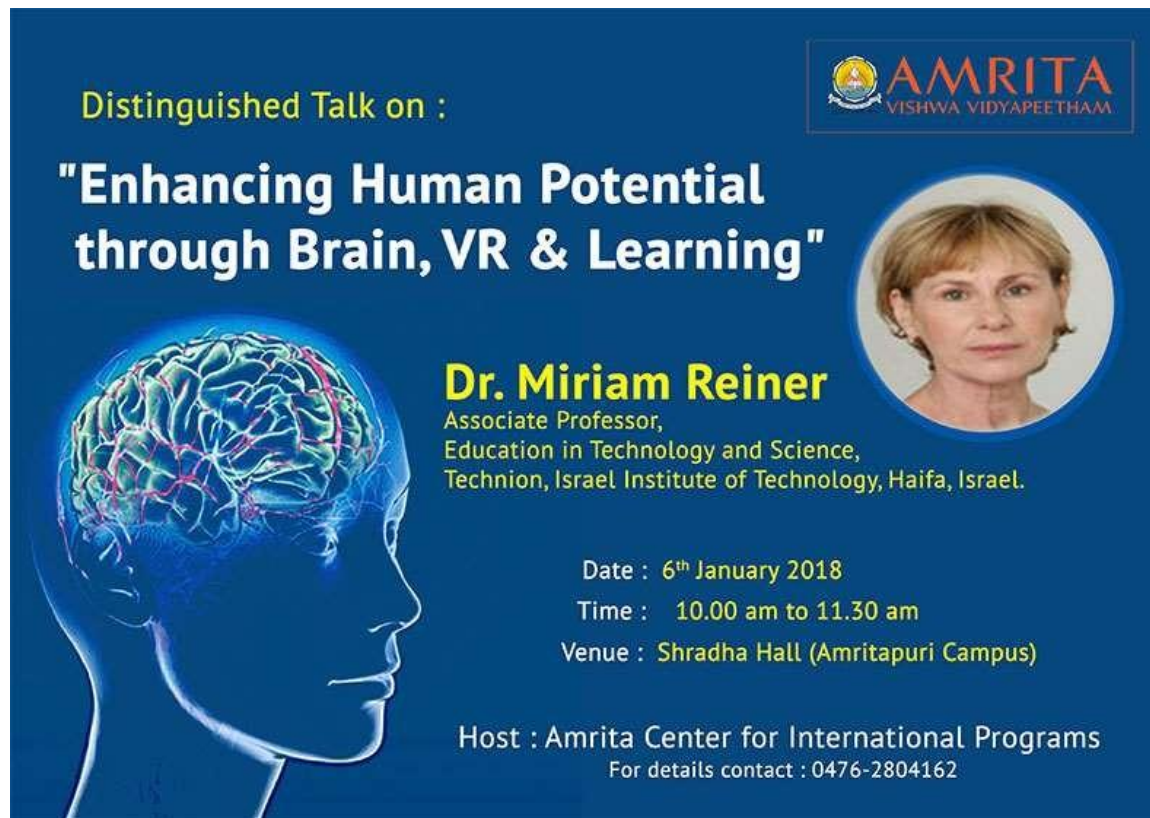


Figure 1: Flyer



Figure 2: Dr.Miriam seminar about learnings of her research areas





Figure 3: Researchers, staff, faculty during the seminar



Figure 4: Dr.Miriam at the Ammachi research lab with researchers