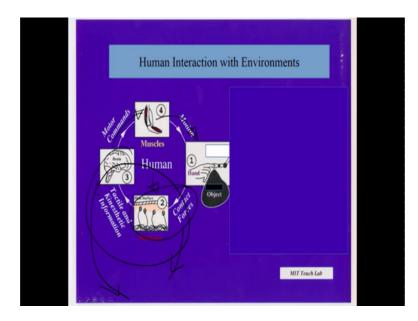
## Virtual Reality Engineering Dr. M. Manivanan Department of Biomedical Engineering Indian Institute of Technology, Madras

## Lecture – 67 Branches of Haptics

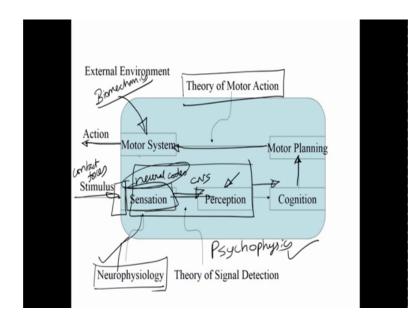
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Before we talk about it the course contents, let us look at how we actually touch the environments, how we interact with the environments. In order to understand and a haptics little more we will look at how we are interacting with a environments. We have the hands when we touch it, because we touch there are some contact forces are developed and this contact forces are sensed by the sensors in our skin. And the sensor convey the tactile and kinesthetic information to the brain and the brain process this information and then ask the muscle to move or do certain things.

And then muscle actually moves and therefore, we are moving the hands therefore, we are manipulating the objects. This is a very rough very crude idea of, what is happening in the haptics right. Let us expand it little further for example; I want to expand what is happening between and a contacting force and what is happening over here just this alone we will take it and then expand it further.

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In a little detail one the stimulus is coming over here all this contact forces right.

Then our receptors or sensors in the skin is converting that contact forces into neural signals right. Neural code, electrical impulses it is generating, that electrical impulses is conveyed to the CNS, and then CNS we have the perception and then the perception leads to cognition, and then cognition we have once we have the cognition we do the motor planning and then once we do the motor planning we lost the motor system to move it and then motor system moves the hands and then action is on the environment right. The same thing as what we have seen in the previous slide is the same thing ok.

Now each stage is a specialized course available. For example, how this neural coding coming from the sensors is converted into perception, there is a separate course called psychophysics. I am offering a course on psychophysics this semester; we talk about only this stage of the haptics. So, the sensation part alone is called the Neurophysiology for psychophysics haptics neurophysiology is one of the very important topic, that it suffers a separate course and ah we are going to use one of the well known text in the neurophysiology, and we will understand how the sensation is happening, and then sensation how sensation is related to perception is going to be by this psychophysics.

So, the cognition is slight is ah is about the higher functions of the brain ok. Perception is you know perceiving, whether there is a you know texture or not whereas, the cognition is about the memory, whether I like it or not recalling it learning these are the higher aspect of the brain is called the cognition ok. So, once we have cognition, then we do the motor planning. Motor planning itself is a big subjects and then how motor planning is executed into the motor action, again there is a theory of motor action there is again a another specialized subjects.

So, how motor system is working in our human body can be you know as a part of the biomechanics that is again an another course which is offered in our department. So, you can see that there are lot of details in it we will in this part of the course, we will focus on a neurophysiology and then psychophysics as a part of the you know human haptics.

Human Haptics = 50%. M/C Hopkiss = 40%. Correp Haptics = 10%.
Indian Institute of Technology, Madras Touchlab

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So, the haptics course is divided into human haptics and then once we understand our human haptics, we may try to simulate in it in a machine in a robotics or we are going to design certain devices and that part of the haptics is called the Machine haptics.

Not only design the machines, but also we need to write softwares in order to give you this experience improve the experience of touch. So, give you a experience of touch in the virtual reality that part of the haptics is called the computer haptics. So, we will have the human haptics, machine haptics, and a computer haptics. These are the three aspects of the haptics; this course will have it ok. So, we will spend about 50 percent of the time in a human haptics another 40 percent of the time in the machine haptics, probably another 10 percent of the time in the computer haptics.