How The Brain Creates Mind
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Lecture – 20
Future of Brain-2

We left at this interesting question, that where is yourself in the dream, and what beautiful physiological timing, but this a distortion of networks probably. So, what it is.

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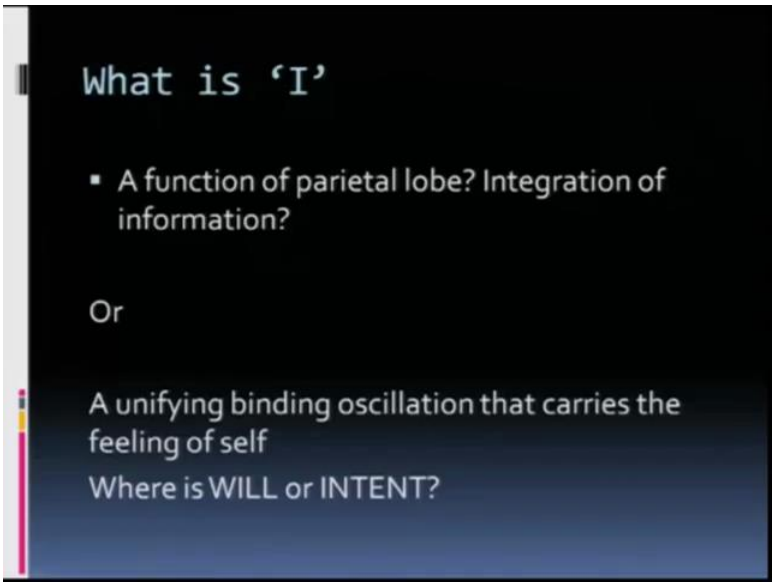

Now, if you correlate with physical it is very difficult to explain now, whether it is a unifying binding oscillation, but where is the will and intent? At times if physicality may be going in one direction, but your will may be tiding our and really make you do things. So, there lots of question which are unanswered; in spite the plethora of knowledge. May be some day we are able to bring out. The biggest question is, and the bigger question.

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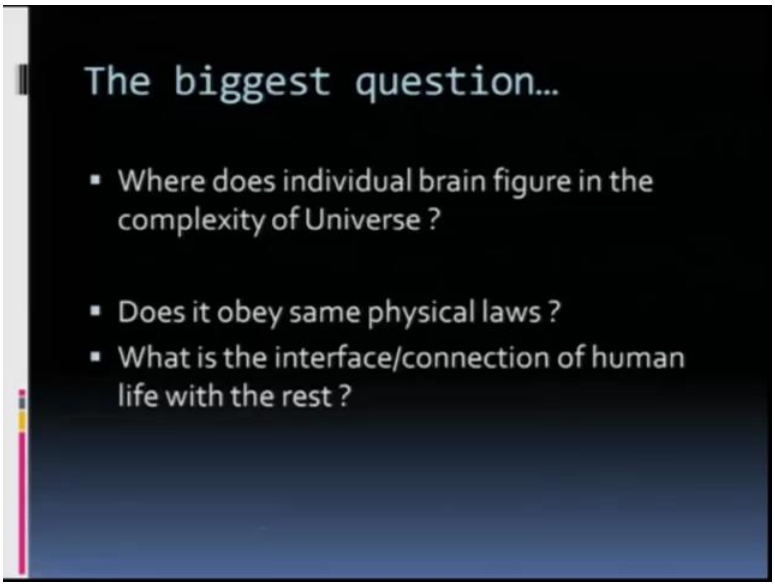

I have written bigger question we are talking about individual brain and behavior neurons and firing and physicality, but earth is just one of the planets in the universe. there is a anthropic principle that, the circumstances favored, the physicality of the universe favored creation of life, and lord philosophically we human beings seem to have a ego, thinking that we are the center of the universe, and we try to explain everything in the world, but that is the function of language and thought that we have developed, but where is the individual brain in the complexity of universe. Right now, we are at the level where we are trying to figure out what is happening in the brain; is there some other physics.

You should do not know, you have been trying to apply gravity and the basic forces and quantum to the universe. We still have not connected our brain to this position in the universe viz are we just separated, because our brain close in the skull and it property. We know I told about the development of the brain. It does not develop without the external influence. So, all my functioning of network is totally embedded in the context in which I am living. So, fine I have explained in the (Refer Time: 02:27) now, where does the whole physicality in the complexity of in us, we still do not know. Does it obeys the same physical laws, or may be all physics gone into the brain. Is it temporal thing or it is special thing.

So, I am living with lot of questions actually, because these are the question which trying

to figure out. In different language if you read lot of lot of popular writing there is a book by Michio Kaku called future of mind, and that is why this sentences appear very duplicative; how does brain create mind, and Damasio has written article. Actually I just said it two days back. So, I can use it as a disclaimer, but he said how does brain create mind, we are also taking about it future of mind, what do you talk about. Lot of overlapping concepts, and if you read two three four books may be at the end of you really do not know what is happening. Damasio as written books called the Descatres errors, lot of the people quantum is writing on the brain. Lot of thing is going on. Some of it is repetitive, some of it original, but when that is situation you have to really pick from it. So, what is the interface and connection of human life with the rest? This question is being addressed.

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Here, where do you go from here, why is mister Obama featuring here? So, this is barrack Obama, we know, as humans we identify galaxies light years away and we can study particles smaller than an atom, but we still have not unlocked the mystery of the three pounds of matter that sits between our ears. So, he 2014 he started something called brain. Brain initiative, it is it is a acronym actually, all though it is fitted very well, brain research through advancing innovative neuro technologies. So, you can see this video it is available here, you should read this document, because this document is available I think P D F is form also in the internet, if you write barrack Obama (Refer Time: 04:47). Although it appears in saying innovative neuro technologies, it may appear as a if you

are talking about technologies, but it is a very. I think it is a good vision because just saw.

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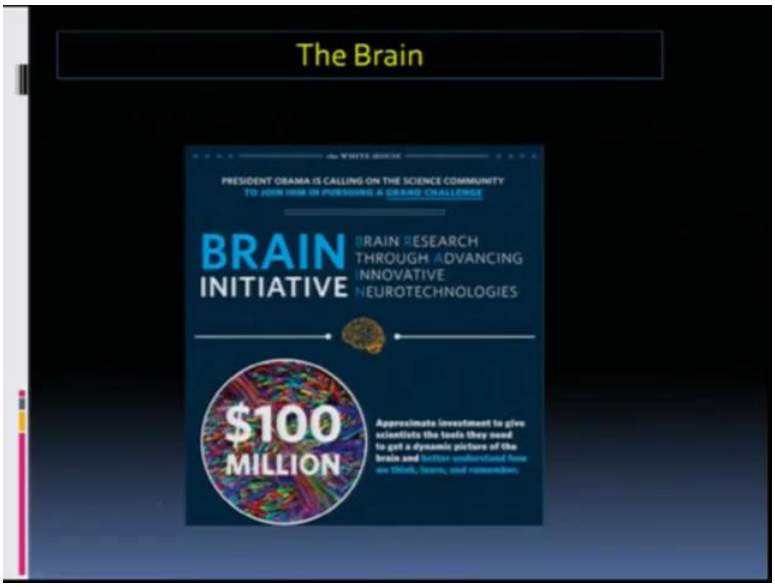

The shear expanse of it brain research through advancing, and a similar thing is going on china Europe, and this is the amount of money he has promised. Approximate investment to give scientists the tool, they need to get a dynamic picture of brain, and better understand how we think learn and remember. So, I told you it is not about the technology is just to (Refer Time:05:29) it or creates robots, and create artificial intelligence this is, also what is inherent in this whole thing, is this, you give the scientists a tool, they need to get a better picture of the brain.

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So, just break down the brain initiative, what are the intent. Generate a census of cell types at a very micro level right, lowers the scale. So, we know there are fifty, at least fifty types of neurons. we do not we do not know what all the do, and we have still not be able to, may be they are more, but this is what we know and they are many more glial cells in the brain, create a structural maps of the brain.

We will be started with the structure. Develop new large scale network recording capabilities. So, we are talking about the temporal thing. So, that is what I say how do you create a investigation which actually covers the whole brain at the same time, a tools for circuit manipulation. So, here was understanding, here we are poking the brain, link neuronal activity to the behavior, if you remember that I showed you that small scaled, and then where do you jump from transcortical to behavior, the whole envelope of behavior. Translation thing is still not; integrate theory modeling statistics and computation with experimentation. See how many fields are entering it to it, delineate mechanisms underlying human imaging technology, create mechanisms to enable collections of human data, and disseminate knowledge and training. So, I do not thing anything is left out, except for how to place brain in the universe.

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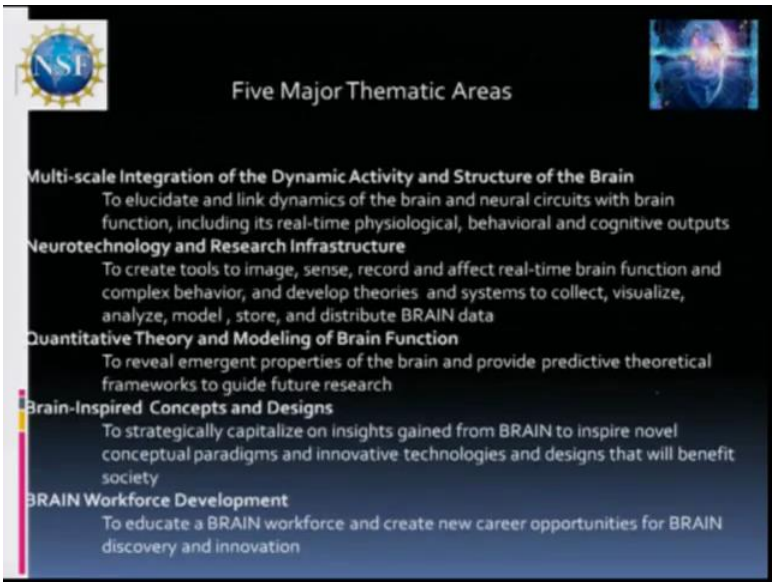

So, five major areas emerge out of this, and I think all country should do, anybody is capable of doing it is a multi scale integration of the dynamic activity and structure of the brain, to elucidate and link dynamics of the brain and neural circuit's with brain function. So, structure and function, including it is real time physiological behavioral and cognitive outputs.

Now real time is when it is just doing it. Suppose give, a as I said give a task and then do still becomes a bit off line thing. But when the brain is really doing, like when I am talking to you, or you are listening that is the real time stuff, and see the you need the physiology you need physiologists neuro technology and research, to create tools to image sense record and real effect time brain functions and complex behavior, and develop theories to collect visualize analyze modal store and distribute brain data, cogitative theory, brain inspired concepts and design, where is where all this new industry of a I and brain computer interface comes in, and work force development.

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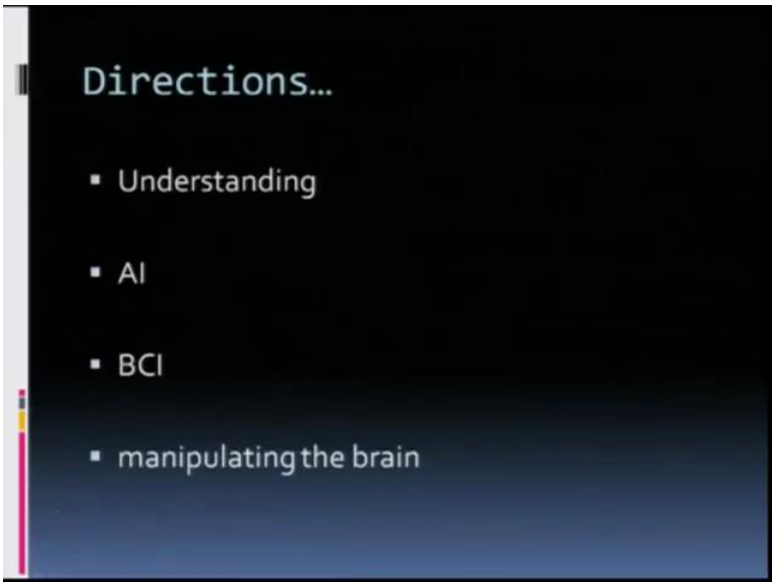

So, the major directions are; understanding the brain first, which illustrates the first three four, artificial intelligence, creating machines like brain, intelligent machines, still far. I think that, I mean just my thought is that, we have taken human brain as a model for artificial intelligence, because we know ourselves, we whatever we know ourselves, but if you may not be the machine which comes out will still be within the range of human mind. It may not be exactly be human, because if you look at the whole species, then there are other animals whose capabilities are much higher like birds, like dogs, who can sniff listen to higher frequencies. So, a perfect artificial intelligence will have to take that intelligence also, or the sheer force of an hundred eighty ton gorilla. Are we including all those things in the intelligence?

Then the machine would not, whatever machine we make will be not a human at least it will be something else. Brain computer interface is a new thing, which is essentially here to help patience with neurological disorders at this point, and to restore function to the normalcy, and then manipulating the brain. We are getting into poking the national evolution, mind mapping, brain computers, and brain prosthetic, brain interface automated testing.

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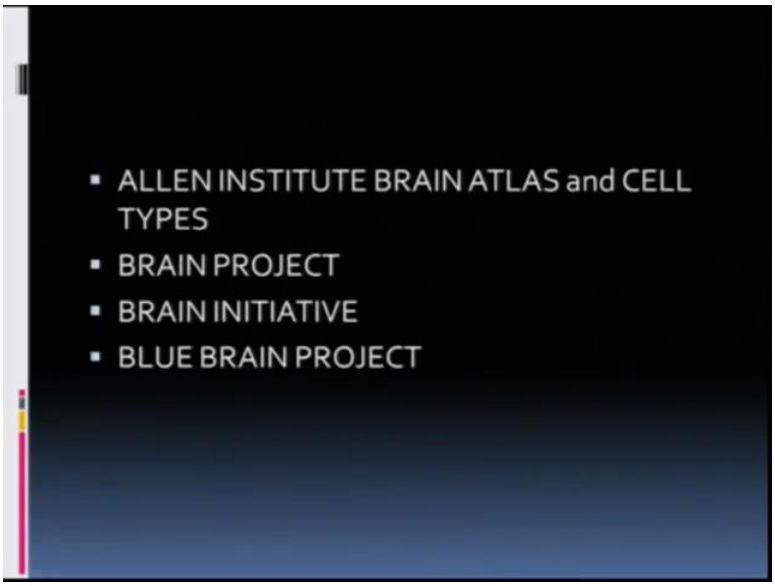

So, these are some of the places, and now lot of huge amount of data sharing lot of it is open domain now and. So, anybody can use. So, we do not have to reinvent the wheel, once somebody as achieved a certain point. So, Allen Institute brain atlas and cell types brain project, brain initiative, blue brain project, all this things we should, see the website of all this, and see the what type of work.

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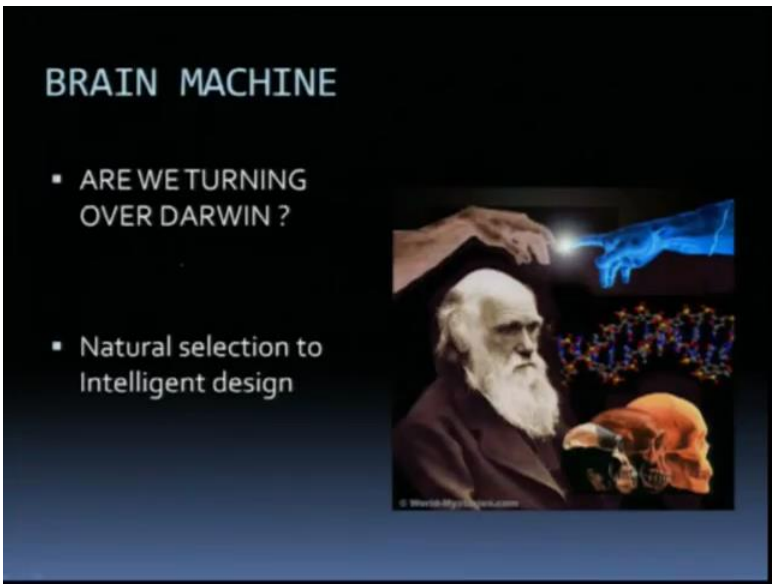

So, what are we doing are we turning over Darwin when I say this, let me ask, you a question you can answer it to yourself. Have you planned over millions of years become

like this? Did you plan that, fine I human beings are going to be like this, I done think. So, I do not think. So, we have till now, if you believe Darwin, is a best theory to understand. Till now we have evolved through natural selection, or the way evolution as taken us, till now, but now what we are doing, we are moving away Darwin. First time the complexity of brain has gone to extent, that from the wheel and from the tools and from fire, discovering fire we have reached a point, where we are trying to crate intelligent design.

Now, look at it, whether we were brought out of evolution, or god designed us, whatever we want to believe, we still have moved on in a natural flow. So, are we doing same thing what god did to us. We are trying to create machines, you ask anybody any young guy, and some of you may be working on it working in machine learning, and artificial intelligence and then B C I, they are really pumped up, which is fine, whether it should be. The question is they want to create a machine, which is as intelligent as human.

Actually the barrier till now is because we are still not able to know what thought and emotions are, but it is the smart thing, to have machine which is us. So, we are almost acting gods, trying to create intelligent design. When it will be created it will sooner later, whether it will be like us, whether it will like us humans or it will be something different, whether it will be a new species which we would have created, and whether it was a same qualities to fit in the nature or not, is something which we really do not know till now.

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So, what you want to become. you want to become like this some all powerful new homo species, really to drink water you do not have to move, you can just look at it and suck it, or have quality of birds and have the power of dog, to sniff to listen to all frequencies, and this is wonderful images somebody has made, I just borrowed it from internet, that all your connections are not, no more contained within the skull. It is like a huge connected thing, and your brain really connected to the whole cosmos, bioengineering.

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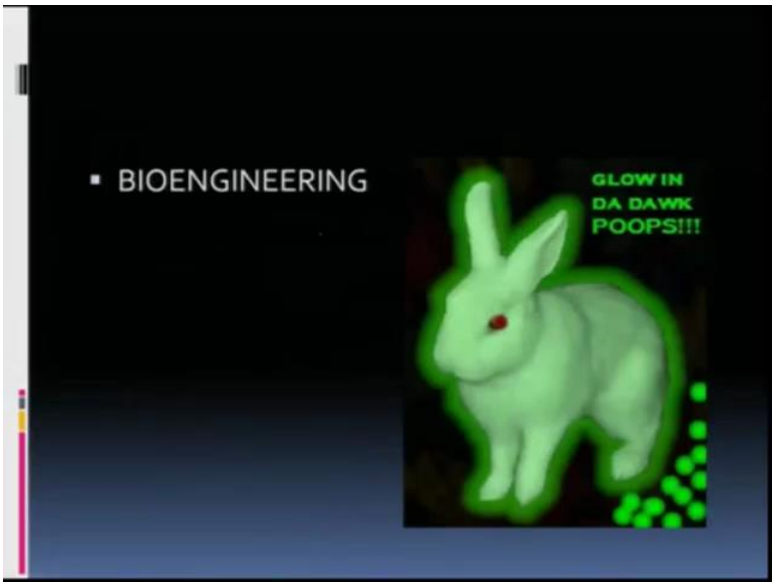

We all know, with gene manipulation, you can create the type of animal we want, is still

restricted to animals, fluorescent genpics, or cyborgs. We have our human bodies, and we have our wires connected to a huge large computer, or small computers, manipulated from their prosthesis may actually do it.

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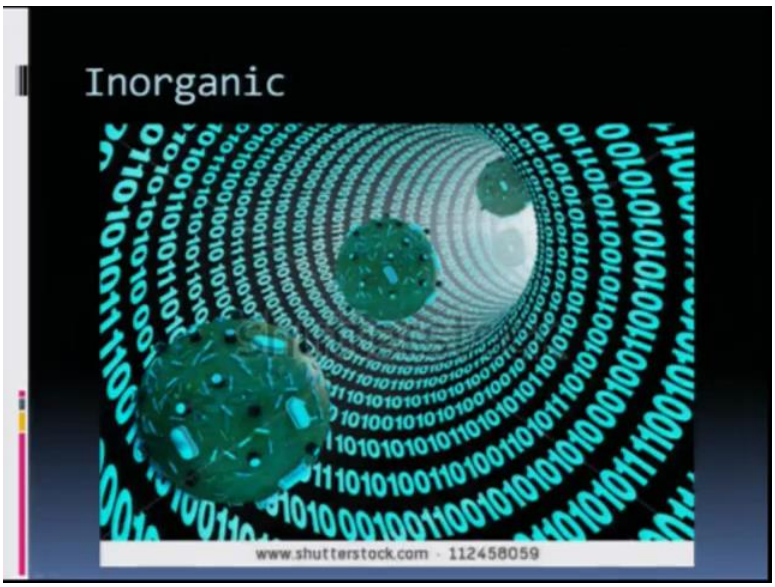

Or it is like you know virus goes in and then virus keeps alternating the genetics, we keep this digital viruses induce them in to the body, and really manipulate.

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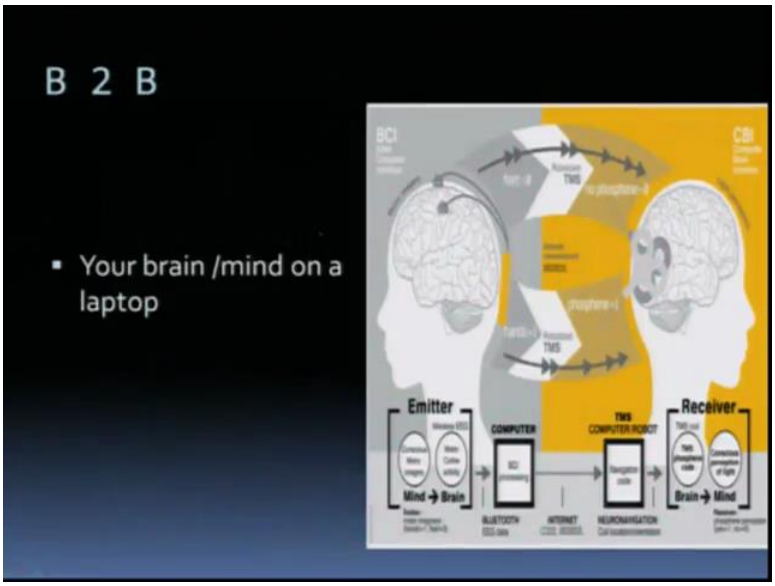

The latest experiments are trying to say brain to brain, you go to mythology Mahabharth and Ramayana all those epics, the people were shown to have capacity to communicate from mind to mind, or they would just close eyes and recite some mantra, and there would be an arrow in the hand. He is the other one person is thinking he can communicate. It may have been fantasy at that time. As I said the questions are the same may be the fantasies are also the same. May be derive our experiments from fantasies, because we really do not know what in our unconscious mind is really pushing. So, the latest experiments, say that a person is thinking at (Refer Time: 15:55) taken transferred to the computer to the other person. He also does the same action. There something called, you see this emitter wireless e g, conscious motor imagery motor cortex activity, it goes to B C I process through Bluetooth, or whatever technique, this is a internet code which goes to the navigation code.

Now, this is not transferred to the electrical signal, there is something called I showed you the when we were talking about a tools, there is something called transcranial magnetic stimulation, you put a magnetic field and stimulated. This part of this brain stimulation, is done by a pacemaker put in a disease called Parkinson's. This is becoming very popular in treatment in neurology, and all that you stimulate the do deep brain stimulation through magnetic field, and that cures you of depression from other illnesses. So, this same data is with the high fidelity transferred, to the receiver which was transmagnetic stimulation coil, and there is a conception here same, same imaginary

same areas.

So, we are trying to talk brain to brain through, and it has happened, the monkey, on a monkeys. It was done that U S recorded in monkeys and robots in japan, and this with the imagery, or every time this monkey reach for banana, this data was transferred through internet, and the robot also did the same thing, but this is still physicality, I still call it physicality about the movement.

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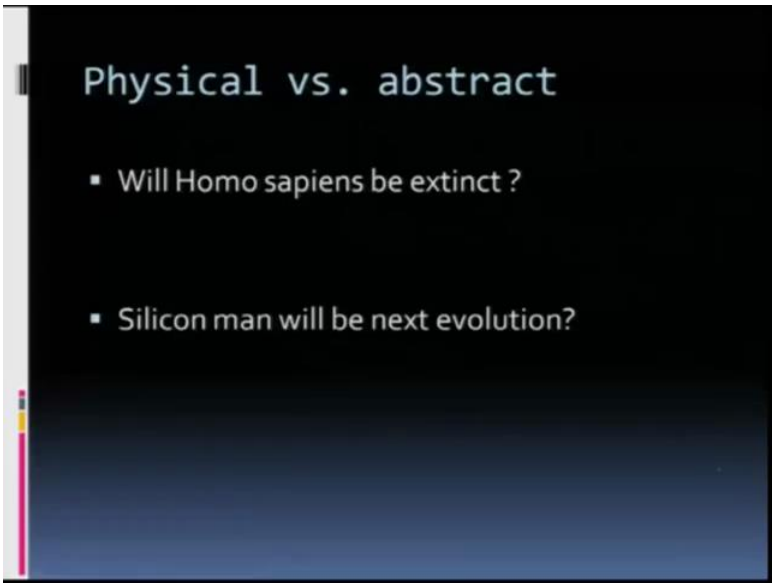

So, will Homo sapiens be extinct. The lots of anxiety in the world if you honestly ask, lots of anxiety, about the technology will really change our life, it will, but imagine. So, we will create a silicon man. So, seeing Hollywood films, you also have a fear that silicon man may become more intelligent than us. If it become more intelligent it will be uncontrolled, you have seen Rajnikanths film robot.

So, all this idea are actually simmering in the head of people, and whether Homo sapiens were really become it robots are also moving, or if not robots at least all of some silicon chip inserted into us. Where is the technology moving? May be some day we are able to digitize all your memory, all your feelings, whatever things are in your head in a small chip, and put it. So, that is you, that is you put it on laptop, anybody puts in a laptop or desktop, and all your, whatever goes into you is there. Now tell me, will that be you. So, the question is, what are you going to do with all this.

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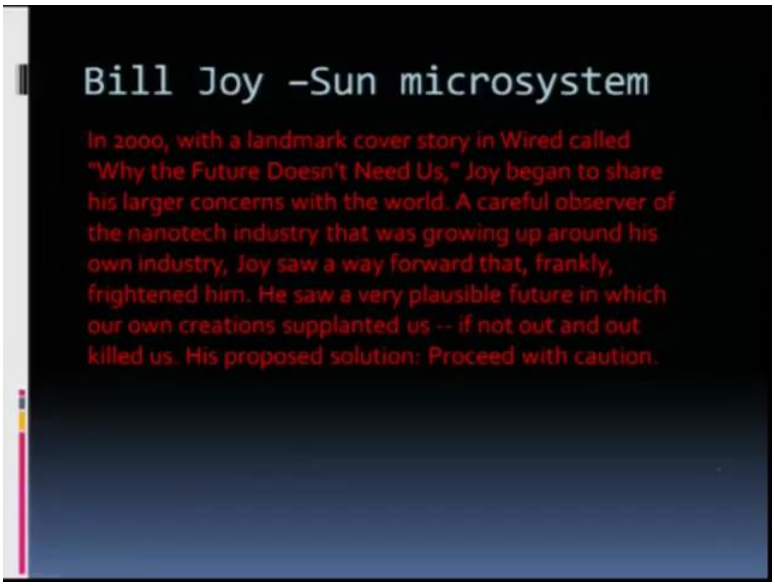

Bill Joy Sun Micro System guy, really created flutter in 2000. He said why the future does not need us, and he actually started to being to share larger concerns with the world, and he said that it was the way it is technologies happening, human beings will be not be needed. Our own creation whether other killed us or they would have replace this? I heard a young boy saying telling me then 20 years all medicine will be done by technology, by engineers, which is fine from the angle of technology, but then the big question is, what happens to the human interface, and the type of things which are happening; the apps for diagnosis for the systems, may be M R I comes in a form of mobiles someday, magnetic for clinical purposes.

We have already implanted a pace maker in Parkinson's disease, de brain stimulation is being used. So, lot prostheses which is being developed, for people who are having stroke, who have paralyses, they cannot move this, or people who cannot see, cochlear implant is one of the oldest thing which people who have congenital hearing problem in the in the inner brain, you put a cochlear implant and train it, but still you have to train it,. if you put a cochlear implant it just automatically starts functioning and the person can ear, we still are far away from that, we are far away from that point, where we put a intervene put something, and the person is back to normal see and hearing and all. You still have to put cochlear implant train.

In Parkinson, because the deeper and conscious process decision making a movement

deep train stimulation does. So, a reflex action or a movement, which goes from the will to move, excites the motor area. The motor area sends signals to nerves to muscle and you move. A person who gets paralysis, and the nerves signal are not going to the muscles to move, it is a engineering issue. Lot of things the brain, and lot of intentions of the initiative of changing, using the brain signal and understanding to convert it into utilitarian stuff, is actually a engineering problem.

So, I will to move my right hand. So, my left hand motor, left motor area gets activated, but I cannot move my right hand, because of the paralysis; so the signal which comes. What is the signal? Signal is E G. So, we have the corresponding signal of each action catch that, transfer it to the chip to the arm which is fitted here, all those optical things or the fibers takes the signal, and something is fitted over by hand and it moves, I can move. It is just a mechanical thing something is closely fitted, the mechanical thing moves my finger also move, these are wonderful things.

They do lot of rehabilitation and all the disability, but that is the neurological physical part of it. What about disability of dyslexia. Whether pattern, visual pattern of words is not being formed, and when the kid writes he cannot spell it correctly. This is a deeper network problem, which will not get so easily, stimulated or done by. So, what I am trying to say, this physical movement and sensation is fine, but is it possible that I take e g from your head, and just give you and say what word is this.

We still not reached there, what is your the kid is just not looking at the face of the mother or smiling, schizophrenia, what is happening in the network. Lot of stuff in psychiatry, because that psychiatry falls in the purview of brain, in behavior and abstract thought and emotion, physicality wonderful, physicality I am sure it is happening and could change. Where is the mind, but in all this. So, we are talking about brain and signal.

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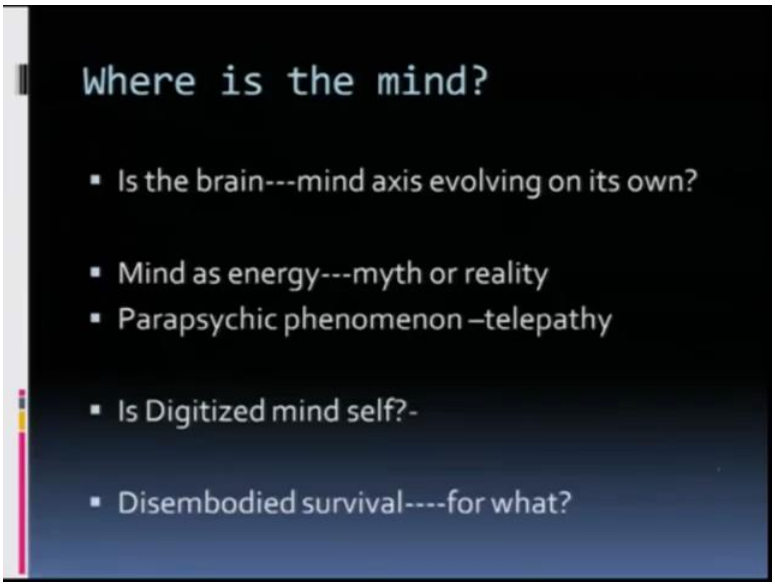

What is the mind doing, while the problem with studying the brain and mind is that we are trying to study brain and mind through itself? So, do we think, although natural evolution is seen in millions of years, do we think while we are trying to do this technologies stuff, for is (Refer Time: 24:07) thing, mind is also evolving possibly. So, is it a race between technological, artificial, new type of humans, and the natural evolution of humans, brain is doing something, brain must be doing something. Is it evolving on it is own. So, mind as a energy if you talk of it, like it you should talk of telepathy and all, and that is why I asked you where is the position of mind in the universe.

Is it a pure energy system and it is communicating? We still do not have tools to you. Otherwise even if you know mirror neurons, that the times you do not even see stimulus and you can feel about the other person. Is telepathy real? Para psychic phenomena, as I said, and as I asked you. If I give you a whole cell phone this will be you, can you just download it and say this is me, will be what happens to yourself, it is a big question disembodied survival, fine I give you everything on a digitized thing and really pass it on to you, and you can pass it to your grandchildren.

So, what will happen, your grandchildren after many years, just as I we want to remember our grandfather, they take a chip plug in all the digitized thought this that everything comes in. So, what is going to happen? Disembodied survival, if you remove yourself from your body and mind and context, for what one, once again why do you

want to survive, so long lot of this race, because we need to live a good life, illness free, but on the other hand if you look at the society, and the complexity of the world illness is also increasing. They there is no respite, in spite what we are trying to do is one side illness is complexity of illness increasing, and the other side increasing technology to counter it. Drugs on the other hand, whole pharmaceutical industry is trying to create more, and someday will affect gene; maybe the gene which control brain, gene which controls neural development. All is the race for what for survival; gene is already doing it for survival. I think we are it is a natural animal tendency to be immortal. Everybody wants to be there for always, but nature is not working like that, nature has it is own resources then it will create it is own crises, but personally if you ask me, I will get very bored if I am immortal.

What you want to see, or may be as (Refer Time: 27:00) says that take a digitized data, earth is getting very crowded, put you all your data everything on a laser, ride it over and send it to some other planet. You will be surviving somewhere. Whether you will be surviving somewhere that is it makes some sense, it has some value or it is just the power of being able to do it, or it has some really utilitarian value. These are the some of the ethical questions, which I am sure time will answer. There is no projective answer for it, it can go both the ways, can go both ways. So, we can be as mobile as shown. It will be interesting to see in coming few years your mobile internet have been there in public use for just 20 years now, 20, 21 years.

Mobiles must later, but it has already altering the attentions span, already the bottle like brain is attention. It is still getting future compelled with all this unnecessary information flowing in; people are not able to stop it. It is interesting to see what technology will do to the evolution of the brain, and what brain does to the technology. It is just a passing far or it is permanent is a something which your kids will have to answer. And I hope some of you will pick up ideas from it, and go further. So, thank you very much for being patient to listen all this. And hope you did enjoy this course.

Thank you.