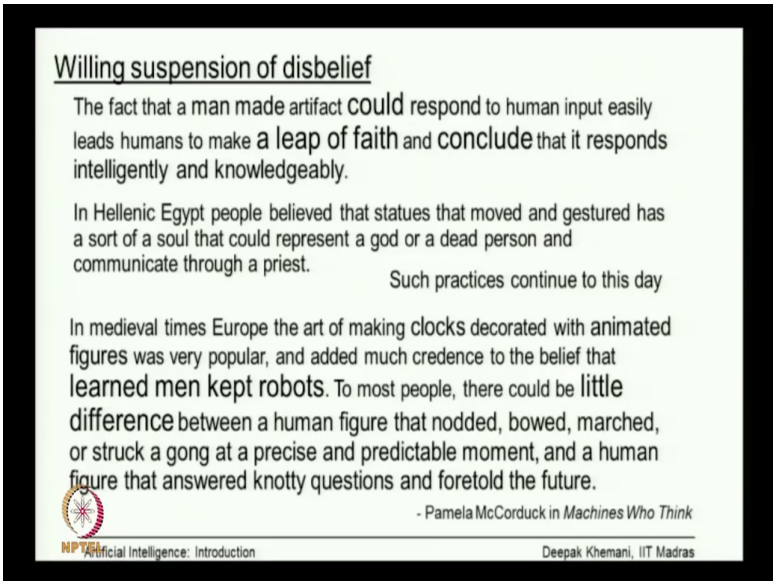
Artificial Intelligence: Search Methods for Problem Solving
Prof. Deepak Khemani
Department of Computer Science & Engineering
Indian Institute of Technology, Madras

Lecture – 07
Introduction (2013)
The Willing Suspension of Disbelief

Difference, between what can be and what appears to be essentially and human beings have a tendency, we have we are willing to suspend our disbelief essentially.

(Refer Slide Time: 00:26)



We are willing to watch a James Bond movie and believe that all that is happening is possible and all kinds of things essentially. So, the fact that a manmade artifact could respond to human

input easily leads humans to take a leap of faith and conclude that it responds intelligently and knowledgeably. Throughout centuries, we have been doing that essentially.

So, in olden times in Egypt people believed that statues which moved and gestured had a sort of a soul and they could represent a god or a dead person and communicate through a priest essentially. So, I said olden times Egypt; but even today, you can find in our country this sort of a thing happening. Now, you have people who eat tea leaves or people who communicate with your ancestors or people who go and get their fortunes foretold by a parrot, who pulls a card out of a bunch of cards.

So, we do it all the time and we believe; well, not everybody, but we mostly believe that this is possible essentially. Such practices continue to this day essentially and in Europe, there was a great fascination for such moving figures, moving automata or you know statues which could move around and shake their heads and so on. So, Pamela McCorduck writes in her book machines, who think that in medieval times art of making clocks decorated and animated figures was very popular essentially. So, if you go to Germany, you can still find them.

For example, in clock towers, when its 12 noon, suddenly there is a lot of music and some statues come out and do something and go back in that kind of stuff. So, it was popular in medieval times that learned men kept robots essentially ok. By learned men, you know society was not very as egalitarian as it was now, there were the kings and there were the peasants and there were the learned men and there were the traders and the warriors. So, there were classes of people, in that learned men kept robots.

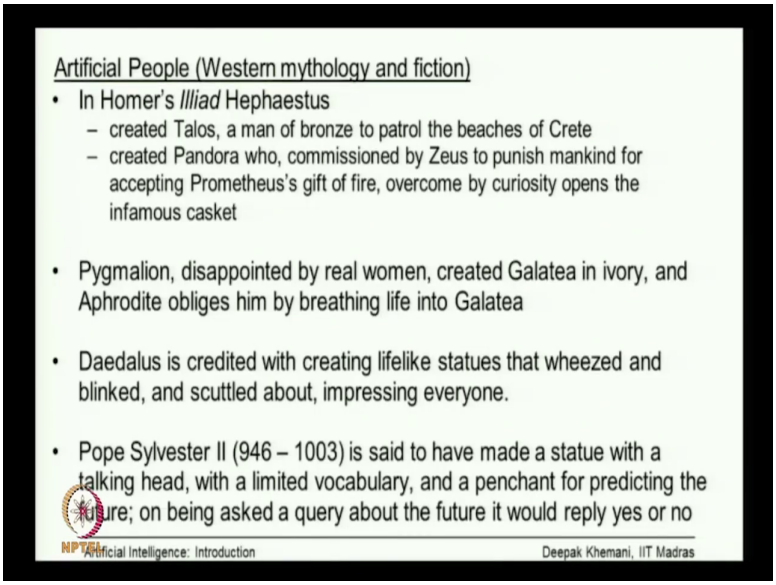
And most interestingly, to most people there could be little difference between a human figure that nodded, bowed, marched or struck a gong at a precise and predictable moment which is entirely feasible. You can construct machinery which is accurate and we know that such machinery exists.

So, between such machinery and a human figure that answered naughty questions and foretold the future. So, for us, there is no difference. If you can construct a statue which can nod its

head and we ask a question and it nods his head, we are willing to say that yes its understand what I am saying and its telling my future and you know that sort of a thing.

So, in a study of history that we are going to be doing, there are going to be two strands; one is this mechanical side of talking statues, moving statues and things like that and the other is going to be the philosophical side which is about, what is the notion of the mind; how did the notion of the mind come you know I am, so those questions will come to a little bit later.

(Refer Slide Time: 03:53)



Let us first address the mechanical side of things essentially. So, all this is happening in Europe, we have this notion of artificial people in Homer's Illiad Hephaestus is supposed to have created this Talos, a man of bronzes to which would patrol this which is of create.

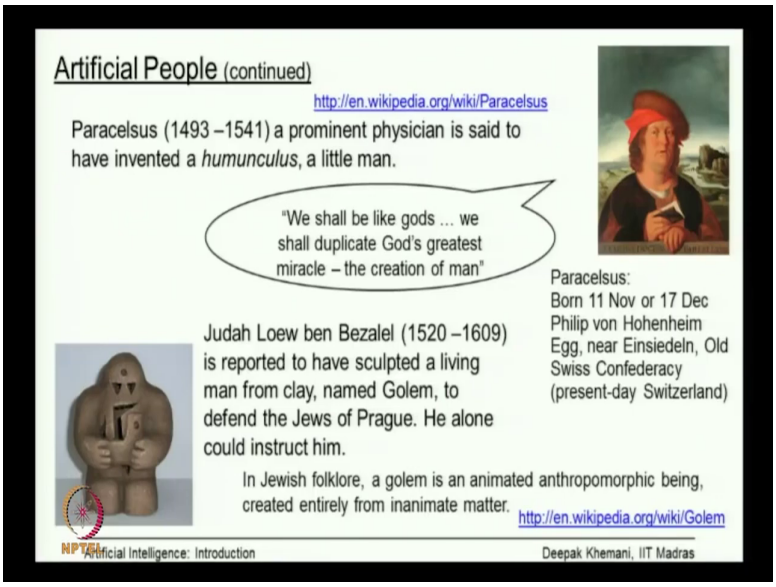
Hephaestus also suppose you have created Pandora, you might have heard about Pandora, who commissioned by Zeus. So, Zeus was a god, to punish mankind for accepting Prometheus's gifts of fire and Pandora is supposed to take that casket, but he is so curious about it, let he opens the casket essentially you know and let us lose the evils into this world essentially.

Pygmalion remember this, Bernard Shaws play called Pygmalion in which there was a character called Eliza, which was the name of the program written by Weizenbaum. Pygmalion also was a mythical creature who was disappointed by real women and created Galatea in Ivory and Aphrodite who was another god. So, the Greeks also had many gods like we Indians have you know Gods for doing different kinds of thing. Obliges him by breathing life into Galatea apparently, he fell in love with his own creation like in the play.

Then, Daedalus, you must have heard about more well known for his artificial wings. He was he wanted to fly, but he was also create credited with creating lifelike statues that wheezed and blinked and scuttled about impressing everyone. So, this is a important thing.

The statues which could seem to be autonomous and if you are autonomous, you must be intelligent essentially. So, that is a leap of faiths that we are making essentially. Then, about a thousand years ago, Pope Sylvester is said to have made a statue with a talking head with a limited vocabulary and a pension for predicting the future. So, that is why people are willing to believe that this talking head can tell your future and on being asked a query, it would reply yes or no by shaking its head essentially.

(Refer Slide Time: 06:15)

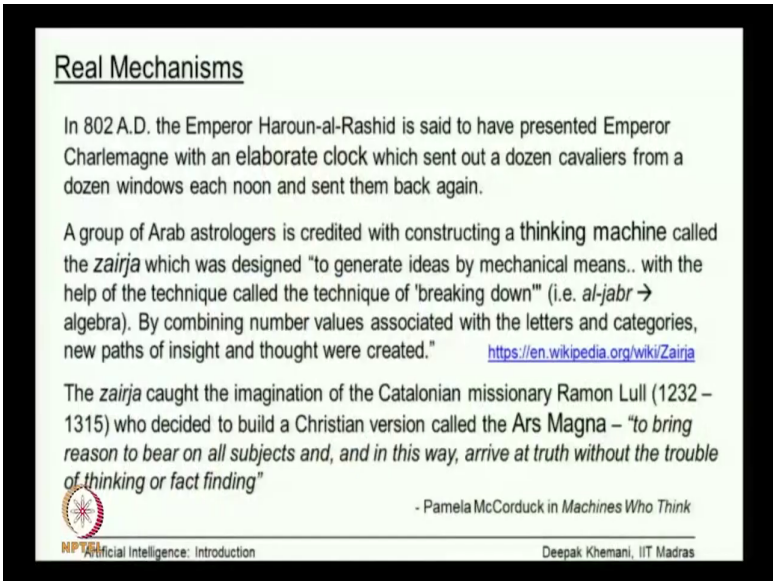


But all that is in myth essentially. There is some more mythology Paracelsus was a physician, who lived from 1493 to 1541 is supposed to have created a little man called humunculus essentially and he made this statement, "We shall be like gods we shall duplicate God's greatest miracle - the creation of man" essentially because in western thought, we have been created in the image of god himself essentially and so, we can be like him and create creatures in our own image. So, to speak essentially.

So, he lived in Switzerland and Rabbi Judah Loew Ben is supported to have sculpted a loom human a living man from clay and he called it Golem, to defend the Jews of Prague. So, in Jewish folklore, a golem is an animated anthropomorphic creature made out of an inanimate matter. So, that is a kind of image the kind of creature, he is supposed to have created

essentially. All this material that is available in Wikipedia and I have given all the references from, where I have taken the images.

(Refer Slide Time: 07:27)



So, let us talk about real mechanisms or some of them were mythical; of course, we cannot imagine man made of clay which could do all this sort of thing. But in parallel real machinery was being created essentially. Some of these ideas came from the East via Arabian countries and in 802, Haroun Al Rashid, you know we heard his name in other contexts as well is said to have presented Emperor Charlemagne with an elaborate clock which sent out dozens of cavaliers from a dozen windows each and back again.

So, this is the kind of clockwork which if you go to Europe, you can still see now essentially in the town hall or city centre, we have this sort of machinery still operating. Then, a group of

Arab astrologers is credited with constructing what they called as a thinking machine called the Zairja which was designed.

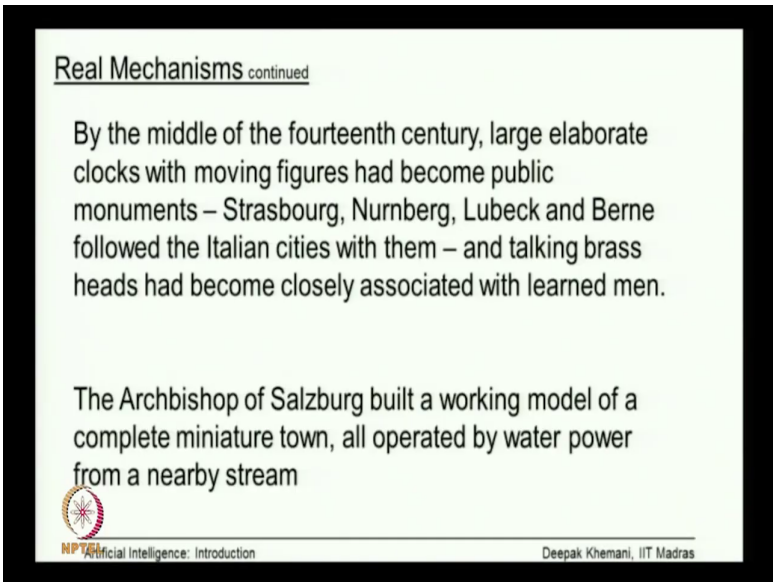
So, it was a collection of rotating disc you know with markings on them and if you rotated the disc according to some input information, you would compute something. But their notion was to generate ideas by mechanical means with the help of a technique of breaking down called Al Jabr which as some of you know is a root for the word algebra.

And by combining numbers, values associated with letters and categories new paths of insight and thought could be created essentially ok. So, this fascination of autonomous entities, autonomous machines which are thinking machines goes back a long time essentially. So, this Zairja caught the imagination of a Spanish Catalonian missionary called Ramon Lull and who decided to design a Christian version of it which he calls his Ars Magna and he said the goal is to bring reason to bear on all subjects and in this way arrive at the truth without the trouble of thinking or factfinding essentially.

So, one thing when you look at the quotations from these times, you must remember that some of the meanings of the words are a little bit different from what they are now essentially. For those of you, who have read Shakespeare, for example would know that Shakespeare's English is a little bit different from ours English and our English, we need to understand things essentially.

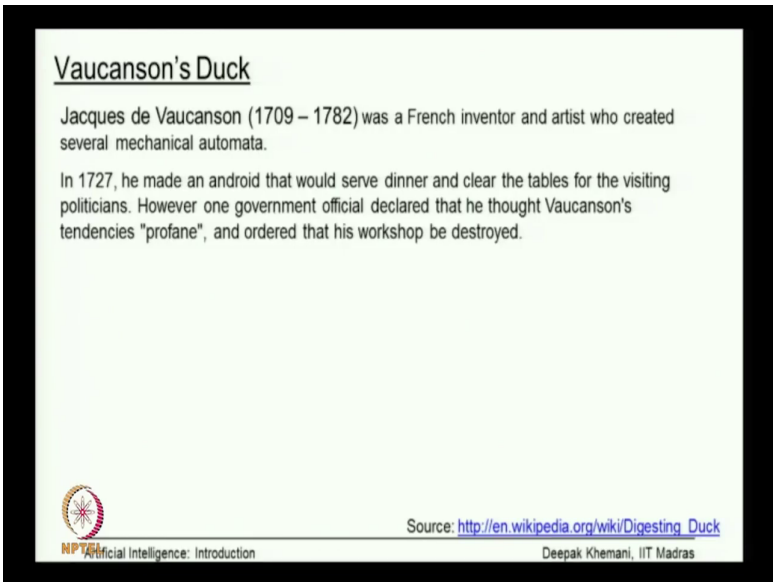
But this notion of arriving at the truth without the trouble of thinking or fact finding of course has been fulfilled now with programs like Google and so on. You just have type in something and you get an answer essentially right.

(Refer Slide Time: 10:21)



So, by the middle of the fourteenth century large clocks and figures became popular in many areas of Germany and Italy and talking brass heads became closely associated with learned men again essentially. The archbishop of Salzburg built a working model of a complete miniature town driven by water power essentially, operated by water power from a nearby stream essentially.

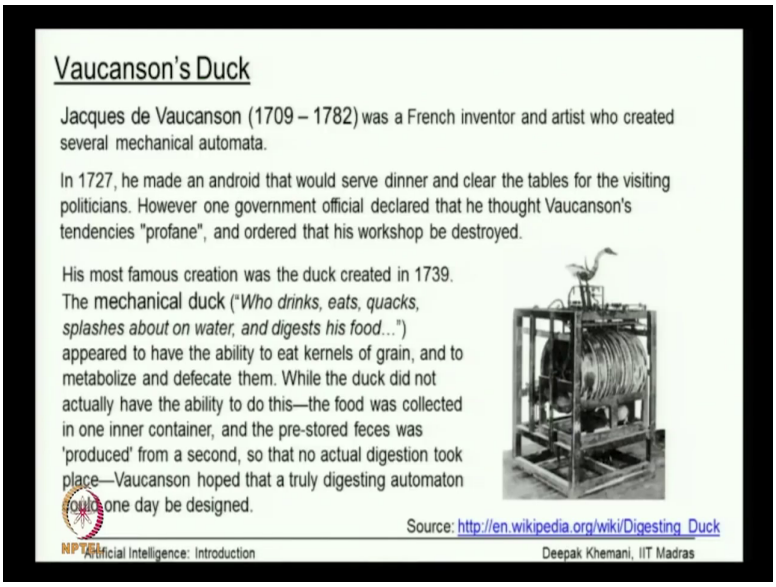
(Refer Slide Time: 10:52)



So, one or two more examples. So, Vaucanson's duck. So, Vaucanson; so, he keep note that yes, so this was he was he made this thing in around 1730 or something like that which is quite long time ago. He was a French inventor. So, one he is credited with having made an android which could serve dinner and clear tables for the visiting politicians. However, one government official declared that he thought Vaucanson's tendencies as profane and ordered his workshop to be destroyed essentially.

We will see later that this kind of political oversight has influence European thought quite a bit political and religious social. So, for example, Copernicus and Galileo and all these people were sort of worried about putting forward their ideas about what the world is really like.

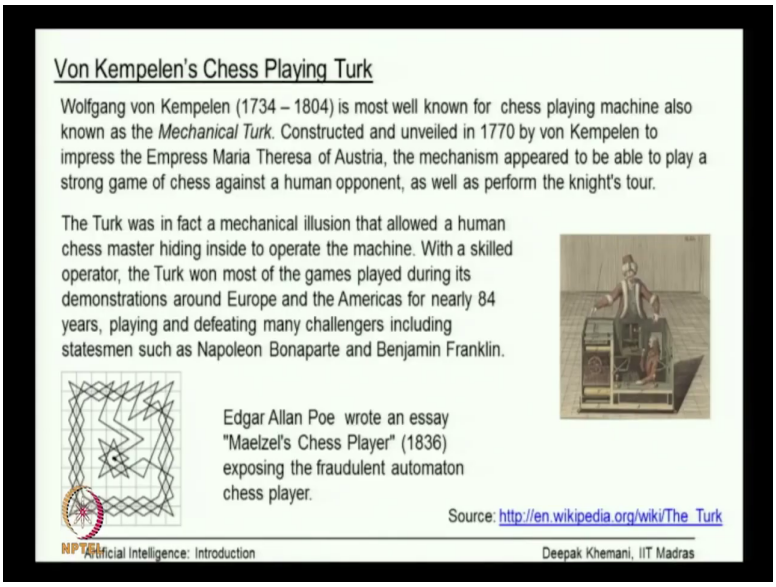
(Refer Slide Time: 11:55)



So, he created this his most famous creation is his duck called the mechanical duck which could appear to be drinking, eating, quacking, splashing about in water and digesting its food essentially and became very famous 1739 and there is a image of the replica of this duck which is lying in some using museum somewhere.

So, of course, in real life meaning in the actual duck that he created, it did not have digestive abilities. The food was actually collected in the food that the duck was supposed to be eating was collected in one container and a the output was sort of pre stored and sent out from another container. But he was hopeful that a truly digesting automaton could one day be designed essentially.

(Refer Slide Time: 12:51)



So, this fascination with machinery is that is what we are trying to look at essentially. Another very famous example is this Chess Playing Turk by Kempelen Wolfgang. Kempelen 1734-1804, he created chess playing machine known as a Mechanical Turk constructed in 1770 to impress the Empress Maria Theresa of Austria and the mechanism appear to be able to play a strong game of chess against human opponents as well as perform the knight's tour.

So, you must be familiar with the knight's tour on a 64 board chess square, can you move a knight to cover all the squares exactly once and the figure on the bottom is a knights to a apparently created by the Mechanical Turk, looks quite a aesthetic figure to me. I think you might have written a program to create a knight's to a at some point.

Now, this was a automaton which compellent took all over Europe, he impressed napoleon and other people beating his general a chess and here is a picture of the automaton. You can

see it essentially maybe I should have made it a bit larger so if you look carefully, you can see that inside this box was a human chess players sitting this. So it was really a hoax essentially, but it was not discovered for a long time essentially and it travelled for nearly 84 years Europe and America beating all kinds of luminaries at chess essentially.

It seems Edgar Allan pole wrote an essay trying to expose that this chess player cannot be a real machine ok. So, let us move on to more useful things. Mechanical arithmetic; can we make machines which will do arithmetic for us? So, Pascal of course, you are familiar with as students of science in various places, Pascal's name is appeared; not least as a programming language, name of a programming language.

So, he invented a mechanical calculator using something called Lantern gears which we will not go into and he tried out 50 different prototypes before presenting his machine in 1645 to the public. It was called Pascaline or Arithmetic machine or Pascal's calculator and it could add and subtract 2 numbers that was its limits of his mental abilities and multiply and divide by repetition essentially.

(Refer Slide Time: 15:37)

Next

Machines with Gears and Wheels