Lighter-than-Air Systems
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Lecture -10
Historical developments of LTA systems, Part-I

So let us start today's talk, good morning and welcome to all. Today's lecture is basically rooted in history. We have lots of lessons to learn from history and we will look at the historical perspective of our LTA systems. The aim of this particular talk is to give you an exposure on how this technology started off, how it reached a peak and then there was a period in which there were lots of negative views about LTA systems and then bounced back recently. So, looking at the historical data available. One can classify as five main periods.

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Now, there is no reasons for classifying in this manner and I am not historian as you know. I have done this only on the basis of certain interesting events that took place. So from ancient ages to the First World War, where is the first period which is a very long period as you can imagine. And then between the two wars there were certain things that took place certain motivations were there to evolve this technology.

During World War 2 there was some applications which were very unique, after that technology went into a kind of hibernation. So from 1940 to mid 80's there was not much happening. But then it bounced back in the mid 80's due to a very interesting project. And then from now on it is again up on the rise, and that is why we are actually having this course. So let us look at the first period.

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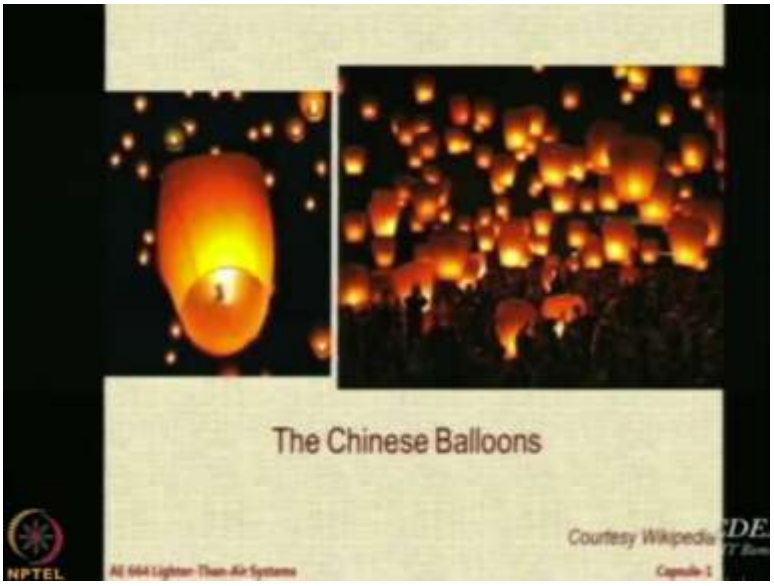

The first period started with the Chinese balloons. And all of us were aware of these lanterns, we see them in all festivals, including indigo type fest. There have been many instances when these lanterns have been lit up in the sky. This is the most primitive LTA system. So it all started.

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The first known LTA system if we forget about historical and you know unproved or undocumented information is the Chinese Lantern. And the main application that they found for this was to use it for signaling during a military operation. And then the Mongolians have used it in some kind of a battle in 1291. So that is how it started.

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Now we will try to trace the historical developments of LTA systems using this map of the world and also the map will change slightly as the history progresses. But barely speaking this is the kind of map from 1912 approximately we use it for our explanation. So you see that there is British Raj in India. So Pakistan, Bangladesh, Sri Lanka and India are all under the British raj there.

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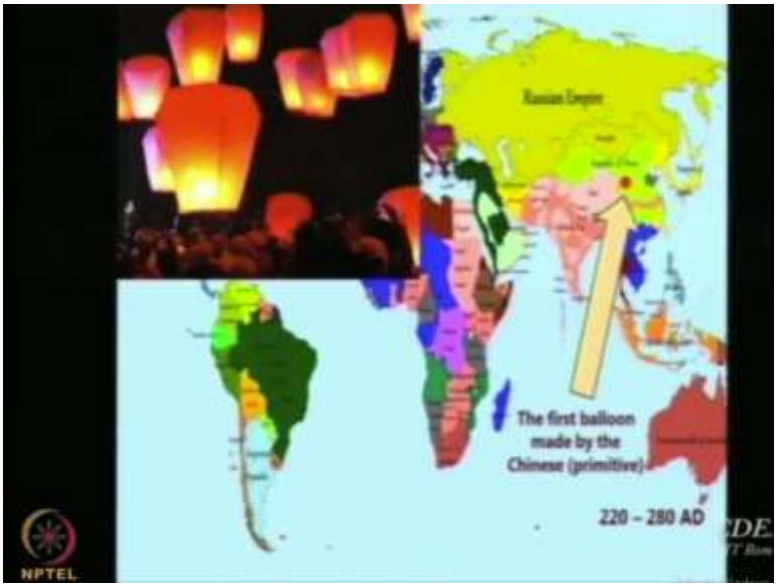

So this is what was primitive to 220AD to 280AD.

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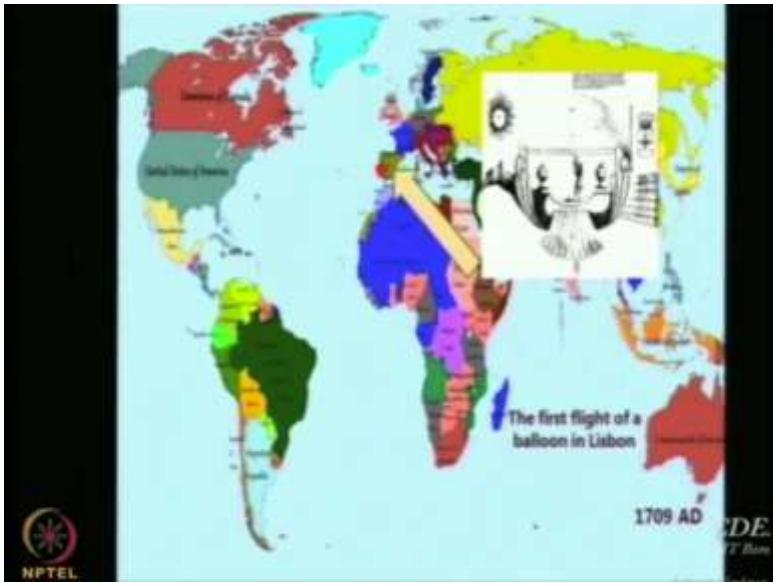

After that the first recorded flight of a balloon was made in Lisbon, Portugal.

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So what happened is that there is Brazilians Portuguese priest and he did this flight in front of the king. The maximum height achieved was only 4 meters. And this was nothing but a paper balloon. But please understand, even today to make a simple paper balloon filled with hot air and to make it rise 4 meters, it is not a simple task. I am going to challenge you in assignment very soon and you realize then what seems really simple is not actually that simple. Anyway, this is, we have this first flight of a balloon in Europe.

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And then our friend Henry Cavendish discovered this gas called hydrogen in 1766. And people realize that apart from being highly combustible, this all this gas also is much lighter than air. And therefore it can be used for some meaningful purposes.

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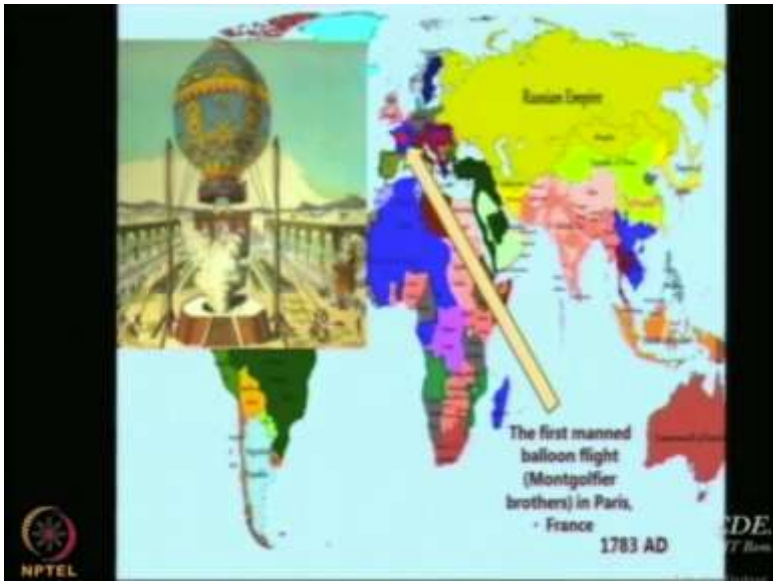

So in 1783 we had the first flight, as we all know from our school textbooks of the manned balloon flight. But interestingly the first flight ever was not a manned flight. Perhaps they were too scared and unsure whether it is safe. So it is said that they took a duck, a rooster and a pig and put it on this balloon they have no wife, they have no I know they had no choice and it raised up when it went up successfully, this seems to be safe.

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So when we had the manned flight, which was in 1783. This was done by two brothers, the Montgolfier that is what we call them. And interestingly the balloon was made in paper and the gas used was hot air. So this was the first hot air balloon in history which carried human beings. This is 1783, many years after hydrogen has been discovered. But the causes of combustion of hydrogen people were worried whether we can use it. And even now people worry whether hydrogen can be used as a lifting gas for manned carrying applications.

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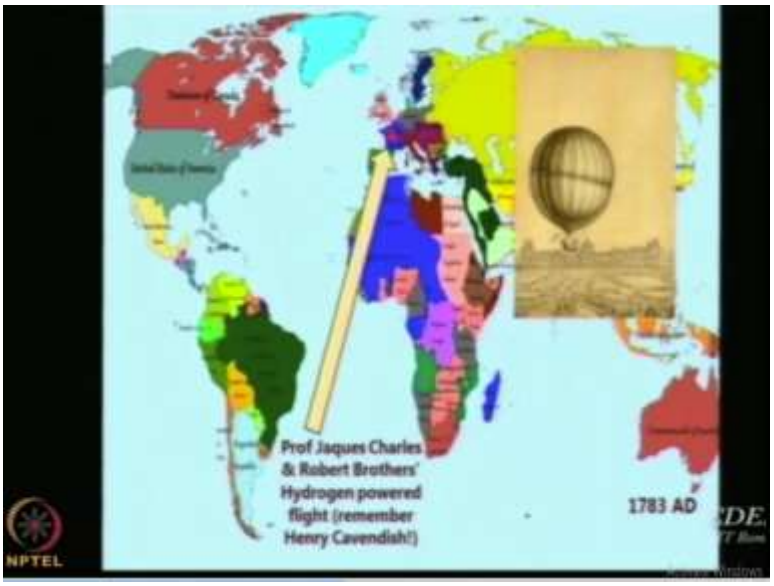

So, just 12 days after the first manned flight with a balloon, that was a Jaques Charles and Robert Brothers, what they did they use the gas discovered by Henry Cavendish. So history has an

interesting information that something like one point five times of Sulfuric acid was poured over above 4 times of Aluminium or Aluminium oxides or some such compound or maybe metallic compound.

And the gas so produced was used to fill the balloon. But unfortunately the gas was hot when it was produced it became cold very soon. So there were issues in getting the lift.

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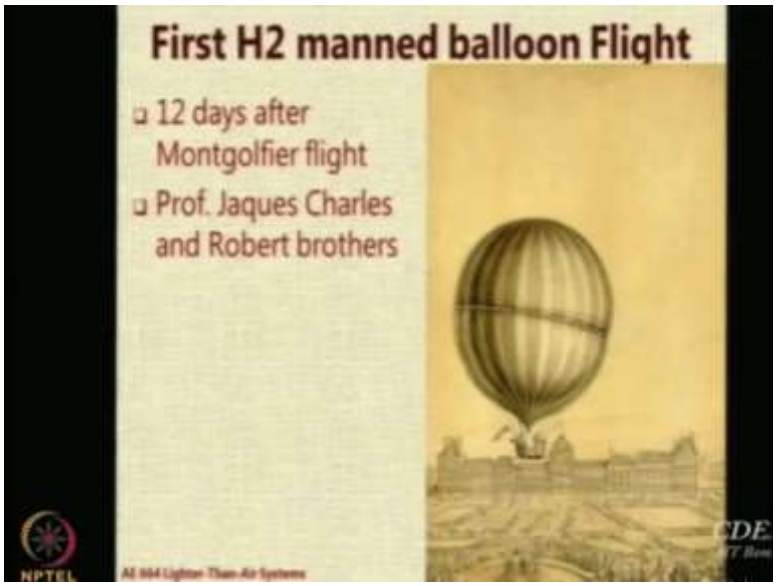

Finally it did succeed and we have this bag filled with hydrogen carrying human beings.

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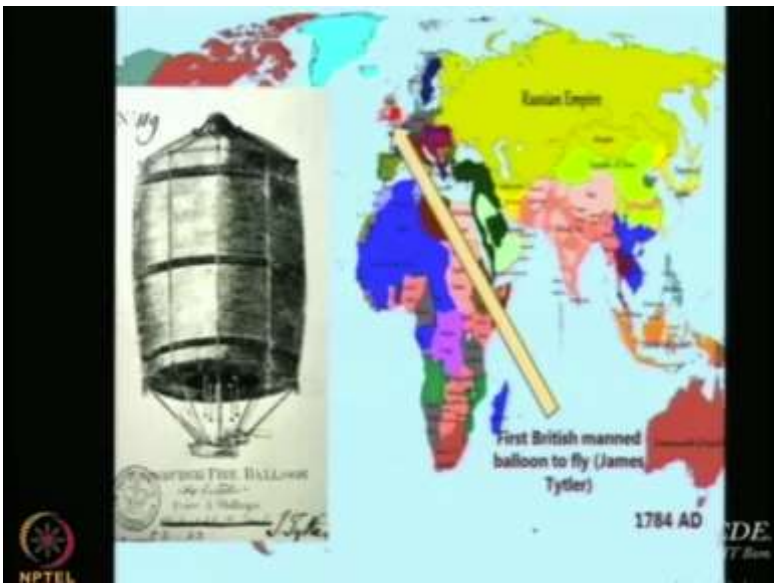

Now, let us move on to England now. This happened in France and as you know, there is a very strong rivalry between England and France which is driven by technical development since many, many years. So, therefore these rivalries took place also in the area of LTA systems. So soon after the next year a Britisher created a balloon to fly in England.

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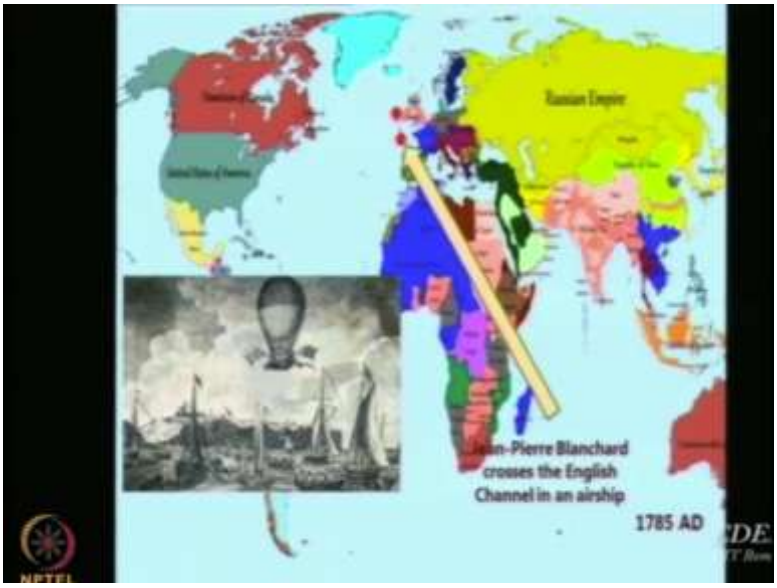

Then we had another Frenchman Jean Pierre Blanchard. He is going to be appearing in a few more slides in the future. He is an interesting character very adventurous person did a few things. So doing that time, one of the biggest challenges for human beings was to cross the English Channel. Just 24 miles distance between England and France. So now we have built challenge available below the ocean to continue to connect these two countries.

But at that time many aviations were first scored across the channel flight. So there was a challenge and Jean Pierre was able to meet the challenge by doing across the channel flight using a balloon. And as you can see this is a hot air balloon because there is a throat on the bottom, which is open.

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And then we also have the first Aviation disaster very soon. Aviation has a very bad name for disaster. But if we start looking at numbers you actually find statistically aviation is quite safe, nevertheless it makes news. So in this case, now can you guess where this took place by looking at the flag? It is not Scotland, it is Ireland. It is not range also, but the arrow is pointed slightly below the location but I thought the flag will give it away. It is Ireland.

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So this took place in 1785, just you know, two years after the discovery and the first manned flight, we had the first disaster in which a hot air balloon caught fire. Interestingly it is not hydrogen to be blamed here, it is hot air. And this happened in Ireland in a town called Tullamore and this fire

was so fears that one hundred and thirty houses were burnt down and this whole town was damaged.

So this town which is a part of Ireland. Ireland as you know, just next to the UK or actually part of the northern island is part of the UK and this was the town in the middle of Ireland which had the first aviation disaster.

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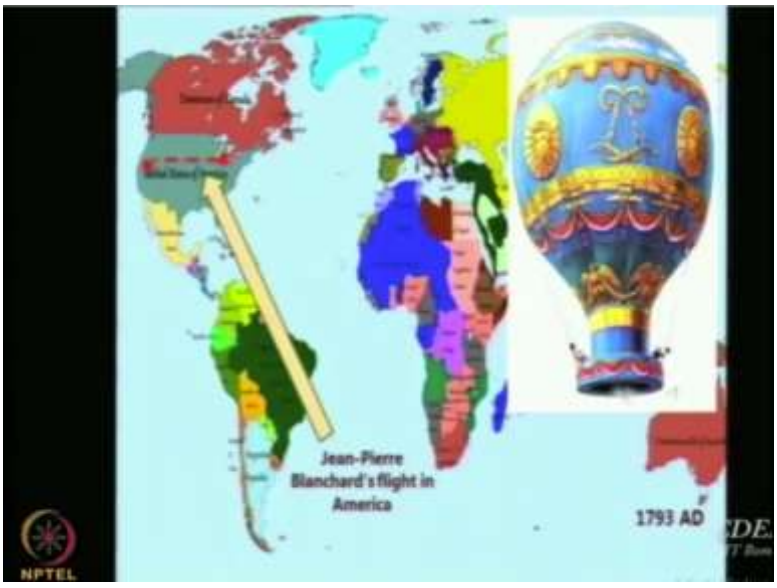

Then the same gentleman Jean Pierre was also instrumental in bringing LTA systems to USA. So he did a kind of trans American flight in a hot air balloon, and with that the technology started travelling to other countries.

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So he is our friend was crossed the Atlantic Ocean to America and then flew within America. He also was an instrumental in using an IC engine for the first time. Before that people were trying to use small steam engines to produce the required thrust force. He was the first to use IC engines. But many years later, no not in the balloon, he just crossed the ship. But very good question, it shows that you are attentive and listening.

Because history can be little bit boring, but I just want to make it interesting looking at the timeline and seeing history how the technology is progressing. So he did not travel across the Atlantic Ocean using a balloon. But within America he is able to travel across.

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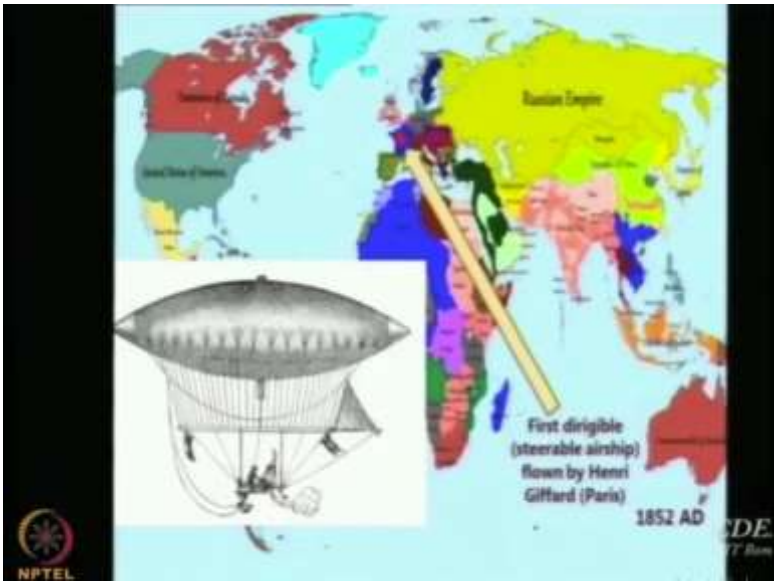

Then we will look at the first airship. People have gone around the world there was a competition and our friend Richard Branson also took part in one competition. But this record was broken very recently there is a very interesting documentary on discovery which talks about around the world flight on a hot air balloon. So now it is possible to fly. But it is possible to fly because of technological developments, not that much in the area LTA systems.

Can you guess which technology enables people to fly across around the world with hot air balloons today? GPS is one thing yes, GPS will give you where you are. But GPS will not enable you to do something. Not that much, no it is a hot air balloon it is not going to be propelled. Yes, that technological development in weather forecasting. It is said that they had developed a mathematical model which can predict the wind at any place in the world with thirty six hours in advance.

Very accurately, they could predict for a long time, but very accurate predictions for thirty six hours forecast and that information is not publicly available and it is a very valued secret. So what they did is they were able to go around the world purely by controlling the flight of the balloon, so that they would put it in the right wind pattern because it is all driven by wind. So other things are also very important.

Including a capsule to keep the people protective from the atmospheric conditions at their altitudes, they actually want to hit the jet streams and then be drained by the jet streams. So other things are also technically very important in fact, Breitling the company which makes these very famous chronographs, they were the people who sponsored this called Breitling orbiter. So I would urge you to look up on this particular thing and maybe somebody can give a link on the moodle page, about the documentary around the world flight in a hot air balloon.