Speech for Honorable Governor of Uttarakhand, Dr.K.K.Paul at the Foundation/Charter Day celebrations of IIT Roorkee on 25 Nov'2015

This is my second visit here in the last two months and I am delighted to be here.

I deem it an honour and a privilege to be amongst the toppers of the country. Being selected to study at an IIT is itself a matter of great honour for a student today. This is further supported by the fact that apart from the I.I.Sc. Bangalore, it is only the IITs who figure in the list of top Universities from India.

Sometimes, the name of an Institution itself holds everyone in awe. I am reminded of an incident about 15/20 years ago, in a Shatabdi Train from Delhi to Chandigarh - a passenger started to sweat and showed symptoms of a heart condition and a call was made for a doctor. Suddenly 2/3 doctors who were also travelling were at hand, to give first aid – but then another doctor appeared, and word went around; "he is from PGI Chandigarh" and everyone made way and the other doctors also withdrew. That is the type of respect that an Institution can evoke. Brand IIT evokes a similar response.

My heartiest congratulations to you all who belong to the IIT fraternity, the top institution of the country. Also congratulations on your foundation day and alumni day. A raising day is like a birthday. In childhood, it is a day of fun, frolic and enjoyment but as you grow up, raising day can be a day of stock taking and chalking out plans for the future and making some resolutions.

All of you must have read about Bill Gates. May be, some of you are already aware of what I am going to tell you, but it is worth recounting. In response to an advertisement from a film in Albuquerque (USA), in 1975, Bill Gates had applied and his proposal was accepted by the company. But they informed him that they would take about 2/3 months more to bring out the final product, so he should not mind. The fact is that Bill Gates, himself had not done any work, when he had submitted the proposal but it was his confidence that he could do it, that saw him through. This was his first commercial venture. He had the zeal and confidence and know that the proposal was amply doable. It is this type of confidence which should inspire many if not all amongst you.

At a younger age, one has the capacity to take risks, on the other hand if you keep waiting for the opportunities to fall in your lap, you may be left behind. So learn to create opportunities and then rise to the occasion.

As today, you are also observing the alumni day, I am sure, the alumni would be sharing their rich experiences with you, as a personal experience can be the best education.

In this cyber age as we move towards a knowledge economy, we have to recognise that, howsoever hard we may try – we cannot have an invention every now and then. So what is to be done – we have to use our knowledge, intellect, the felt need, and then improvise. Sometimes an improvisation can add such a value to the invented product that the consumers lap it up immediately and response may be better than the original.

Remember, innovator is one who sees what everyone else sees, but thinks of what none else thinks. Indeed if you master the art of visualizing the invisible, you can make even seemingly impossible, as possible. Since inventions are not possible always. That is where innovation has become necessary and important. Japan was not the country where either the automobile was developed or its manufacturing started. It was England, Germany and America, that were in the forefront. Japan took it up much later, and yet Japan overtook all these leading countries. In the same car, the Japanese installed an air conditioner, a clock and a music system, though none of these was meant originally for the car. Cars were made light weight and fuel efficient. These and some other innovative changes made the product so different from the original one, that it was accepted as the best in the world. Even those who created the car, had to feel humble before what Japan was able to do. Korean example of innovative culture is even more amazing. Korea was a small country and had no particular ambitions at that point of time, in the early fifties, and India was relatively ahead. Yet Korea had been able to emerge as an Asian tiger while India has begun to be noticed at the international level only about 15/20 years ago. India started manufacturing Ambassador Cars based on a British model. Korea also took up manufacturing cars of the same model.

In 5- 10 years, Korea came out with various new models altogether, but India continued with the initial model of Ambassador for decades. Such instances depict a picture of non-innovative ways of doing things, of living happily with what has already been given, of being indifferent to how the competitors are moving ahead, of preventing others from competing with us and then feeling that we have been able to achieve a great deal. There is no point in re-inventing the wheel. Time has come when India should have a platform for launching research based innovations. Such measures can improve productivity and the economic scene.

As the top technologists of the country, you are amply equipped to indulge in some out of the box thinking and focus on innovative ways and means of harnessing technology. Out of the box thinking can sometimes make those projects work which were hitherto unworkable.

When someone tells you that it cannot be done, take it that it is more a reflection of his or her limitation not yours. Remember innovator is one, who does not know that it cannot be done.

We are all aware of means of harnessing energy from non-conventional resources.

The idea of extracting energy from ocean waves and turning it into electricity has been an alluring one. The first serious attempt to do so dates back to 1974, when Stephen Salter of Edinburg University came up with the idea of "ducks" : house-sized buoys, tethered to the sea floor that would convert the swell into rotational motion to drive generators. It failed, as have many subsequent efforts to perform the trick.

The brainchild of researchers at Oscilla Power, a firm based in Seattle – is trying to address head-on the reason why previous efforts have foundered. The reason, according to Rahul Shendure, I do not know if he is an IITian, the firm's boss, is that those efforts took technologies developed for landlubbers, often as components of wind turbines, and tried to modify them for marine use. The consequence was too complicated a bit and sensitive for the rough-an-tumble of life on the ocean waves, and also too vulnerable to corrosion. Better, he reckoned, to start from scratch. Instead of generators with lots of moving parts, Oscilla is developing ones that barely move at all.

These employ a little-explored phenomenon called magneto/triction, in which ferromagnetic materials change their shape slightly in the presence of a magnetic field. Like many physical processes, this also works in reverse. Apply stresses or strains to such a material and its magnetic characteristics alter. Do this in the presence of permanent magnets and a coil of wire, such as are found in conventional generators, and it will generate electricity.

The core of Oscilla's design is a bar made from an alloy of iron and aluminum, a mixture that is strongly ferromagnetic. Such bars need be compressed by only one in 10,000, to have the desired effect. This means, to all intents and purposes, that the generator has no internal moving parts that can go wrong. Fortunately, ocean waves are powerful enough to generate the force to yield compression. Oscilla's design, as the firm's name suggests, does it by oscillation.

Oscilla's generators will, Dr. Shendure acknowledges, be expensive to build and install. But their simple design, he says, should allow them to operate for decades with no more maintenance than an occasional scrub. He calculates that the cost of producing electricity from them will be around ten cents a kilowatt hour. That compares with 16 cents a kilowatt hour for the offshore wind farms and six cents for the onshore variety. A grid-connected fossil fuel power station would be cheaper still

give cents or less. But ten cents represents a decent start for such a novel way of generating electricity.

The concept is the same as the original but approach is entirely different.

Our Prime Minister has announced the projects on Digital India and Smart cities.

There is a lot of work to be done to make these projects on smart cities and digital India succeed. A major problem is the inclusion of rural areas and small towns.

"How do we reach every household in rural areas to provide them affordable preventive as well as curative health care services? How do we connect small farmers, entrepreneurs in our small towns and villages with banks to enable them to participate in the economic development of the country more vigorously? And most important of all, how do we make the services that government provides to the citizen more accessible, inclusive and transparent? The solution lies in harnessing the digital revolution backed by innovations. The digital revolution would in a way, decentralize the governance. One does not necessarily need a very big company or even the government to think and bring solutions to all the problems. Today, any innovation happening anywhere in the country or world can be replicated and adopted suitably on a large scale. I am glad to see that our government has joined hand with IT giants like Intel and Academic Institutions like IIM Ahmedabad to crowd source Ideas, incubate, fund and mentor them to make them workable and replicable. Bright Ideas may come from a single source, but to see them fructify into action is our collective responsibility."

The Digital India project of our government aims to work on providing digital infrastructure as a service to the citizens, providing governance and services on demand and digitally empowering the citizens. These are very ambitious but desirable goals. The National Optical Fiber Network started in 2011 aims to bring broad band services to all the Gram Panchayats of the country by next year end. This connectivity will enable the hinterland of our country to become part of the digital revolution and benefit from it. Another important goal of spreading digital literacy and education to all will have to be pursued vigorously because we cannot afford digital divide in our society if we aspire to become economically stronger and inclusive. The third and most important goal of providing services on demand, will require innovation to build solutions, test them and make them popular. This certainly requires, coming together of the government, individuals, Academic and Research institutions and Entrepreneurs.

India is a land of Satyam Shivam Sunderam. We have celebrated the appointments of Satya and Sunder as CEOs of Microsoft and Google and who knows in years to come, there may be many more from here to scale these heights. An analysis was done as to why people who are born and brought up here, are not able to do well as they excel in a foreign environment.

The answer was and, perhaps, it may also be right, that India is a land of ideas, whereas USA is a land of opportunities. Ideas combine with opportunities to create success stories. Talent, ideas and opportunities have to get together. While at the UPSC, we had conducted an empirical study and found that a number of IIT and other engineering graduates who appeared for the civil services, had opted for subjects other than those taken up for engineering and yet were doing very well. So they were using the opportunity and adapting to the new discipline, and now as the plans stand, opportunities are getting created here in India itself through the specialized programmes so that our talent can contribute significantly to nation building.

Before I close, I would like to share some of the problems on which work can be immensely useful and productive : (1) Making use of conducting plastic sheets so that flexible solar cells could be rolled up. (2) Lithium batteries – In the long run we need an electric car – During the recent visit to USA, our Prime Minister had visited the plant of Tesla Car. (3) Cheap desalination (4) Bio-fuels (5) Sequestering of CO2.

Traditional components of production as per classical economists have been, Capital, Labour, land and technology. The last one contributed just a little fraction. Things have now changed, it is the technology which will now be driving force behind production and making the system more effective and efficient. Some of the very successful start ups are a clear example of this and provide inspirational stories to youngsters like you.

Today, you form the bridge between the past and the future. Your education here does not end with the degree, of course, brand IIT is very important, but how you think and apply yourself is even more important for the country. And the country looks up to you for the mission of nation building.

Thank you.

Jai Hind !