

**Address and interaction with the
Students of IIT Kharagpur
12 January 2008**

“Technology and Societal Transformation”.

"When you wish upon a star,
Makes no difference who you are
Anything your heart desires
Will come to you"

I am indeed delighted to interact with the Students and Faculty members of IIT Kharagpur. I congratulate IIT Kharagpur team for its visionary action in generating over 35,000 engineers during the last more than five decades who are pioneering entrepreneurs, researchers, executives in industry and academicians and are contributing in the development of many organizations in the country and abroad. My greetings to the Director, Professors, faculty members, Staff, Students and distinguished guests.

IIT Kharagpur is famous for having alumni as its partners. I am sure in the coming decades IIT Kharagpur in participation with other institutions will create a platform which will lead concept to reality for mind to market missions and be a starter for creating number of Original Equipment Manufacturers (OEM) and Original Design Manufacturers (ODM) in the country. IIT Kharagpur has already started a school of Medical Science and Technology and also

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establishing a Multi Specialty Research Centre now. I am sure with this combination, a world class medical research facility will emerge leading to the development of indigenous bio-nano-info medical engineering systems and products which will be directly beneficial to the Indian health sector. With multiple disciplines in IIT Kharagpur, I would also suggest the faculty members to study and generate large number of new courses such as Mechatronics and biomechatronics. These courses will integrate mechanics, electronics, control engineering, computing and molecular engineering (from nano-chemistry and biology) when combined, will enable generation of simpler, more economical, reliable and versatile systems.

The topic I have selected is “Technology and Societal Transformation”.

Towards Knowledge Society

The mission of any educational institution is to transform into knowledge society. This mission will have an impact on removing illiteracy, upgrading the educational system at various levels for providing employable education and enriching the teachers at all levels. It has to enrich not only the communication area, but provide the leverage to multiple sectors such as agriculture, construction, manufacturing and

delivery of social services. IIT Kharagpur particularly has the tremendous responsibility to spread to the rural areas of West Bengal to give the knowledge connectivity which will become the life line for the employment generation potential in the rural ambience through value added products. IIT graduates have to transform into knowledge professionals enriched with the value system drawn from our civilizational heritage. This combination of knowledge and value based education definitely will help them to match the needs of the impedance of the rural population. Can we meet the challenge and bridge the rural-urban divide?

Technology Interfaces

Technology is the non-linear tool available to humanity, which can affect fundamental changes in the ground rules of economic competitiveness. Science is linked to technology through applications. Technology is linked to economy and environment through manufacture of knowledge products. Economy and environment are linked to technology, which promotes prosperity to the society. The engineering and technology has to promote societal transformation in our society leading to become knowledge society. How IITs can contribute towards achieving this goal? Let me now talk to you about the mission of developed India.

Based on the ambience in the country today, I am visualizing the how the IIT Professional can make a difference to the billion people of India in the Development profile of the nation by 2020. Let me present the distinctive profile of India 2020. Dear friends, all of you should map on, how you can contribute to one or more of the 10 missions without disturbing the academic and research programme of IIT Kharagpur.

Distinctive Profile of India 2020

1. A Nation where the rural and urban divide has reduced to a thin line.
2. A Nation where there is an equitable distribution and adequate access to energy and quality water.
3. A Nation where agriculture, industry and service sector work together in symphony.
4. A Nation where education with value system is not denied to any meritorious candidates because of societal or economic discrimination.
5. A Nation, which is the best destination for the most talented scholars, scientists, and investors.
6. A Nation where the best of health care is available to all.
7. A Nation where the governance is responsive, transparent and corruption free.

8. A Nation where poverty has been totally eradicated, illiteracy removed and crimes against women and children are absent and none in the society feels alienated.
9. A Nation that is prosperous, healthy, secure, devoid of terrorism, peaceful and happy and continues with a sustainable growth path.
10. A Nation that is one of the best places to live in and is proud of its leadership through creative and effective leadership in Parliament, State Assemblies and other institutions of the State.

I am confident that these distinctive profiles of the nation will give adequate challenge to the creative and innovative minds of IIT'ians of Kharagpur. Out of the 10 distinctive profiles to be achieved, let me give you an example for bridging rural-urban divide.

Contribution in bridging the rural urban divide.

How do we bridge this gap? We can bridge it through the creation of projects PURA (Providing Urban Amenities in Rural Areas). India has over 600,000 villages where 700 million people are living. To enhance their prosperity and life style, we need to create 7,000 PURA complexes across the country. IIT Kharagpur can consider planning and preparing the report for creation of number of PURA complexes covering the West

Bengal villages around Kharagpur. The creation of PURA complex involves provision of three connectivities namely physical connectivity, electronic connectivity and knowledge connectivity. Provision of these connectivities to the rural complex will lead to economic connectivity. Students and Faculty members have a role in planning the PURA complexes and creation of connectivities through the use of science and technology. Particularly, IIT Kharagpur students and faculty members can assist the state government authorities in organizing electronic and knowledge connectivity in the rural clusters located around Kharagpur. Also, some of the students who are keen to become entrepreneurs can create PURA enterprises in the PURA complexes. I would like to share the contribution of Periyar Maniammai College of Women in Thanjavur district in establishing Periyar PURA and particularly working on one village one product scheme in partnership with JETRO of Japan.

One Village One Product and PURA

The members of Periyar PURA in Vallam, Thanjavur district in Tamil Nadu have created a strategic partnership with Japan External Trade Organization (JETRO) of Japan. During the last one year, people of Periyar PURA villages technologically supported by Periyar Maniammai College of Engineering for Women have worked with experts from JETRO

on various products for which core competence and raw material is available in Thanjavur district. They developed proto types for 123 products such as bed sheets, table runner, cushion cover, brass drum, curtains, bread basket etc. Interaction with JETRO specialists included comparison of Japanese product, discussion on raw material selection, technical advice on product development and final quality inspection. Based on this intensive interaction, Vallam people produced 123 products and JETRO selected 55 out of them for international market.

These 55 finalized products were displayed in an exhibition at New Delhi during February 2007 and they have also been displayed in Interior Lifestyle 2007 Exhibition at Tokyo held during 6th to 8th June 2007. Over 168 Business visitors and industries have shown interest in the life style products presented by Periyar PURA team. The important point I would like to mention is that the local technical consultancy support for improving the product has been provided by Periyar Maniammai College of Engineering for Women, and also JETRO. I am sure; Students and Faculty Members of IIT Kharagpur will definitely be able to replicate such missions in the rural areas adjoining Kharagpur using the core-competence of the people in the region. The second example, I would like to discuss is about provision of energy.

Energy Independence - A Perspective

India has 17% of the world's population, but only about 0.8% of the world's known oil and natural gas resources. Based on the progress visualized for the nation during the next two decades, the power generating capacity has to increase to 400,000 MW by the year 2030 from the current 130,000 MW in India. This takes into consideration of energy economies planned and the design and production of energy efficient equipments and systems. Energy independence has got to be achieved through three different sources namely renewable energy (solar, wind and hydro power), electrical power from nuclear energy and bio-fuel for the transportation sector. Energy independence throws very important technological challenges to the world: The solar cell efficiency has to increase from the present 20% to 55% through intensified research on CNT (Carbon Nano Tube) based solar cells. For thorium reactors, as it is known, thorium is a non-fissile material. It has to be converted into a fissile material using Fast Breeder Technology. In the Bio-fuel area, the challenge is bio-fuel plantation for higher yield, esterification technologies for the higher output and the modification to automobile power plants. These three research areas definitely need intensive cooperation between European Union and India. I would suggest setting up of an "Indo-EU Renewable Energy Development programme" for taking up advanced R&D in all forms of renewable energy leading to the availability of

commercial class large scale power plants within the next decade.

Now I would like to share with you an important discovery which can lead to a solution for the problems faced by mentally challenged children.

3D atomic structure of proteins

On 5th January 2008, I met a Nobel Laureate Dr. Roger D Kornberg who has revealed the three dimensional atomic structure of proteins in high resolution. The high level of detail allowed Kornberg to view the complex structures that make up proteins and offered the first real understanding of the defining events of genetic transcription. I am wondering whether this can help us to see the 3D image of brain and enable us to observe the deficiency in the information transfer in the neurons of a Mentally Challenged child's brain. IIT Kharagpur can consider creation of an education and research centre for treating mentally challenged children. The IIT researchers can take up this problem using the results of Dr. Roger D. Kornburg's work. Now let me share with you another important study related to knowledge driven technology leading to non-linear growth.

Knowledge driven technology gives non-linear growth

I had an interesting study with my team. From the study I could find among the Top IT companies in India, per capita revenue per employee varies from \$32,000 to \$82,000 per annum, whereas the value addition per employee in one of our Indian automobile industries is \$205,000, which is second in the world in manufacturing. But at the same time, I have studied certain IT MNC's whose business is based on Knowledge products. Their per capita employee revenue is in the order of \$200,000 to \$600,000. Per capita revenue of one of the leading search engine company is over 10 lakh dollars. Here you should see the difference. Why I am bringing this point here is, to emphasize how the knowledge based system can bring non-linear growth to the organization as well as to the nation. Higher the productivity of knowledge based system, better the employee productivity leading to the non-linear growth of Indian industries. The researchers of IIT should work on development of such knowledge based products for enhancing the productivity of our Industries as a whole. For achieving great missions, time is a very important resource.

You can navigate the time

As you all know, the earth rotates on its own axis once in a day having 24 hours or 1440 minutes or 86400 seconds.

Earth itself orbits around the sun. It takes nearly one year for an orbit. With the completion of one rotation of earth around the sun, your age is added by one year as you are living on planet earth. Seconds fly, minutes fly, hours fly, days fly and years fly. We have no control over it. The only thing that we can do is, while the time flies, we can navigate the time. “Let not thy winged day, spent in vain”. Young friends, all of you have to have a mission in life and work for it by navigating the time towards the mission.

Conclusion: Indomitable Spirit

While meeting you today, I thought of conveying an inspiring message to the IITians. I would like to recall a great clarion call of indomitable spirit, which was given by Sir C V Raman, at the age of 82. The message is still reverberating in my mind: “I would like to tell the young men and women before me not to lose hope and courage. Success can only come to you by courageous devotion to the task lying in front of you. I can assert without fear of contradiction that the quality of the Indian mind is equal to the quality of any Teutonic, Nordic or Anglo-Saxon mind. What we lack is perhaps courage, what we lack is perhaps driving force, which takes one anywhere. We have, I think, developed an inferiority complex. I think what is needed in India today is the destruction of that defeatist spirit. We need a spirit of victory,

a spirit that will carry us to our rightful place under the sun, a spirit, which will recognize that we, as inheritors of a proud civilization, are entitled to a rightful place on this planet. If that indomitable spirit were to arise, nothing can hold us from achieving our rightful destiny."

Now I would like to administer the eight point oath to the IITians.

Republic Day Message for IITians

1. Wherever I am, a thought will always come to my mind. That is "What can I give?"
2. Whatever the mission I will do, my motto will be "Work with integrity and succeed with integrity"
3. I will always remember that "Let not my winged days, be spent in vain".
4. I realize I have to set a great goal that will lead me to think high, work and realize the goal.
5. When I am in a professional carrier, I will ensure that I will lead at least ten members to achieve higher education.
6. My greatest friends will be great human beings, great teachers and great books.

7. I firmly believe that no problem can defeat me; I will become the captain of the problem, defeat the problem and succeed.
8. My National Flag flies in my heart and I will work for removing the ignorance wherever needed, freedom from poverty and freedom from injustice.

My best wishes to all the Members of IIT Kharagpur success in their mission of empowering the youth with value based education, entrepreneurial skill and research focus for contribution to national development mission.

May God bless you.