

Creating an environment in India to do great work in science

**A lecture delivered on December 02, 2021,
at the Infosys Science Foundation**

**By
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A progressive society honors its intellectuals, creates a climate conducive to their flourishing, and makes their life comfortable. The purpose of the Infosys prize is to add its own bit to this important task of our country. Our winners have solved some of the toughest problems as we have just heard. The latest is Prof. Manjul Bhargava who proved, just the last month, the 1936 conjecture of van der Waerden. This problem lay unsolved for over 85 years. Congratulations to this year's winners.

Scientists study the world as it is, ponder about its anomalies, discover the reasons for these anomalies, and usher in new ideas and theories. The engineers use these ideas to create a world that never was. The social scientists make living in this world meaningful. The artists make our lives enjoyable.

Adi Shankara's *Advaita Vedanta* and Immanuel Kant's *The Critique of Pure Reason*; Brahmagupta's invention of zero; Adam Smith's invisible hand; Will and Ariel Durant's *The Story of civilization*; Freud's work on psycho analysis; Vyasa Maharshi's *Mahabharata*; and Guido d'Arezzo's work on musical notation for Western Classical music are good examples of great minds at work in philosophy, mathematics, economics, history, psychology, and music.

The Theory of General Relativity; Quantum Mechanics; Maxwell's Electromagnetic Theory; Alan Turing and Von Neumann's work on computers; Claude Shannon's work on Information Theory; Tim Berner Lee's work on World Wide Web; and Alfred Bertheim, Paul Ehrlich and Alexander Fleming's work on penicillin, to name just a few scientific and engineering ideas, are some of the most impactful examples of the power of such great minds at work in physical

sciences, mathematics, computing and engineering, and life sciences.

India has made laudable progress in using science and engineering ideas to advance our country. However, several grand challenges remain. Let me mention just three. Our air is toxic and unfit for breathing in many places. We have serious shortage of potable water. We are yet to design vaccines for Dengue and Chikangunya.

What are the solutions? There are two. First is to create an environment of high aspiration, positivity, enthusiasm, full academic freedom and humility among our researchers. The second is to bring a competent, transparent and accountable bureaucracy with a focus on speed of action. Let me focus on the first solution.

The students of EE and CS revere Prof. Richard Hamming who developed the Coding Theory and the famous Hamming code. Prof. Richard Hamming, in his scholarly book - *The art of doing science and engineering*, has spoken about the importance of developing a certain style of thinking among youngsters to do research work and solve important problems. That discussion is for another day.

What is style? Style is working on the right problem at the right time and in the right way to solve a grand problem. The best way to develop such a style among the youngsters, according to Prof. Richard Hamming, is to create an environment of aspiration to solve important problems, courage, self-belief, desire for excellence, open mindedness, ability to invert the problem and solve a grander problem, sustained intellectual investment, pluralism, curiosity, hard work, ability to tolerate ambiguity, discussion, debate, cross discipline orientation, critical thinking, acceptance of one's failure, appreciation for those that perform better than us, and the ability to applaud truth no matter how far our stand is from it.

The ability to applaud truth based on data and facts is what distinguishes our chief guest of the day – Prof. Gagandeep Kang. She has become the definitive and authentic voice on the Covid 19

vaccine. Her words have earned much confidence among the cognoscenti of our land. Any interminable discussion on Covid 19 comes to an end when somebody says, "Prof. Kang has said it".

She is a well-known Indian microbiologist and virologist. She is a Professor of Virology and Gastrointestinal Sciences at the Christian Medical College – Vellore. She has won several awards. I will just mention two. We are proud that she won the Infosys Prize for Life Sciences in 2016. She is the first Indian woman to be elected to the Royal Society – UK.

Friends, I have great pleasure to present to you all Prof. Gagandeep Kang.