

Research Career – Why? What? How?

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Research Career in Computer Science

Outline

A brief about ACM and ACM-India

Why – an academic career?

There are a lot of jobs

Stable and Satisfactory

What happens in a research career?

What qualities do you need?

How?

Preparing for an academic career – PhD and beyond

Some general info

Preparing for the tests and interviews

Conclusions

ACM, ACM-India

- ▶ Largest Professional organisation of computer scientists
- ▶ Awards Turing Award, among others
- ▶ ACM-India started 12 years back to focus on India specific activities.
- ▶ Summer/winter schools, PhD clinic, Anveshan Setu, Teaching Partnership Program, ARCS symposium, webinars, ...
- ▶ india.acm.org

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Some Facts

- ▶ India has one of the largest youth population (in age group 18-30).
- ▶ National **Gross Enrollment Ratio** (GER) (proportion of youth enrolled in College) is 27% and Government wants to increase to about 50%
(TN average was already above 50%, slight drop recently, Kerala is around 40%).

Some Facts

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- ▶ National **Gross Enrollment Ratio** (GER) (proportion of youth enrolled in College) is 27% and Government wants to increase to about 50%
(TN average was already above 50%, slight drop recently, Kerala is around 40%).

Corollary Nearly double the college seats required.

Government Initiatives

Screenshot of a news article from news18.com about the National Digital University.

The article features a large image of Union Minister Dharmendra Pradhan with the Indian flag in the background. Below the image is the caption: "National Digital University will be launched by the end of 2023 (File Photo)".

Text Content:

Union Minister for Education, Skill Development and Entrepreneurship, Dharmendra Pradhan has said that the National Digital University which will be launched by the end of 2023 will increase the Gross Enrolment Ratio (GER) in higher education.

He said that the presence of National Digital University would scale this up from the 27 per cent enrolment.

The Minister was speaking after inaugurating the second floor of the LOGOS lecture hall at the National Institute of Technology (NIT), Tiruchi on Sunday.

He said that there should be a collaboration between the IITs, IIMs, and NITs for research and innovations.

Trending: Paathaan Box Office Day 1: SRK Film Creates History, Likely to Cross Rs 54 Crore, Beat KGF 2

Most Read: Athiya Shetty's Mom in Tears As She & Suniel Shetty Hug Actress After Wedding With KL Rahul; See Pic

Editor's Pick: From 'Kannur Ke Gandhi' Meet 25 Unsung Heroes Shri

More News:

- PM's Sabka Saath Vikas, Free Ration Ram Temple, G20...
- Students Will Be 'corrected' Verso Indian History fro...
- Congress MP UP Education Mini JEE Main 2023...
- India, Zimbabwe Joint Working Education, SK...

Government Initiatives

South

THE HINDU
Opinion

An India chapter for foreign universities

For a long time, proponents of the internationalisation of higher education have cherished the dream of foreign universities operating in India. For nearly two decades, they have emphasised the need to provide conducive conditions and an enabling framework for such institutions. But the idea failed to come to fruition due to the concerns of the regulatory authorities and governments in India as well as the foreign higher educational institutions.

Concerns

Promoting excellence, preventing malpractices, safeguarding the interests of students and protecting national interests have been some of the major concerns. My were wary of the cultural eat that this initiative posed. ne of those who were at the front of preserving the purity dian culture are now a part of political dispensation. Policy ners and regulators have been cularly concerned about how me up with a framework that ts the best of the best and the fly-by-night kinds of cities. On the other hand, the government is



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Education in the
Planning Commission,
is a Professor of
Management at
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New Delhi. Views are
personal

their campuses in India has been so compelling that the National Education Policy (NEP) 2020 provided that "selected" universities e.g., those from among the top 100 universities in the world will be facilitated to operate in India. A legislative framework facilitating such entry will be put in place, and such universities will be given special dispensation regarding regulatory, governance, and content norms on par with other autonomous institutions of India." Even though the NEP favoured a "legislative framework", the idea is being executed through a regulatory route by the University Grants Commission (UGC). There seems to be determination to get the idea going, even if it amounts to some dilution in standards.

While the policy prescribed "facilitation" and "special dispensation" for the top 100 universities of the world, the draft regulation seeks to lower the standards by extending the scope to the top 500 universities, overall or in any discipline. Further, for the "educational institutions", just being "reputed" in their home country would be a sufficient requirement. The draft regulation doesn't seem concerned about the subjectivity and scope of

financial autonomy to foreign institutions but takes that away by asserting that they abide by all the conditions that the UGC and the Indian government prescribe from time to time. The provision that the foreign higher education institutions must not do anything "contrary to the sovereignty and integrity of India, the security of the State, friendly relations with foreign States, public order, decency or morality" might determine the best universities that most value their academic autonomy.

Leaving aside the issue of whether the idea would succeed, one wonders why India is so on foreign higher education. During a media briefing, it was stated that foreign universities in India would stop the outflow of \$28-30 billion in foreign exchange. This does not corroborate on outward remittances or studies abroad, as reported by the Reserve Bank of India. During 2021-22, foreign account of studies abroad was more than \$5.165 billion. If we add to it the outflow of \$1.4 billion for education (though these do not relate to studies abroad), the total be \$8.973 billion. It is also noted that even \$5.165 billion is a conservative sum.

Government Initiatives

- ▶ Push for foreign universities
- ▶ New IITs (6 to 23 in the last 20 years)
- ▶ Increased enrollment in colleges and institutes
- ▶ New IIITs
- ▶ IISERs (Indian Institute of Science Education and Research), NISER
- ▶ New State and Central Universities (Joy University, SNU, Sai University in TN).
- ▶ Online Education (NPTEL, SWAYAM, ...)
- ▶ National Digital University

Private Initiatives

- ▶ A number of private engineering colleges/institutes (SRM, DA-ICT, VIT, SSN, Amrita, Sastra, Amity, LPU,)
- ▶ A number of new multidisciplinary universities (Azim Premji, Krea, Ashoka, Chanakya,)

Corollary Thousands of teaching jobs for the near future....

Research

- ▶ Constant push to increase research funding, as Nations have realized the potential advantages for economic development.
- ▶ Department of Science and Technology (DST), Department of Atomic Energy (DAE), Council of Scientific and Industrial Research (CSIR) pump money into research
- ▶ Google, IBM, Microsoft, TCS, Infosys have exclusive research centres.
- ▶ International collaborative funding (DST, Fulbright, ...)

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Corollary Tens of thousands of academic (teaching and research) jobs in old to new institutes to industry for a foreseeable future.

Contrast this to

Google Sign in - Google Account | All Career Guru | All Career Guru | Welcome to The In... | Home

← → C google.com/search?q=nearly+2lakhs+fire... employees&oq=Nearly+2lakhs+fire...&aq...=chrome.1.69i57j33i10i160,127

New Tab Mail :: Reply: Re:... a Donald E. Knuth -... RefereeVerify - Ins... YouTube Maps +1 முனிசிபல் +2 முனிசிபல்

 **nearly 2lakhs fired employees** X | Microphone Camera Search

the U.S.
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More news →

<https://brandequity.economictimes.indiatimes.com> › news :
Google job cuts: Investor tells company to fire 1.5 lakh ...

1 day ago — Apart from suggesting that Google should fire 1.5 lakh employees, he also said that the company should "address excessive employee compensation" ...

<https://www.thetechoutlook.com> › news › business › it-... :
IT Employees Being Laid Off by Big Tech Giants Including ...

2 days ago — Over 2 lakh IT employees in the United States have already been laid off by companies like Google, Amazon, Microsoft, Meta, and others and more ...

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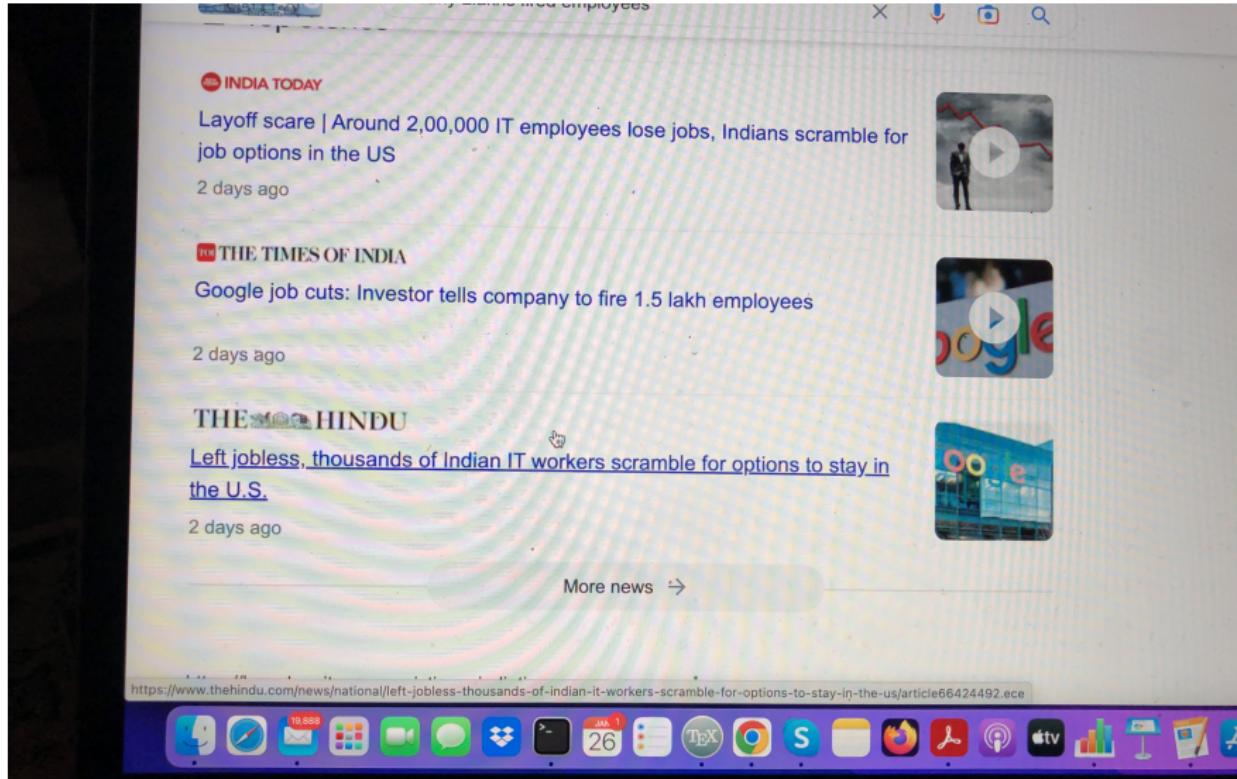
INDIA TODAY
Layoff scare | Around 2,00,000 IT employees lose jobs, Indians scramble for job options in the US
2 days ago

THE TIMES OF INDIA
Google job cuts: Investor tells company to fire 1.5 lakh employees
2 days ago

THE HINDU
Left jobless, thousands of Indian IT workers scramble for options to stay in the U.S.
2 days ago

More news →

<https://www.thehindu.com/news/national/left-jobless-thousands-of-indian-it-workers-scramble-for-options-to-stay-in-the-us/article66424492.ece>



Stable

- ▶ Not so much affected by recession
- ▶ Stable, long term career
- ▶ Flexible hours, not so much pressure
- ▶ Noble profession
- ▶ Well respected in the community
- ▶ Opportunity to mentor students (feel youthful always!)
- ▶ Develop skills for intellectual criticisms and debates

Salaries and Perks

- ▶ Starting salary is in the order of 150k Rs per month (after PhD and Post-Doc in top institutions)
- ▶ Good health care benefits, Research grants, housing, systems
- ▶ Opportunity to travel including abroad to attend conferences and institutions
- ▶ Opportunity for Consulting

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The Institutional Landscape – from Research to Teaching

- ▶ Industry Labs (Google, Microsoft, IBM, TCS, ...)
- ▶ Research Institutes (IMSc, CMI, TIFR, ISI, IISc, ...)
- ▶ IITs, IIITs
- ▶ Universities and Colleges

Funding, Salary, Perks, Entry requirements vary according to the above

A day in the life of a researcher

- ▶ Prepare and give lectures
- ▶ Research discussions with students and colleagues
- ▶ Attend seminars
- ▶ Write papers
- ▶ Read/Review papers, Continuously update yourself
- ▶ Attend conferences and meetings

What do you become?

- ▶ One of the top few *international experts* in an area
- ▶ Creator of new knowledge
- ▶ A problem solver
- ▶ A mentor
- ▶ Hungry for knowledge and intellectual challenges
- ▶ Become a part of the **international community** of researchers
(reading, writing, reviewing, talking about research articles)

What is it NOT?

- ▶ It is not just for super intelligent nerds!
- ▶ It is not just boring lecture after lecture!
- ▶ Research is not psychologically tiring that you have to give up everything in life

Qualities needed

- ▶ Curiosity
- ▶ Commitment
- ▶ Perseverance
- ▶ Time discipline
- ▶ Problem solving skills
- ▶ ...

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Where to start

- ▶ Identify your comfort level and interest in specific subjects –
Be broad
(Follow your interest, not trend)
- ▶ Start with Summer/winter schools, good videos
- ▶ Identify experts and groups in the country
- ▶ Write to people at these places (may not get prompt reply, but persist :)).
- ▶ Visit these institutes (visit library, internships,)

Exciting research happening in India and elsewhere?

By Hemangee Kalpesh Kapoor, Mausam, Venkatesh Raman

Communications of the ACM, November 2022, Vol. 65 No. 11, Pages 40-42

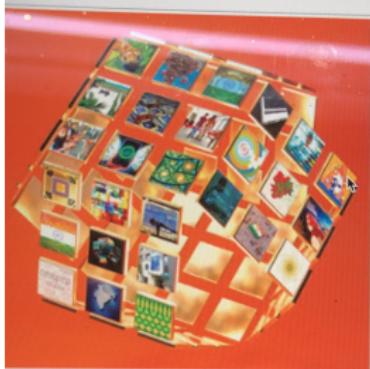
10.1145/3564603

Comments

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Computational sciences in the India region are going through exciting time. While India has always had significant strength theoretical computer science (CS), in recent years it has developed substantial presence and maturity in other, more applied areas of CS such as hardware and computer architect data science and artificial intelligence (AI), and cyber-securit Alongside pure research, there has been a significant push toward lab-to-field projects and technology transfer and deployment, creating broad impact to the region and beyond. Significant efforts have been made on the democratization of education through online courses, enabling the vast populati learn from a relatively limited number of available experts. A these activities have continued to bolster India's already stro

Opportunities fo...png

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GE



MacBook Air

Read CACM November 2022 special issue of India section

→ C cacm.acm.org/magazines/2022/11/265820-welcome-back/fulltext?m...

New Tab Mail :: Reply: Re:... a Donald E. Knuth -... RefereeVerify - Ins...

A screenshot of a web browser displaying the November 2022 special issue of Communications ACM (CACM) focused on the India region. The page has a light blue header with the ACM logo and navigation links. Below the header is a large, scenic image of the Taj Mahal. Overlaid on the image are several graphical elements: a red hexagonal graphic containing a grid of smaller images, a blue circular icon with a white smiley face, a black rectangular button with the text 'CACM' in white, and three black rounded rectangular buttons with white icons (a heart, a clock, and a right-pointing arrow). The main title 'India Region Special Section 2022' is prominently displayed in white text on the left side of the image. To the right of the main title, the journal title 'COMMUNICATIONS ACM' is visible. At the bottom left, there is a timestamp '04:28'. The URL in the address bar is partially visible as 'cacm.acm.org/magazines/2022/11/265820-welcome-back/fulltext?m...'.

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Read CACM November 2022 special issue of India section

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Theory Research in India: 2019–2022

We explore some of the results of exciting new research in the field of algorithms in India.

C. Aiswarya, V. Arvind, Saket Saurabh
Pages 88-93

AI and Data Science Centers in Top Indian Academic Institutions

A look at the activities of artificial intelligence and data science centers located at seven top Indian institutes.

B. Ravindran, Sunita Sarawagi, Aditi Jain
Pages 94-97

Cybersecurity in India

A look at some of the major research accomplishments resulting from the efforts of several academic institutes to secure cyberspace.

Debdeep Mukhopadhyay
Pages 98-102

cacm_1.jpeg cacm_2.jpeg Opportunities fo....png foreign_univ_ne....jpeg

ACM India Annual Event 2023

Attend
the talks
today

Tests and Scholarships

- ▶ Different institutes have different entry procedures
 - ▶ JEST for IMSc (March 11th, Feb 25 Application deadline)
 - ▶ CMI, ISI have their own tests
 - ▶ IITs, IIITs (Apr/Oct deadlines), IISc (23 Mar 2023), GATE
- ▶ Several PhD seats and research grants go vacant even in good places
- ▶ You get stipend (30000+ Rs per month) during PhD Plus HRA, travel to conferences, book grants.
- ▶ There are also Prime Minister Fellowships (about 70000+ per month), Visweswara Scholarship, industry fellowships, Ramanujan Fellowship, INSPIRE fellowships
- ▶ In some institutes, one can go for integrated PhD direct after BTech
- ▶ Most institutes offer internships (summer or otherwise)

How to Prepare

- ▶ Get the fundamentals right, if necessary go back and read basic books
- ▶ Concepts and high level understandings are more important than details: Some examples:
 - ▶ JAVA vs C++ differences – more than specific syntax of either languages
 - ▶ Linux vs Windows differences
 - ▶ The advantages and disadvantages (say array vs linked list)
 - ▶ Knowledge versus aptitude
 - ▶ Problem solving skills
- ▶ Ask 'Why' for every concept; Explore answers!

What happens in a PhD

- ▶ You identify a broad area of your interest Then, with the help of a guide
 - ▶ Read advanced books and papers to understand state of the art
 - ▶ Learn them critically
 - ▶ Create new ideas, new theories, verify by experiments (and proofs).
- ▶ Proper information (through guide or otherwise) on state of the art, unsolved problems/directions is important.

What after PhD?

- ▶ Teaching
- ▶ Post-doctoral research
- ▶ Research (even in Industry)
 - ▶ Jobs in industry from the 90s have changed to become real interesting development jobs that need higher learning.

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- ▶ Academic career is challenging, satisfying and attractive
- ▶ For the next few years, this is going to witness even faster growth.
- ▶ Hopefully, some of you will think about it and contribute to our nation's creation of knowledge and the knowledge seekers!

Finally ...

Turing award winner, author of TAOCP series, Knuth says ...



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'When my books came out, they were not copies of any other books. They always were something that had not been fashionable to do, but they corresponded to my own perception of what ought to be done.'

Finally ...

Turing award winner, author of TAOCP series, Knuth says ...



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Thank You