Krishnamoorthy Iyer | CV

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Doctorate in electrical engineering. Convocated in early August 2018.

Previous Employment

- **Indian Institute of Technology Bombay, Dept. of Electrical Engineering** **Powai, Mumbai**
  Doctoral Candidate *January 2009–February 2018*

  I joined the PhD program as a doctoral candidate in January 2009. Please see "Notable Projects" for my PhD work and experience.

- **Indian Institute of Technology Bombay, Dept. of Electrical Engineering** **Powai, Mumbai**
  Research Project Staff *November 2007–April 2008*

  Based on my performance in a course conducted by Professor Shreevardhan A. Soman, I was offered a post as project staff in his lab 'Power Anser'. The work involved applying optimization software to electrical power consumption data.

- **Indian Institute of Technology Bombay, Dept. of Physics** **Powai, Mumbai**
  Research Project Staff *November 2004–April 2007*

  Starting November 2004, I was involved in a variety of projects in the Radiation Physics lab of Professor Raghava Varma, who was my B. Tech project (senior thesis) advisor. The main project involved applying machine learning techniques to analyze particle physics' data, specifically the detection of events. I worked closely with a B. Tech student who I guided through the mathematical aspects of the analysis.

- **Essar Corporation** **Mahalaxmi, Mumbai**
  Strategy Analyst *January 2003–June 2003*

  My first – and so far only – experience in the corporate world. I was a member of Essar's Strategy division. I prepared reports on possible future scenarios in the oil industry with a view to formulating strategy and was involved in drafting letters explaining and defending the company's point of view.

- **National Centre for Biological Sciences** **Hebbal, Bangalore**
  Research Project Staff *September 1998–May 1999*

  I spent nine months as a project staff pursuant to my interest in computational neuroscience. I recognized that the pseudocode developed to perform a certain task was incredibly wasteful of computer resources. I reformulated the problem in a more mathematically insightful manner and developed a much better algorithm that took into account the problem structure; the resulting program was orders of magnitude more efficient, with huge savings in computer resources.

Education

Academic Qualifications

- **IIT Bombay** — **Powai, Mumbai**
  Doctoral Candidate in Electrical Engineering , — *January 2009–July 2018*
- **Massachusetts Institute of Technology** — **Cambridge, United States of America**
  Doctoral Candidate in Neuroscience, — *September 1999–May 2000*
- **Indian Institute of Technology Bombay** — **Powai, Mumbai**
  Bachelor of Technology in Engineering Physics, — *July 1993–August 1998*
- **Guru Nanak Khalsa College** — **Matunga, Mumbai**
  Higher Secondary School, — *1991–1993*
- **A. M. Kewalramani Premier High School** — **Sion, Mumbai**
  Secondary School, — *1979–1991*

Notable Projects

- **Current Project:** *'Dispensing with Noise Forward in the "Weak" Relay Eavesdropper Channel'*

  This is ongoing work. I will be presenting a recent results poster at the International Symposium on Information Theory and Its Applications (ISITA) 2018 to be held at the Grand Copthorne Waterfront Hotel in Singapore between October 28th - 31st.

- **PhD Thesis Project:** *'Relay Broadcast Channel with Mutual Secrecy'*

  This project formed the last part of my thesis; it was presented at SPCom 2018. I applied techniques from network information theory to issues of physical layer security in wireless telecommunication networks. The work is a technically more challenging continuation of my earlier work presented at the NCC 2016. Aspects of it are also interest telecommunications engineers.

- **Fall 2015 side project:** *'FOSSEE Educational Videos in Haskell and Functional Programming'*

  During an (unofficial) break from the PhD program, I got acquainted with the functional programming (FP) paradigm in Computer Science whose mathematization-cum-abstraction I found it extremely congenial. Due to increasing software complexity and the increasing ubiquity of distributed systems, I expect that FP will transform from niche to mainstream over the coming decade. By December 2015, I had prepared a proposal for a series of educational FOSSEE videos in the Haskell programming language that addresses a lacuna in the training of students with backgrounds in engineering, physics, and mathematics.

- **PhD Thesis Project mid 2013–March 2016:** *'Broadcast Channel with Confidential Messages and Secret Keys'*

  The project marked the beginning of my independence as a researcher. I explored the scientific literature, formulated a new research problem and mastered the techniques necessary for its solution. All of the foregoing was done independently. I did have the benefit of discussions with my advisors, for which I am grateful. The problem holds interest for telecommunications engineers concerned with the security of their messages. I presented this work at NCC 2016 held at IIT Guwahati.

- **PhD Thesis Project January 2012–October 2012:** *'Power Controlled Adaptive Sum-Capacity in the Presence of Distributed CSI'*

  Despite sometimes not having full knowledge regarding network conditions, a wireless network uplink user may have to transmit information while ensuring that her signal does not prevent the correct reception of another user's signal. Our work formulated a strategy that ensured this. This project led to my first conference paper and my first journal paper. It won the S.K. Mitra memorial award by virtue of its novelty. I presented this work at ISITA 2012 held in Hawaii, USA.

Technical and Personal skills

- **Programming Languages:** Intermediate proficiency in: C, C++, Matlab, Haskell.
  Also basic ability with: Fortran.
- **Mathematics:** Advanced: Five course sequence in Mathematical Analysis at the MS level.
- **Computer Science:** Advanced: Algorithms and Data Structures, Machine Learning, Functional Programming.
- **General Business Skills:** Presentation skills: good. Teamwork: enjoy working in small groups, especially one-on-one. Mentoring: I have informally mentored B. Tech, M. Tech, and PhD students with career advice and suggestions.
- **Other:** Enjoy writing well organised, structured and detailed reports.

Interests and extra-curricular activities

- I am an extremely avid reader. I enjoy both technical as well as non-technical works.
- I am a science fiction buff, both books as well as movies.
- I am a yoga enthusiast.
- I am a salsa and ballroom dance aficionado.

Final Remarks

Network information theory, the subject of my PhD, is a generalization of information theory, a branch of telecommunications and applied mathematics. Information theory has wide applicability to fields such as machine learning.

References

- Available on request

Publications

K. Iyer, S. R. B. Pillai, and B. K. Dey, "Power Controlled Adaptive Sum-Capacity in the Presence of Distributed CSI," in *2012 International Symposium on Information Theory and its Applications*, Oct 2012, pp. 66–70.

——, "On the Adaptive Sum-Capacity of Distributed Multiple Access with Individual CSI," *IETE Journal of Research*, May 2015. [Online]. Available: http://dx.doi.org/10.1080/03772063.2015.1027306

K. Iyer, "Broadcast Channel with Confidential Messages and Secret Keys," in *2016 National Conference on Communications*, March 2016.

——, "Two Receiver Relay Broadcast Channel with Mutual Secrecy," in *2018 International Conference on Signal Processing and Communications, SPCom 2018*, July 2018.