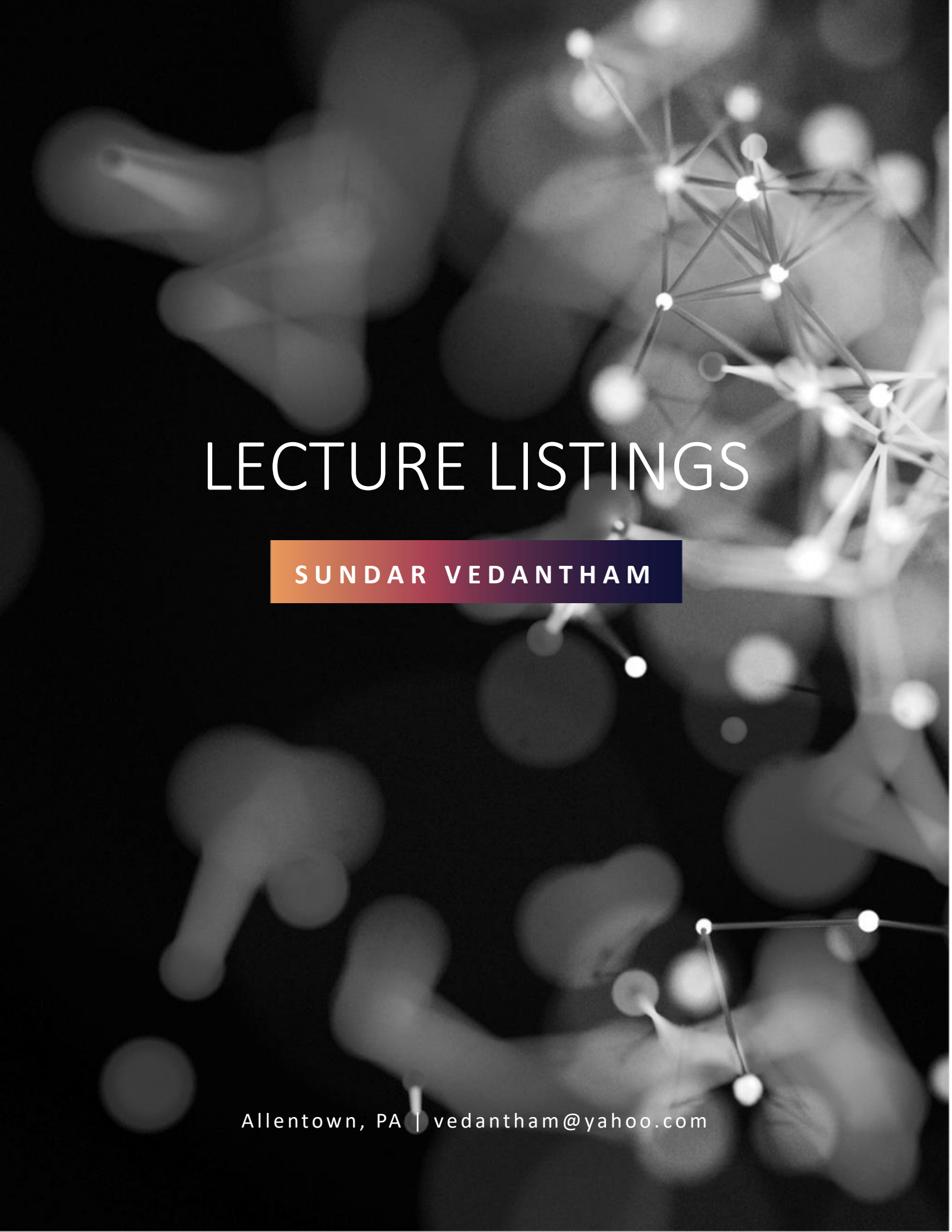


LECTURE LISTINGS

SUNDAR VEDANTHAM

Allentown, PA | vedantham@yahoo.com

SUNDAR VEDANTHAM

Dr. Sundar Vedantham served as Director of Software Development in the Network and Edge Group (NEX) of Intel Corporation in Allentown, PA. He is an Adjunct Professor at VIT, Chennai, India. His skillset and experience cover a wide range of telecommunication related domains. His team delivered highly optimized software layers that drive silicon hardware accelerators, designed to aid mobile and cloud networks. He joined Lucent Technologies a couple of decades back and has traveled through various incarnations of his division to eventually become part of Intel Corporation.

His research interests include network traffic and congestion management, high-speed networking, security, and theoretical computer models, areas in which he holds patents and has published papers, book chapters & articles. He received his Ph.D. in Computer Science from Louisiana State University. In his early years he worked in a Helicopter Design Bureau and served two years as a maintenance engineer in an offshore Oil & Gas platform.

He enjoys writing articles in English and Tamil to help improve public understanding of the technical details behind the fields he has worked on and to attract young students to get into STEM fields. Many of his articles are available online for free. As part of this effort, he has published a book titled *Thought Experiments* available online to help anyone from high school students onwards understand complex ideas embedded in fields like Mathematics, Computer Science, Physics, Ethics, Democracy and Medicine.

INTRODUCTION

LECTURES

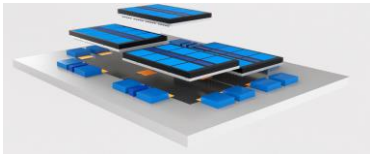
This document contains the details of the lectures I deliver in various forums.

REQUIREMENTS

I normally request a good internet connection, audio & video support, that includes a good microphone and projection system with a big screen that can display slides & videos well

OTHER INTERACTIONS

I will be happy to interact with students/faculty in informal settings and answer any questions related to my work, studying in the US, careers in Intel, living in the USA, developing a professional digital profile and so on.



Vectors

- Clock speed
- Process Nodes
- Substrate
- Packaging

Bringing a Swiss Army Knife to a VLSI Sword Fight!

ABSTRACT

This lecture discusses multiple fronts of optimization/improvements (hence the reference to Swiss army knife) our industry and particularly Intel is working on, to improve CPU performance. No major prerequisite knowledge is required to follow this lecture.

I show small video clips from YouTube during my talks to break the monotony and to make the presentation visually more interesting. You can view these videos ahead so that we can reduce the length of the presentation.

https://www.youtube.com/watch?v=_VMYPLXnd7E

https://www.youtube.com/watch?v=t6Y41zdO3Pc

https://www.youtube.com/watch?v=Jv40Viz-KTc

Factors

- CPU, SoC, ASIC
- Accelerators
- Pendulum Swing

Should we go hard or soft on packet acceleration?

ABSTRACT

This lecture discusses the role of hardware (silicon) accelerators in modern computing, specifically in improving the packet processing throughput. We will walk through a bit of history as well as today's status, covering both Intel and non-Intel technologies. Should be easy for anyone interested in this topic to follow.

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Dimensions

- Residual Effects
- Moral Dilemmas
- Algorithms
- AI/ML

Ethics and Emerging Technology

ABSTRACT

This talk looks at the computing profession related technological deployments that are right around the corner and push the audience to think through the kind of societal disruptions they are bound to unleash. Since Intel is big on ethics as well as technology, while we nurture all the positive aspects of technologies such as AI, ML, DL, autonomous driving, we also need to understand and be prepared to handle any ethical, moral, societal issues it may pose. If they are not handled properly, resulting changes can obliterate all the virtues technology can bring to our society and turn the population against it. Talk will look at issues and potential solutions.

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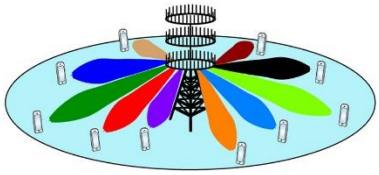

Enablers

- Massive MIMO
- Cognitive Radio
- URLLC
- HD HetNet
- Collaborating Computing

5G & Beyond – Technology Overview, Problems & Solutions

ABSTRACT

This presentation covers the following topics:
- What is 5G?
- What are the main domains of differences between 4G & 5G?
- What are the technological enablers?
- What are the stumbling blocks that will slow down deployment?
- Network Slicing implications to 5G
- Societal & ethical implications.

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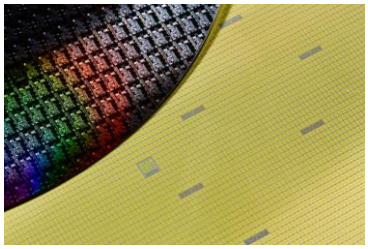
https://www.youtube.com/watch?v=LVoYdwS4xok

https://www.youtube.com/watch?v=-Mee444kdl0



Domains

- Simulators
- Board Design
- J-TAG

Post Silicon Bring-up

ABSTRACT

This one-hour talk discusses the pre-work and the actual process of bringing up a new silicon device for the first time in an Intel lab. Talk was given to Allentown, PA team members who wanted to understand how the new Snow Ridge SoC, one of the first 10nm mass production devices will be brought up in the lab. Covers RTL, SW, FPGA emulation/simulation as part of the pre-work, board designs and the actual bring up steps.

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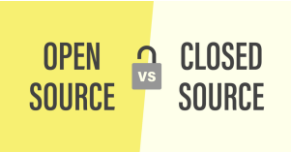

Open-Source Software Development

Topics

- What is it?
- License Models
- Business Models
- Participation

ABSTRACT

This lecture discusses the whole wide world of Open Source software development. We will get into what is open source, how does it differ from closed source, how do companies make money with open source models, and various licenses in use. We will also delve into few interesting, large projects that are out there and how you can participate in this revolution.

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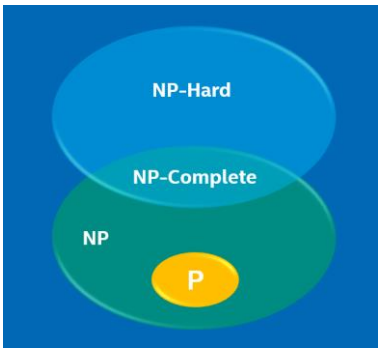


Complexity Theory

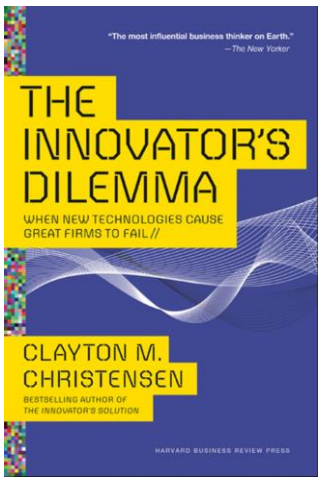
- Turing Machine
- Random Access Machine
- P = NP?
- Heuristic Algorithms

How Hard is it to Solve?

ABSTRACT

This lecture introduces problem complexity theory, an important area of theoretical computer science. We start with simple problems like multiplication and build up to much more complicated problems, to help analyze how the difficulty of solving them should be understood. We will discuss various classes of problem classification based on the time/space requirements needed to solve them, theoretical models used in such analysis and available resources, including Quantum Computing, when the complexity involved in solving a problem is too high.

These are the expected takeaways:
- An awareness about problem complexity and different classes of problems
- Realization that once you hit NP-Complete level, exhaustive search won't work
- When deterministic algorithms can't be developed to solve these problems, how do heuristic solutions work?
- How does Quantum Computing work and affect this order?



Incubation Process

- Past failures
- Incubation Process
- Venture Criteria
- Interesting Outcomes

My Biggest Failure – New Business Venture through Incubation

ABSTRACT

Our current culture encourages us to highlight and talk about our successes while hiding all our failures. This trend has been accelerated further due to the prevalence of social media, where everyone tends to curate how successful their career/projects are, how fabulous their lives are and so on. But there is a lot to be learned from our failures, if we are willing to discuss them openly and learn from those experiences. This talk will discuss a big venture incubation process that we went through but didn't get funding in the end.

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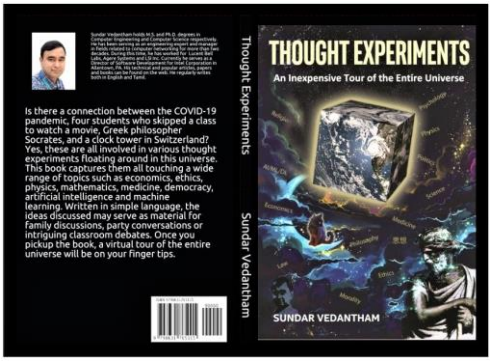
Thought Experiments



Domains & Experiments

- Schrodinger's Cat
- Chinese Room
- Hilbert's Hotel
- Cube shaped Earth!

ABSTRACT

Few years back, I published a series of articles on a Tamil web magazine named Solvanam.com on various thought experiments that span multiple domains/areas. Subsequently I published them as a book, first in Tamil and then in English. Chapters in the book are meant to serve as interesting topics for discussion among families & friends, spanning Physics, Economics, Ethics, Medicine, Democracy, Mathematics, Computer Science, Artificial Intelligence and so on.

Is there a connection between the COVID-19 pandemic, four students who skipped a class to watch a movie, Greek philosopher Socrates, and a clock tower in Switzerland? Yes, these are all involved in various thought experiments floating around in this universe. Based on the material discussed in the book, this lecture will introduce such thought experiments while focusing on the ones related to STEM. If required, the lecture can be tailored to match the interests of hosting organizations so that it is more relevant to the attending audience. Book details can be found at https://tinyurl.com/TESVAmazon to get a better idea of the range of topics covered.

Areas

- Creation
- Detection
- Impact
- Responsibilities

Deep Fake: Technological Manifestations & Societal Implications

ABSTRACT

This talk looks at Deepfake related developments that are becoming a new technological tsunami approaching our shores and pushes the audience to think through the kind of disruptions they are bound to unleash. While we want to nurture all the positive aspects of this technology, we also need to understand and be prepared to handle many legal, ethical, moral, and societal issues starting to affect our zeitgeist. If they are not handled carefully, resulting changes can obliterate all the virtues technology can bring to our society and turn the population against it. Talk will look at implementation models, issues and potential solutions.

https://www.youtube.com/watch?v=o2DDU4g0PRo&t=0s

https://www.youtube.com/watch?v=Jv40Viz-KTc

Suggestions

- Higher Studies
- Living in the USA
- Career in Semiconductors
- Tech Industry

Ask Me Anything Session

ABSTRACT

This is a general session, where audience can ask questions related to higher studies in the USA, working for Intel Corporation in the USA or India, developments in semiconductor industry, AI/ML developments, etc. I will try to answer them to the best of my abilities.

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Mnemonic

- C – Content
- L – Look
- E – Energy
- A – Articulation
- R – Recap

Giving CLEAR Presentations

ABSTRACT

This is an hour-long session designed to teach the art of giving effective presentations. We will use the mnemonic CLEAR to help presenters understand the factors that are important in communicating our ideas well.

We will discuss how executive presentations are put together with photos & videos. Audience is urged to watch this one video in advance as we will build the process on top of the items discussed there.

https://youtu.be/Iwpi1Lm6dFo?si=hLr6nOQyuewPALum