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DEPARTMENT OF ELECTRONICS AND COMMUNICATION

EXPLORE, DREAM, DISCOVER

ISSUE 57 MONTHLY NEWSLETTER NOVEMBER 2022

GENESIS

IGNITING THOUGHTS

Contents

Vision

- To be recognized at the national and international level for excellence in education and research in Electronics and Communication Engineering.

Mission

- Inculcating leadership qualities, adaptability, and ethical values
- Imparting quality education in the field of electronics, communication, and related areas to meet the challenges in the industry, academia, and research
- Nurture the growth of each individual by providing a dynamic and conducive learning environment.

DEPARTMENTAL ACTIVITIES

A visit to an old age home “Jesus Bhavan” Mankuzhy was made on 13th November 2022, as a part of “DHARMAAN”. DHARMAAN is a society under the ECE association that is meant for feeding the hungry. In association with this program, we distributed some groceries and daily needed items to the inmates of Jesus Bhavan old age home. Around 20 students from the ECE department, along with the staff coordinators and HOD visited the old age home and spent some time with them.

HAM RADIO WORKSHOP

"HAM RADIO WORKSHOP" as hosted by the Communication Society Chapter of IEEE Student Branch, ASIET in collaboration with the Communication Society of Kerala section on 31st of October, 2022 from 10.30 am to 12.30 pm in the college auditorium. The session was about 'the importance of Ham radio. Working of Ham radio' and its role. The former was handled by SUBRAMANIAN N SHASTRI, Director, Institute of Amateur Radio in Kerala, Director, Ham Radio Emergency Network, Kochi.

The session began with a short introduction on 'Ham radio' by Ms.Titya Ramachandran, Women in Communication coordinator, and a welcome speech by N Sneha Das, Secretary, IEEE Communications Society SBC. A small speech was given by Ms. Neema, Chapter Advisor of the Communications Society. The speaker gave several insights about the importance of Ham radio in the communication uses of Ham Radio, and the role of Ham radio operators. The participants were given various examples of different types of equipment. Later provided several tips to obtain a license in Ham radio.

The session was set into motion with a brief interaction with the attendees about their knowledge on Ham radio. The speaker was able to provide a clear-cut idea about amateur radio operators. The significance of amateur radio operators who have also provided emergency communications during forest fires, floods, hurricanes, and other disasters. They serve as an important link between stricken communities and the outside world until normal communications are reestablished. The session also paved out to be an interactive one where the students raised various questions regarding the topic. He then gave real life examples of several persons who had made use of the Ham radio.

By the end of the session the attendees acquired knowledge about the importance and role of Ham radio equipment of Communication. A feedback session where the students gave their views on various aspects of the session was also conducted. The session was then concluded with a vote of thanks delivered by Mr. Sreekarun A, Vice Chairperson IEEE Communication SBC ASIET.


IEEE ComSoc | IEEE ComSoc Kerala Chapter
IEEE ComSoc
IEEE
HAM RADIO Workshop
31st OCTOBER 2022
10:30 AM
Main Auditorium, ASIET
IEEE ComSoc Member: FREE
IEEE Member: ₹100/-
Non IEEE Member: ₹150/-
THE SPEAKER
SUBRAMANIAN N SHASTRY
DIRECTOR,
INSTITUTE OF AMATEUR RADIO IN KERALA
REGISTER NOW
min.lc/HamRadio-Workshop
SCAN HERE
IEEE | SB ASIET
Adi Shankara

CAMPUS PLACEMENTS

CONGRATULATIONS
to our students of 2019-23 batch

Ashily Shibu
6D Technologies,
Quest Global

Gayatri M
Quest Global

Amal Krishna V
Quest Global

Abijith K
Quest Global

Abhirami Muraleedharan
Quest Global

Hritika S Pai
Quest Global

Swetha S
Suyati Technologies

Sneha V Iyer
Qburst

ACCOLADES

Our team won the runners-up trophy in the KTU D-Zone Women's Volleyball Tournament held at Viswajyothi Engineering College, Vazhakulam.
Kudos to the team and our students from the ECE department, Ashly Shibu and Anna Mary Jose for this wonderful victory.

Anna Mary Jose
S7-ECE A

Ashily Shibu
S7-ECE A

Mr. Akhilkumar A of the 2018-22 batch was awarded the Outstanding Student Volunteer 2021 award by IEEE PES Kerala Chapter. Congratulations on this remarkable achievement!

TECH TALKS

STAFF ZONE

EXPLAINABLE AI (XAI)

NEEMA M
ASSISTANT PROFESSOR
ECE DEPT.

Recently, we have seen a widespread adoption of Artificial Intelligence (AI) in almost all walks of life. The AI market worldwide have grown from 480 billion US dollars in 2017 to 2.59 trillion US dollars in 2021. AI has become an in escapable technology and have significant impact on society. We are already accustomed to AI making decisions for us in our daily lives, from product and movie recommendations on Netflix and Amazon, to friend suggestions on Facebook and tailored advertisements on Google search result pages. However, while using AI in life-changing decisions such as disease diagnosis, it is critical to understand why and how such a decision was made. The critical importance of explaining AI outcomes becomes clear at this point.

Problematically, while AI algorithms appear powerful in terms of results and predictions, they have a lack of transparency, making it difficult to gain insight into their internal working mechanisms, particularly Machine Learning (ML) algorithms. This complicates matters even more because entrusting important decisions to a system that cannot explain itself poses obvious risks. Explainable Artificial Intelligence (XAI) proposes a shift toward more transparent AI to address this issue. Its goal is to develop a set of techniques that generate more explainable models while maintaining high performance levels.

While the term is new, the problem of explain-ability has been around since the mid-1970s, when researchers investigated explanation for expert systems. However, progress toward resolving such a problem has slowed as AI has reached a tipping point with spectacular advances in ML. Technically, there is no standard and widely accepted definition of explainable AI. Actually, the term XAI refers to a movement, initiatives, and efforts undertaken in response to AI transparency and trust concerns, rather than a formal technical concept.

XAI is centered on the challenge of demystifying the black boxes, it also implies Responsible AI as it can helps to produce transparent models. This should happen without affecting the AI models accuracy, thus in AI in general and in ML specifically, often a trade-off must be made between accuracy and interpretability.

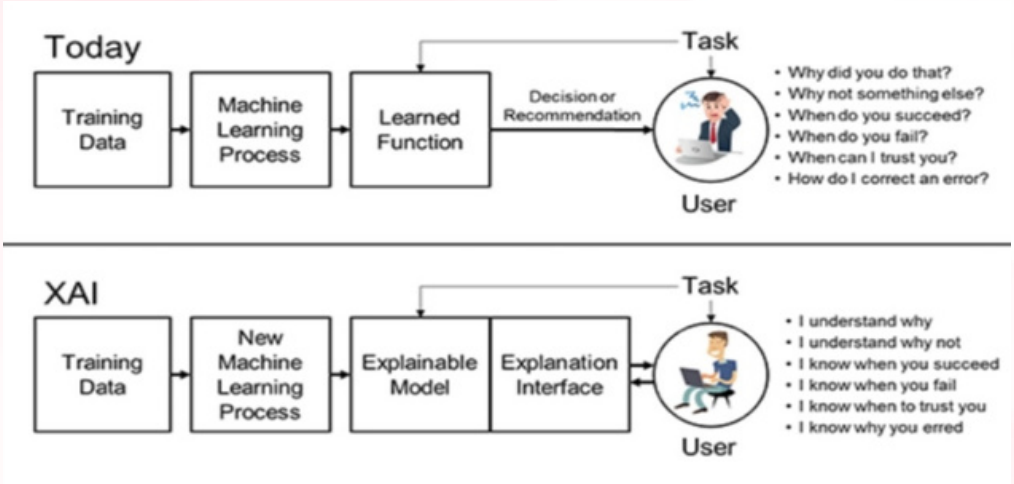


Fig 1: XAI concept

Reasons for XAI

The need of XAI can be for commercial benefits, for ethics concerns or for regulatory considerations, XAI is essential if users are to understand, appropriately trust, and effectively manage AI results

1. Explain to justify: There is a growing demand for explanations to ensure that AI-based decisions were not made in error. When we speak of an explanation for a decision, we generally refer to the need for reasons or justifications for that specific outcome, rather than a description of the inner workings or logic of reasoning behind the decision-making process in general.
2. Explain to control: Explainability is not just important for justifying decisions. It can also help prevent things from going wrong.
3. Explain to improve: Another reason for building explainable models is the need to continuously improve them. A model that can be explained and understood is one that can be more easily improved
4. Explain to discover: Asking for explanations is a helpful tool to learn new facts, to gather information and thus to gain knowledge. Only explainable systems can be useful for that.

As a result, when it comes to explaining decisions made by algorithms, there is no single approach that works best. There are many ways to explain. The appropriate choice depends on the persona of the consumer and the requirements of the machine learning pipeline.

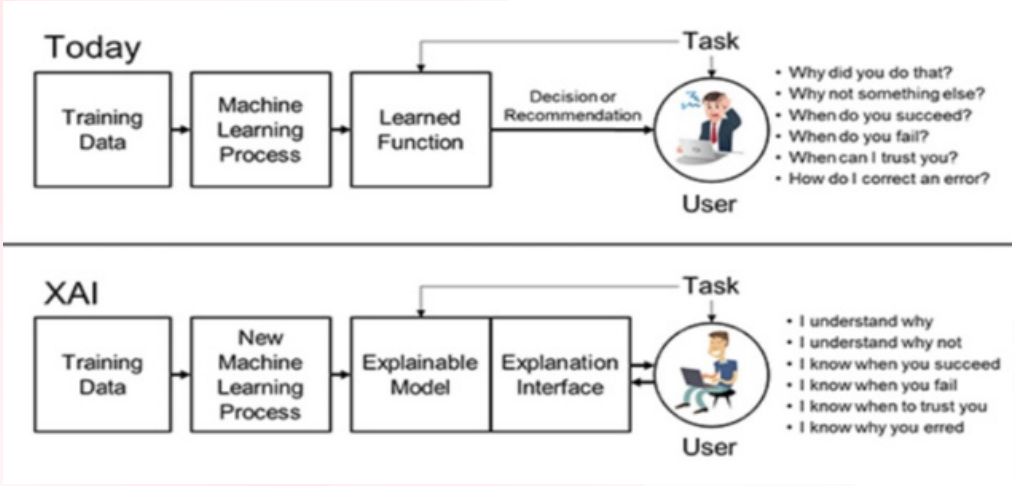


Fig 2: AI Explainability Usage diagram

AI Explainability 360, AI Fairness 360 and Adversarial Robustness 360, two other open-source toolboxes from IBM Research released in 2018, to support the development of holistic trustworthy machine learning pipelines. Explainable AI is a set of tools and frameworks to help you understand and interpret predictions made by your machine learning models developed by Google. SHAP is another novel approach to explainability developed by Scott Lundberg at Microsoft and eventually opened sourced.

XAI application Domains

1. Transportation: Transportation is a potential application domain of the XAI. Works towards explaining self- driving vehicle behaviour have already started, but there is a long way to go
2. Military: Now a days, AI in the military arena also suffers from the AI explainability problem.
3. Health care: Only by interpreting the model, medical diagnosis, which is responsible for human life become reliable
4. Legal: In criminal justice, transparency of how a decision is made is a necessity in this critical domain.
5. Finance: AI credit-based score decisions more explainable and auditor friendly

Moreover, XAI can find an interesting application in others domains like cybersecurity, education, entertainment, government, image recognition etc

REFERENCE

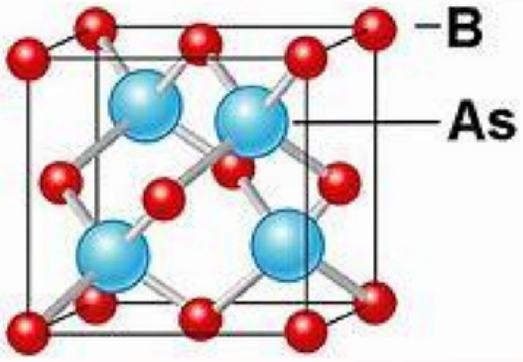
1. Gunning, David, et al. "DARPA's explainable AI (XAI) program: A retrospective." Applied AI Letters 2.4 (2021): e61.
2. A. Adadi and M. Berrada, "Peeking Inside the Black-Box: A Survey on Explainable Artificial Intelligence (XAI)," in IEEE Access, vol. 6, pp. 52138-52160, 2018, doi: 10.1109/ACCESS.2018.2870052.
3. https://www.ibm.com/blogs/research/2019/08/ai-explainability-360/
4. https://cloud.google.com/explainable-ai

STUDENT ZONE

Cubic Boron Arsenide -Successor of Si

Avin Sony
S5 ECA

Silicon is one of the most abundant elements on earth and, in its pure form, is the basis of many modern technologies, from solar cells to computer chips. However, the properties of silicon as a semiconductor are far from ideal.
For one thing, although silicon allows electrons to easily pass through its structure, it is less likely to get into "holes" - positively charged copies of
electrons - and the mining both are important for certain types of chips. Also, silicon is not a good conductor ofh eat, which is why overheating problems and expensive cooling systems are common in computers.
Both these issues have been sort out by Cubic Boron Arsenide.The compound promises 10 times greater heat dissipation than silicon, while also having much better flowability for positively charged particles known as holes.



THERMAL CONDUCTIVITY

Researchers predict that boron arsenide has theoretical thermal conduction of 2200 W/m/K, the highest ever achieved by any compound. However, high-quality materials are required to achieve such a high value since defects and impurities drastically degrade thermal properties. It is the first known semiconductor with a bandgapequivalent to silicon of nearly 1.5 eV to have ultrahigh thermal conductivity.

ELECTRICAL CONDUCTIVITY

BAs has high electron and hole mobility, >1000 cm2/V/second, unlike silicon which has high electron mobility, but low hole mobility.Semiconducting cubic boron arsenide (c-BAs) has been predicted to have carrier mobility of 1400 square centimeters per volt-second for electrons and 2100 square centimeters per volt-second for holes at room temperature.With near-bandgap 600-nanometer pump pulses, it was found that a high ambipolar mobility of 1550 ± 120 square centimeters per volt-second, in good agreement with theoretical prediction. Additional experiments with 400-nanometer pumps on the same spot revealed a mobility of >3000 square centimeters per volt-second,
which we attribute to hot electrons. The observation of high carrier mobility,
in conjunction with high thermal conductivity, enables an enormous number of device applications for c-BAs in high-performance electronics and optoelectronics.

c-BA's Attributes and Features

BAs have shown thermal conductivity of 1200 watts per meter per Kelvin (W/m/K), and ambipolar mobility of 1600 centimeters squared per volt per second (cm2/V/s). It is predicted that due to the hot electron effect, the electron mobility in cubic boron arsenide could reach as high as 3,000 cm2/V/s. Additionally, boron arsenide has a good bandgap, which makes it suitable for different applications compared to silicon.
Boron arsenide has a thermal conductivity that is ten times greater than silicon. Silicon and gallium arsenide have good electron mobility and poor hole mobility. Graphene has high carrier mobility, but its substrates are expensive.
In addition to heat dissipation, electrical transport, and bandgap properties, semiconductors must be commercially viable to be considered a strong candidate for application in next-gen electronics. They need to be made at scale and at a justifiable price to find their place high on the rank of best semiconductors. Fast and cheap hits the mark. At the moment, there is a lot more to be invested in purifying the c-BAs crystals to enhance their practicality. It could take decades to reach that point.

Applications

Boron arsenide is most appealing for use in electronics thermal management.Experimental integration with gallium nitride transistors has been shown to form GaN-BAs heterostructures, which perform better than the best GaN HEMT devices on diamond or silicon carbide substrates.Manufacturing BAs composites was developed as highly conducting and flexible thermal interfaces.Defect-free boron arsenide crystals have been experimentally realized and measured with an ultrahigh thermal conductivity of 1300 W/(m)K consistent with theory predictions. First-principles calculations have predicted that the thermal conductivity of cubic BAs is remarkably high, over 2,200 W/(m)K, at room temperature, which is comparable to that of diamond and graphite. Subsequent measurements have yielded a value of only 190 WThermal conductivity of 900–1000 W/(mK) has been demonstrated for crystals with a low defect density.t has been discovered that the cubic-shaped boron arsenide conducts heat and electricity more effectively than silicon, and that it also conducts electrons and its positively charged counterpart, the "electron-hole," more effectively than silicon.

STAFF ACHIEVEMENTS

Dr. V T Gopakumar

- Attended two day workshop on Intelligent IoTs organized jointly by IIIT Kottayam IEEE Communication Society on 28 and 29 October organized jointly by IIIT Kottayam IEEE Communication Society

- Attended Amrita - DPRI Kyoto University Japan online Joint workshop in Disaster management on 11 Oct 2022 by Amrita - DPRI Kyoto University Japan.

Remya Ramesh

- Attended a Webinar on International Seminar in Deep learning techniques for medical image classification on 11/11/2022 conducted by M. Kumarasamy College of Engineering, Karur.

STUDENTS ACHIEVEMENTS

Student Batch	Name	Course attended	Conducted By	Date
2021-25	RITHWIK VALLABHAN TV	Python Programming	Tathva, NIT Calicut	10/21/2022
2021-25	SWATHY KRISHNA B	Python Workshop	NIT Calicut	10/21/2022
2021-25	HARIPRASAD ARAVIND	Python Programming	NIT Calicut	10/21/2022
2020-24	JOEL SAJI	Android app development	Techmaghi	10/02/2022
2019-23	SIDHARHTH AJ	Deep Learning	NPTEL	10/30/2022
2019-23	SIDHARHTH AJ	Essential mathematics for machine learning	NPTEL	10/30/2022
2019-23	SONA PAUL	Deep Learning	NPTEL-IIT Madras	11/17/2022
2019-23	MANIKANDAN AR	Deep Learning	IIT Madras	11/17/2022
2019-23	SONA PAUL	Essential mathematics for machine learning	NPTEL-IIT Roorkee	11/10/2022
2019-23	VYSHNAV CJ	Deep Learning	NPTEL	11/10/2022
2020-24	TITYA RAMACHANDRAN	Essential mathematics for machine learning	IIT Roorkee, NPTEL	10/30/2022
2020-24	JAISON T POULOSE	HACKATHON	Jeppiaar College Of Engineering	10/13/2022

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