



**ATMANIRBHAR BHARAT - ARTIFICIAL INTELLIGENCE, A STRATEGIC SYNERGY
BETWEEN IT AND DEFENCE**

IT for Defence 2022

Hybrid Conference by CSI- Bangalore Chapter and SIG-Formal Methods, Computer Society of India

Date: March 4th and 5th, 2022

**Summary, Recommendations and Conclusions
Of the Conference on ITD 2022**

**Aatmanirbhar Bharat – Artificial Intelligence, A Strategic Synergy
between IT and Defence
March 4-5, 2022**

INTRODUCTION

A two day Hybrid Conference was organized by CSI Bangalore Chapter and SI-Formal Methods, CSI on March 4-5, 2022 on IT in Defence, 2022. The Theme was inspired by the fact that almost all defence related systems and functions are being influenced by AI in many ways and forms . The Theme of the Conference was accordingly titled “Aatmanirbhar Bharat- Artificial Intelligence, A Strategic Synergy Between IT and Defence, ITD2022”

The first day inauguration was both live and online. The live inauguration was conducted in Royal Orchid, Bangalore Central, at the Manipal Centre, Dickerson Road, Bangalore 56001. The formal Inauguration was done in the virtual mode by Dr. G Sateesh Reddy, Secretary, Department of Defence (R&D) and Chairman DRDO, including the Inaugural Speech. It was restricted to the main dignitaries, sponsors and selected invitees and CSI special invitees such as past Chair persons and the Sponsors such as the Principal sponsor, Maxbyte Technologies, Diamond Sponsor, Altair Engineering and Silver Sponsor, Ansys and Technology Partners, CDAC. The Guest of Honor was Dr Rajalakshmi Menon, Program Director (AEW&C MKII), and Director, CABS, DRDO who addressed the gathering at the Inauguration. Other speakers who spoke were the Special Invitee was Dr.Gautham Mahapatra President of CSI and Director of IT in RCI and the Special Advisor to ITD 2022, Dr. Prahlada Ramarao, Padma Shri, Pro-Chancellor S-VYASA, Former VC (DIAT).

SUMMARY, RECOMMENDATIONS AND CONCLUSIONS

There were in all 21 papers presented at the 13th Conference on IT in Defence, on the Theme AI, A Strategic Synergy between IT and Defence. The papers presented came from a number of different organizations, such as Defence forces, Defence R&D establishments, Civil Aerospace R& D Labs, Public and Private Industries and Academic Institutions. The papers presented were of high quality from very eminent speakers working in the field of Artificial Intelligence, Machine Learning, Formal Methods, Application areas of defence and heads of various Organizations and Software developers in the field. Here are some key points

1. A keynote presentation by the Director of CAIR looked into issues regarding IPR for AI/ML software when deployed. This is in particular to those OEM vendors who deliver to the defence forces and how they should calibrate the data.
2. Since for effective AI application, continuous learning is important, the Director of the Young scientist Lab in Bangalore presented an approach for how to develop an approach to avoid Catastrophic forgetting to achieve continuous learning.
3. There were papers on Formal Methods for safety critical missions and for other type of applications.
4. There were more than 5 papers that talked about digital twin and making of the digital twin from operation purposes, maintenance purposes to war games and training purposes. In all of them it was mentioned that making a Digital Twin requires the generation of data both by way of testing and simulation. Hence AI and ML are necessary tools.
5. Another important point brought by the speakers is that for real time interface and operational purposes the human in the loop is required. One cannot have a fully autonomous system.
6. AI and ML are now essential technologies of current day combat and they are being used in the Indian Scenario and is being implemented in the Services.
7. People talk of AI as if it is a monolith Technology but consists of several technologies.
8. There is a need to have continual learning in AI as the data keeps changing.
9. AI based sensor technologies have been developed.
10. For operational Conditions AI requires Human interface.
11. Five key areas that are required to drive AI at the national policy level to ensure that the country maintains the initiatives in AI/ML in the battlefields of tomorrow

- a. Through initiatives that can push fundamental research breakthroughs in commercial space.
 - b. Have a requisite AI/ML Development roadmap for a vision that the stakeholders can work towards.
 - c. To created initiatives that can help in creating a military AI/ML pipeline for defence establishments
 - d. Need to develop formal methods for developing and formulating verification, validation, testing and certification of AI/ML technologies
 - e. Lastly developing operational concepts and analytical war gaming frameworks to enhance the capabilities.
12. Since AI will be omnipresent in the future, responsibility of software engineers to make AI reliable, responsible, explainable is very high
 13. Considering that India is very strong in software., there are huge opportunities for India becoming s world leader in AI both in defence and non-defence applications.
 14. AI requires data and specific efforts need to be made to collect and categorize data.
 15. AI and applied machine learning for improved product development cover multiple areas of applications.
 16. Digital Twins are both data driven and physics driven models. One of the biggest design areas in digital twins are to be able to make operational decisions. Because of the large test and simulation data, high performance computing is required.
 17. There is a need to democratize Data Science for Engineers.
 18. By saying AI should be it should be explainable it implies that one should have a better understanding of how AI works.
 19. People talk about facial recognition. In India there are very wide facial varieties Hence there is a lot of scope for this in the Indian Army
 20. India is slowing getting good in Hardware too not just in Software.
 21. Building a fully autonomous system is not really possible. One should be looking at having a human in the loop. AI will reduce the response time of the human.
 22. Human IN THE LOOP IN DEFENCE SYSTEMS APPEARS MANDATORY. Whether both proactive and reactive decisions need to be shared needs to be addressed.. Need to build in the human interface in AI applications. How judiciously incorporate co working in AI. AI in Indian ecosystems is important. Hence they have to be tailored to Indian Culture. It should be spiritual, emotional, mental etc.

23. One assumes that data is coming from a fixed process. Once the opponent knows that one has an AI in the system he will try to change the data. Data trips. The opponent will camouflage the data. So AI has to learn the new data. So we need to have a new way of managing the AI data and so a new AI life Cycle Management system is required.
 24. This data management is also call ML operations and every model is challenged and only the best model is kept..
 25. In preventive or logistic maintenance autonomous AI maybe used reliably but in operational conditions as such as in explainable AI, human interface is required.
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