REPORT OF THE PROCEEDNGS OF 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 G Sateesh Reddy, Secretary, Department of Defence (R&D), 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 spoke 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 was Dr. Prahlada Ramarao, Padma Shri, Pro-Chancellor S-VYASA, Former VC(DIAT), Pune

INAUGURATION

The detailed program of the inauguration is given in the Annexure 1. There was a welcome address by Dr. Shrishail Angadi, Chairperson of CSI BC and Program Chair who then Introduced Dr.Gautham Mahapatra President of CSI and Director of IT in RCI. He said that by agreeing to inaugurate the Conference , Dr. Satheesh Reddy has made the conference important and relevant. CSI is a PAN India body with branches in 25 cities. AI is the force multiplier in defence. AI will eventually manifest in almost all aspects of warfare starting from , military equipment and platforms, combat simulation and training, mission planning , operations and decision making, target recognition and cyber warfare.. He said that CSI has more than 75 student branches pan India. He urged that industry should join with the CSI to train students in AI. CSI is also planning to start a Special Interest Group in AI.

Dr. Ramanathan, Event Chair spoke about the IT in Defence. Dr.Prahlada Ramarao, Special Advisor, ITD 2022, gave an overview on the Theme of the conference and the papers being presented. He said that the IT in Defence - Theme conference was initiated by Dr. C R Chakravarthy in 2004.

Mr. Viswas Bopanna, Treasurer, CSI BC introduced the next speaker, Dr. Prahlada Ramarao,. Dr.Prahlada Ramarao brought to the attention of all that back in the 1970s computer was only an addon item in the complete radar which was full of RF items and digital circuits , mechanical items , structure and some small signal processing analog/digital hardware . Computer was only at the end as interface with desktops to retrieve the data and try some simple data processing .
When the next generation radars called Phased Array radars came into operation there was a marked difference in the way the computers were playing their role . The computer systems took

the centre stage and the computer with its embedded software was continuously monitoring every subsystem, interfacing and communicating with all the subsystems of the radar like transmitter , receiver , power supplies , data processor , signal processor , displays ,health monitoring, real time calibration .The computer , actually a number of them , in the so called radar had taken full charge for supervisory role . The RF systems occupying limited space was seemingly carrying out secondary functions . He said that he sees a similar futuristic advancements happening when the artificial intelligence (AI) modules will take over most of the functionalities and activities of the radar system and interface and interact with other hardware and software modules in the radar. This will be extended to all defence systems whether software defined radio or torpedoes or missile systems or unmanned vehicles or airborne early warning systems or guns or bombs or support systems . AI based models will be continuously monitoring , interacting and managing functionalities of all the elements of each of the defence systems , taking over most of the thinking, logical and high speed functions of human operators and getting the best out of the defence systems . It is therefore seen that all the end to end activities like configuring , designing , operations , interaction functionalities , maintenance , harnessing the capability of the systems , inventory management and whatever one can explain . The AI will be at the centre stage . AI based systems will be the brain controlling all the activities of the defence systems , not only influencing just the operations and management but also correcting , learning , adaptive , self healing and self configuring . It will make the life of defence operator much more effective than what it is today . He expressed happiness to see that so many key participants are in this webinar and the papers cover machine learning , digitalisation , predictive maintenance , intelligent and quick decision making , humanoid, naval warfare systems in the next 2 days . A number of senior officials from private , government , defence and DRDO are sharing their thinking and strategies for years to come and how the AI will be strategically synergizing all the different operations .

Dr. Ramanathan, introduced the Chief Guest Dr. G Sateesh Reddy, Secretary, Department of Defence (R&D), Chairman DRDO, to the august gathering and requested him to inaugurate the conference and deliver his address. Dr Satheesh Reddy congratulated CSI for the 13th conference on IT in defence and the theme ---- AI a Strategic Synergy between IT and Defence. He said that AI is going to play a major role in all defence systems and will be present in all of them in the future. It is important for IT and AI people to work together. DRDO has started dedicated cells in AI work in all labs. AI will play a significant role whether it is Radar, missiles, UAV or in electronic warfare. . He said that the Prime Minister has given encouragement by asking DRDO to set up Young Scientists Laboratories in many fields and one has been set up for exclusively in Bangalore. He said that the Laboratory in Bangalore, Centre for Artificial Intelligence and Robotics , is playing a key role in this area. It has been promoting and giving support in this area of AI to many start-ups He requested the speakers and delegates to come up with specific guidance and roadmap in specific areas . He wished the participants the very best in the conference.

After the inauguration the Guest of Honour Dr Rajalakshmi Menon, Program Director (AEW&C MKII), and Director, CABS, DRDO was introduced by Ms.Bhanumathi, Event Co-Chair and Convener of SIG-FM, CSI . The Guest speaker said that today AI has become broader and not just the pursuit of true humanlike intelligence. AI is used in many applications such as E-commerce, for personalized shopping, AI Powered Assistants for NLP using NLP, fraud detection and prevention,

in Education such as developing automated education aids for educators, creating smart content, application in navigation for companies such as those providing taxi services, to improve operational efficiency, optimize, analyze road traffic, and optimize routes, etc, robotics, Healthcare , Social Media , law and Finance.

She mentioned that a casual search for AI in the defence sector will not find many applications because it has not yet been fully exploited as yet and conferences such as this will further the use of AI in the defence sector. She emphasized that the use of AI in defence includes Training, Surveillance, Ammunitions and Arms and Cyber security and Logistics. Training and simulation are diverse fields that employ system and software engineering ideas to create models that can assist soldiers in training on different systems used in actual operations.

AI technology is now employed in new age weaponry. Advanced missiles, for example can estimate the kill zones . . Intrusion detection is classified as authorized or not. And Artificial Intelligence aids are used to help in such classifications. She said that India is incorporating AI based technologies in its Combat and Surveillance Projects.

After land, sea, and air , cyberspace is current regarded as the war front in military circles. A hacked or malevolent network will jeopardize the security of entire region. Machine learning is being employed by the defence services to protect against unauthorized intrusions.

She told that there are 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.

The inaugural session then ended with the opening of the virtual exhibition and the Vote of Thanks by the Program Chair Mr. T Sabapathy.

TECHNICAL SESSIONS
Day 1: Mar 4, 2022

Session 1: 11:30-12:00 - **AI Integrated in Weapon Systems**

Session Chair: Dr. Janaki C H, Associate Director and Group Head, CDAC

Dr. Ramakrishnan Raman, Fellow, Honeywell Machine, *Learning Models for Behavior & Performance Predictions in Complex Airborne Systems*

Mr. Surendran Devaraj, Chief Product Director, Maxbyte Technologies, *Digital Manufacturing Transformation Approach for Defence Industry*

Raghavendra Bhat, Technical Manager, Ansys, *Harnessing the power of AI/ML in safety and mission critical systems*

We had three tracks with multiple session in each track viz., First Track on Digital Technologies in Defense Mission with sessions on AI Integrated in Weapon Systems (Defensive & Offensive Systems) and Significance of AI in Defence Platforms (Aircraft, UAVs Naval Ships, Submarine, Tanks etc.). The first speaker from Honeywell spoke on the topic of Machine Learning Models for Behavior & Performance Predictions in Complex Airborne Systems. He talked about Machine L earning (ML) Models for Performance Prediction and then ML Model for Behaviour Prediction. In the first case he takes the case study of aircraft fuel flow and in the second case he takes the case study swarm of autonomous UAVs. Measure of Effectiveness (MOE), Complex systems.

The Maxbyte on Digital Manufacturing Transformation Approach for Defence Industry He talked about evolution from Internet of People to Internet of Things. All devices and hardware are connected at the physical level. The other levels are Communication Level, System level and End User Level. Now everything is going into AI based solutions. He also talks about IoT Cyber Security and introduction of Robotics. He mentioned the Key Challenges of IIOT which includes awareness, Technology, Implementation and last the Validation and Adoption.

The last from ANSYS on Harnessing the power of AI/ML in safety and mission critical systems. He talked about what are the motivations for harnessing AI/Ml and AI in Control Applications and Formal Methods based on verification. AI requires powerful computer resources and also GPUs. For Embedded systems there is a limit on computer resources. He talked about model based s/w design with certified code generation. He talked about AI in control applications. He talks about connecting to Neural network library.

Session 2: 14:00 15:30 - **Formal methods and Application of formal methods for safety critical applications**

Session Chair: Dr. C.M Ananda, Chief Scientist & Prof. AcSIR, Head - Aerospace Electronics & Systems Division, CSIR-NAL

Dr. Sumumana Ghosh, Prof. ISI, Kolkata**,** *Formal Methods for Robust Design of Control Schedules for Real-Time Cyber-Physical*

Dr. Manju Nanda, Chief Scientist and Associate Director ALD, CSIR-NAL, *Formal Methods in Aerospace Engineering*

Mr. Sagar Verma, Researcher, TCS, *EImprove - Optimizing Energy and Comfort in Buildings based on Formal Semantics and Reinforcement Learning*

The second Track on Digital Technologies in communication systems. The next session was on Formal methods and Application of formal methods for safety critical applications. We had on speaker from ISI Kolkata on Formal Methods for Robust Design of Control Schedules for Real-Time Cyber-Physical Systems. She started with showing various Cyber-Physical Systems – integration or computation, communication and control. Safety Critical applications deal with Embedded Control systems. She discussed the Federated architecture (each controller has its own resource.) and Integrated Architectures (multiple controller share the same resources). Her work focused on Formal method application to the Integrated architecture design for coming up with a robust design.

The second paper on Formal Methods in Aerospace Engineering could not be presented by the Author since she was tied up in some urgent work, but however Dr. C M Ananda gave a gist of the Formal Methods activities in CSIR-NAL. Formal methods have been initiated in their group for over a decade. They have introduced the verification of the models using formal methods. They have used it for their aircraft level programs and in their LRUS and in their testing. They have a lot of requirements in the scheduler applications. Packet drops are unacceptable in their applications.

The paper from TCS research on EImprove - Optimizing Energy and Comfort in Buildings was based on Formal Semantics and Reinforcement Learning. He stated the problem as Heating, Ventilation and Air conditioning, Regulate Temperature and at 50% of energy load and Optimize the Energy and Thermal Comfort. It is a control problem. It can be classified as Schedule Based, Model Based and Machine Learning based. Schedule based does not capture the dynamics of the model. Model based requires a well calibrated model. Machine learning based requires a lot of data. EImprove is their method which takes care of the deficiencies of the three earlier models.

Session 3: **16:00-16:30 - <u>AI Supported Defence Learning and Development Systems</u>**

<u>Session Chair</u>: **Dr. Manjularani, NPOL**

Speakers:

Nilesh Parulekar, GM & Head Defence Electronics And Sensors, L&T, *Changing Paradigm from Preventive to Predictive maintenance - AI as enabler*

Dr. Sunny Manchanda, Director, Young Scientist Lab, DRDO, *Using AI to Continual Learning*.

Captain T N Pranesha, (IN) Retd. , Senior Vice President, ADTL, *Relevance of AI Technology in Active Protection System*

Dr. Bharat Jayaraman, Emeritus Prof. University at Buffalo (SUNY), *Model Extraction and Runtime Verification of a Java-based UAV*

The speaker from L&T delivered on topic Changing Paradigm from Preventive to Predictive maintenance - AI as enabler. The session on how AI is revamping the maintenance operations from reactive to predictive approach, how AI is recommending tailored maintenance schedules for improving military operations was interesting. He compared the importance of the equipment which requires predictive maintenance as compared to preventive. It should be based on need based importance. He talked about getting data in order to make the digital Twin for floating assets etc.

Next speaker is Director from Young Scientist Lab, DRDO delivered his talk on AI for continual Learning. One of the Sections in Continuous Learning Paradigms is Approaches to Avoid Catastrophic Forgetting. He talked about different paradigms for AI like multi task learning, Meta learning, lifelong learning. This is how humans learn. AI systems struggle to learn in a lifelong way after it has been put into production. Machines are not able to do so. Can a Robot pick up new skills when deployed in the field. If multiple tasks are there then one a skill is learnt first and then

the a second task is learnt then if the first task degrades then it is called Catastrophic Forgetting. He talks about methodology to avoid this in machine learning.
Next talk on Relevance of AI Technology in Active Protection System by Alpha Design. Globally, ground forces are looking for protection of assets against variety of emerging new generation threats like AGTM(An anti-tank guided missile (**ATGM**)), RPG's (Role Playing Game-RPG) & RR's (Rashtriya Rifles-RR's)in the tactical battlefield. We had good talk on Active Protection System (APS), a promising solution to counter this threat. Active Protection System (APS) consists of real time sensing of the battle field with Electro Optical (EO) & Radar sensors, detection & identification and locating the threat, responding to the same with graded attack of combination of Electro Magnetic (EM) (Jammers), Interceptors and optionally with High Energy Weapons to neutralize the threat. He showed the status of APS in various countries. He showed the system of APS concept and the system.
Next topic by Professor from University at Buffalo (SUNY) on Model Extraction and Runtime Verification of a Java-based UAV The talk on Model Extraction and Runtime Verification of a Java-based UAV covered the structural and behavioral properties of jUAV, a Java-based adaptation of an open-source controller for autonomous and manual flying of unmanned aerial vehicles with case studies. He talked about Paparazzi UAV.

Day 2: Mar 5, 2022

Session 4: 9:30-11:15 - **AI in support Systems, Army bases, Airforce bases, Naval Bases**
Session Chair: Dr. Narasimhamurthy, Sc "G", ADA
Speakers
Dr. Subrata Rakshit, Director, Centre for Artificial Intelligence and Robotics (CAIR), DRDO, *IPR, Regulatory and Economic Challenges for ensuring Synergy between IT and Defence*
Rear Adml. Guninder Singh Jawanda, Director General, WESEE, Naval Product, *Artificial Intelligence and Future Naval Warfare Systems – A Pragmatic Perspective*
Maj Gen Ravi Chaudhary, VSM (Retd), NTRO, *Suggested Data and AI Strategy for the Forces*

In the first session on Day Two on AI in support Systems, Army bases, Airforce bases, Naval Bases, we had Key Note address by CAIR Director on IPR, Regulatory and Economic Challenges for ensuring Synergy between IT and Defence. His talk was very important. CAIR is an important Lab in DRDO exclusively for AI and Robotics. He talked about various IPR, Regulatory and Economic Challenges that face the Defence Sector before AI can be delivered. Between Demand and Supply there are a number of issues. There are a number of Synergy Challenges posed by AI. They are Requirements, Design and Development, Acceptance Tests, Certification, and Production and Costing. The system not only has software but also has AI built in. Requirements and Acceptance are very important. AI is different from the usual hardware or software systems. After acquisition, deployment takes place. Before deployment, calibration has to be done before putting it to use in the field. Data for Calibration, acceptance, deployment. Sinc it is generated by the computer, one has to be sure what is generated is correct. He talked about Explainable AI, Believable AI, regulating AI.

Next talk was by Director General, WESEE on Artificial Intelligence and Future Naval Warfare Systems – A Pragmatic Perspective. He lecture was about the plethora of sensors, that are available, so before one can deploy and activate the weapon they should Observe, Orient, Decide and Act. Observe and the payloads have become services now. He talked about new technologies to improve observe and decision making. So AI is necessary. He said that a Digital Twin is being built. AI has to come as a partner between the machine and the human. A large number of

aggregated small numbers of autonomous ships are more valuable than a few large manned naval ships. AI is used for mission critical applications and not for safety critical applications since they are rule based. Human and AI have to work together. AI will be disruptive. WESEE is making combat systems which are modular and these tactical systems were earlier rule based.

The last lecture in this session was on Suggested Data and AI Strategy for the Forces by NTRO. He talked about information as the primary resource in the battlefield to get Asymmetry against the enemy. This is where AI plays a prime role. He stressed about Data quality and converting to Information. He spoke about Own Data, Adversary Data and Terrain Data. He spoke about a Typical Intelligence Architecture with AI/ML to work on the Data. He talked about data as a service.

Session 5: 11:30-13:00 - AI in Electronics (networks, radars, 5G, sensors, IR

Session Chair: ES. Padmakumar, Deputy Director, Control Guidance and Simulation Entity (CGSE), VSSC , Trivandrum

Dr S Karunanidhi Subramoniam, Associate Director, OS, RCI, DRDO Hyd, *SMART Defence Systems*

Rajesh Krishnan, Vice President –Technical Operations, Enterprise Solution & Analytics, Altair, *Realizing the Digital Twin for Optimized Product Development*

Dr. S.E. Talole, Scientist `G' and Group Director, Systems & Control Group at the R&DE(E), Pune, *Technology Challenges in Humanoid Robotic System*

The next session on AI in Electronics (networks, radars, 5G, sensors, IR). Associate Director RCI spoke on SMART Defence Systems. He talks about Cyber Physical Systems, IOT, Engine Management Systems, Additive Manufacturing System. He talked about using some of these techniques used the various launch vehicles.

The second talk in this session was on Realizing the Digital Twin for Optimized Product Development by Altair Engineering. He talks about how to move for IOT, AI/ML to a digital Twin. The idea is to leverage the Convergence of simulation, performance computing and AI. Everything is going towards smart and connected.

The last lecture was on Technology Challenges in Humanoid Robotic System by Group Director R&D Engrs. The session on Technology Challenges in Humanoid Robotic System covered the need for biped robot is most evident in applications requiring locomotion in hazardous human environments/areas which cannot be accessed by wheeled/tracked mobile robots or large multi-legged robots. In essence, it is desired to replace a human being by a robotic system in an environment meant for a human; an anthropomorphic bipedal robotic system is the only option.

Session 6: 14:00-16:30 Integration of AI in Defence Logistics

Session Chair: Dr. Sushma Verma, HQ DRDO

Speakers

Col. Aman Bains, Army Design Bureau, *Military Applications of AI - Opportunities and Challenges in New Age Warfare*

Dr. Vinay Jammu, VP - Physical Digital Technologies, GE, Digital Twins for Digital Transformation

Sundar Prasad Jayaraman, Sr Tech Architect, Accenture, *Artificial Intelligence in Maintenance and Operations*

Dr. Balaji Rajendran, Associate Director, C-DAC Bangalore, *Electronic Trust Models - Approaches and Solutions*
Dr. Anitha Singh,Scientist 'E', IRDE, DRDO,ARDE, AI Enabled Night Sight Surveillance System
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In this session on Integration of AI in Defence Logistics there was a talk by Col Amain Bains, from Army Design Bureau on Military Applications of AI - Opportunities and Challenges in New Age Warfare. AI has the capacity to revolutionary impact on the operation and capability of the armed forces in the future. Its applications has far reaching consequences for the military organization and structure. Advance weapons systems have to be integrated to the basic platforms and that is where AI comes to play a part. They are working with all sectors public sector and private sector in this area.

Next talk from GE was on Digital Twins for Digital Transformation. He talks about Motivation, Digital Transformation, Digital Twin Overview, Digital Twin Examples (Aviation engines), and Path to Digital Transformation). The motivation for digital twins are – safety, readiness, reliability and optimization (people, asset, cost, etc).

Accenture gave a lecture on Artificial Intelligence in Maintenance and Operations. He talked of technology trends such as AI, digitalization across value chains, Digital Twins, and Immersive Technologies. He talked about AI capabilities such as Computer Vision, Speech Analytics, Natural Language Processing, Virtual Agent, Predictive Analytics, and Responsible AI. He then goes on to AI in Production Engineering& operations, maintenance Repair and Overhaul. Responsible AI includes Biasness & fairness, Explainability, Human Touch and Governance and Accountability.

The talk from CDAC was on Electronic Trust Models – The topics discussed are Approaches and Solutions - Essential elements of Trust in Electronic Medium, Understanding Trust Models, Demystifying Technologies and Trust Requirement and Solutions. Essential Elements of Trust are Confidentiality, Integrity and Authentication and non-repudiation. He then talked of various Trust models.

The last paper was from IDE on AI Enabled Night Sight Surveillance System. Various applications of AI for various systems such as Cyber Security, cyber Warfare, Robotic Battlefields for Guns, battle tanks were presented. She spoke about AI emerging technologies. Also AI Enabled Electro-Optical Sensors. AI EO Sensors AI enabled Driver Night Sight System.

PANEL DISCUSSIONS

Topic: AI Leading to paradigm shift in Defence Systems

Moderator: **: Dr. Sudhir Kamath, Former Director General of DRDO Cluster Micro Electronic Devices and Computational Systems (MED & CoS)**

Panelists:

Dr. Prahlada Ramarao, Padma Shri, Pro-Chancellor S-VYASA

Rajesh Krishnan, Vice President –Technical Operations, Enterprise Solution & Analytics, Altairt are Con

Dr. Prahlada Ramarao: AI will be omnipresent. Responsibility of software engineers to make AI reliable, responsible, explainable is very high. . Considering that India is very strong in software., there are huge opportunities for India becoming s world leader in AI in defence and non-defence applications.

Dr. Sudhir Kamath said that AI requires data and specific efforts need to be made to collect and categorize data.

Rajesh Krishnan: AI and applying Machine Learning and applying machine learning for improved product development Looking at the Defence there are multiple areas of applications. There are data driven and physics driven models we call it digital twins, trying to design an operational decisions making one biggest area. Need for utilize high performance computing. Data is key. Either we get the key or get simulation data. We need to democratize Data Science for Engineers.

Prof. B Ravindran: People talk of AI as if it is a monolith Technology. When you say it is explainable. One should be more nuanced in talking about AI. We should be more understanding of how AI works. We have a great opportunity in India to take AI forward now. He said that we cannot say India is not good in Hardware. India is getting there. India is very good in software. People talk about facial recognition. In India there are very wide facial varieties. There is a lot of scope for this in the Indian Army. Building a fully autonomous system is not really possible. We should be looking at human in the loop. Let us not look at fully autonomous AI. It should reduce the response time of the human. This is the reason for setting up the Bosch Centre in IIT Madras. We have people from Different domains.

Dr. Sudhir Kamath: Change detection is also important to determine if there are changes in the border. Human in the loop is very important.

Dr Prahlada Ramarao: In Balasore they were doing Range safety. So they did a lot of AI. So the concept of co-working to determine where a human should be there is important. Do not remove the pilot from the loop. Compute does reactive decision. Human being takes reactive decision. Need to build in the human interface as Prof. Ravindran mentioned 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.

Visual inspection of gear heads – small fitting in the gear heads. We trained an AI system and it made 3 errors in 7000. Checking why this it was found that 2 of the three was mislabeled by the human. However the third piece as almost broken in two pieces. The AI system saw the two pieces

and cleared it saying there was no error. There was a problem of integrity of the piece. Such training cannot be given to AI. So that is why a human interface is required.

It is not possible for the AI to be trained. AI life Cycle management is required.

Rajesh Krishnan: Human being can never be replaced by AI. In financials and banking sectors e and banks where credit only data is there maybe AI can play a primary role. But where geometry or object is primary, AI is still learning. How do you apply simulation data like ISER image especially the target and identification of various objects like RCS images. If we can get 90% identification it is good. It is only to assist the human. It is always the false positive and false negatives are important. It is how humans learning. It is not one time creation of data. It is not just based on historical data. AI is not one time learning it is continuously training in a production environment and remove the false positive and false negative. IT is still not a replacement of false positive false negative.

Prof. B Ravindran: But we are assuming 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 we have 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.

Mr. Rajesh Krishnan: This data management is also call ML operations (ML Ops). It is called Champion Challenger Models. Every model is challenged and keep the best model.

Dr. Sudhir Kamath summing up the proceedings said that for predictive maintenance or logistic maintenance for defence it may be OK AI can be used more reliably. But in operational conditions as Dr. Prahlada said such as in explainable AI, human interface is required. However where data is involved, continuous training is required as Mr. Rajesh Krishnan mentioned. But in an actual brute war the use of AI has to be examined.

Concluding Session

Dr. Ramanathan, Event Chair concluded the Two Day Conference by first thank all the Eminent Speakers for taking part in this Conference and sharing their valuable knowledge. He thanked all of them for taking their precious time out of their busy schedule for making the presentations. He also thanked the Session Chairs who were themselves experts in the field for chairing the sessions and hence making the sessions lively with pertinent Q/A sessions.

He said that the panel discussions went off well with some very good suggestions which are given in Annexure 1 and was moderated by Dr. Sudhir Kamath with Dr. Prahlada Rama Rao,, Rajesh Krishnan and Prof. B Ravindraas panel members. Thanked them all for giving valuable inputs.

He expressed that he would like to thank all the delegates for attending the conference and making it a success. Hope they will take with them the knowledge and use it in their respective work places to further AI.

Then he thanked the Chief Guest Dr. Sateesh Reddy, Secretary Department of Defence (R&D) and Chairman DRDO, for inaugurating the Conference and Dr. Rajalakshmi Menon, Program Director (AEW& MKII), Director CABS for giving the address as Guest of Honor .. He also thanked Dr. Gautam Mahpatra, CSI President and Dr. Prahlada Ramarao, Special Advisor, ITD 2022

He thanked DRDO who have been the backbone for this conference. He thanked the Prinicipal Sponsors, Maxbyte, the diamond sponsors, AAltair and Silver sponsor Ansys. He thanked all the Patrons of the conference, and the Various Committee Members, Advisory and Program Commit tee and all the supporting members for making the Conference a success. Acknowledgement is also due to all the members of the Program Committee as well as the Management Committee of CSI BC and CSI-BC manager.

He said that the report will be put in CSI-BC website (www.csibc.org) including the findings of the conference in a brief manner and also send them to DRDO as requested Dr. Sateesh Reddy, Chairman DRDO in his opening address.

CSI also thanks the platform vendor A1 logics who had provided the platform in 2020 also.
Thanks to the website developer for updating the website and also developing the brochure.

DAY 1, March 4, 2022

https://youtu.be/d7-Z5A2dHO4

DAY 2, March 5, 2022

https://youtu.be/PwUGseYXVeA