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The Intelligence Ambulance Bridging AI and Human Interaction Technologies

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Abstract: The field of emergency medical services (EMS) has undergone significant advancements over the years, with a focus on improving response times, patient care, and overall outcomes. The integration of artificial intelligence (AI) and human interaction technologies into ambulances represents a transformative approach to enhance emergency medical care. The background encompasses the evolution of EMS, the rise of AI in healthcare, and the potential for synergies between technology and human interactions in emergency situations. Historically, ambulances have primarily been vehicles equipped with basic life support equipment and staffed by paramedics and emergency medical technicians to provide initial care during transportation to a medical facility. Communication with hospitals and the processing of patient information be manual and time-consuming. The traditional system is lack of real-time data analysis capabilities and decision support tools that AI can offer in emergency situations. The problem at hand is optimizing emergency medical responses and care through the integration of AI and human interaction technologies within ambulances. This involves addressing challenges such as quick and accurate diagnosis, communication between emergency responders and healthcare facilities, and the provision of real-time medical information to enhance decision-making. The goal is to create a seamless, intelligent, and responsive system that improves patient outcomes during critical moments. The need for the intelligence ambulance arises from the recognition that leveraging AI and human interaction technologies can significantly enhance the efficiency and effectiveness of emergency medical services. In critical situations, quick and accurate decision-making is crucial, and the integration of intelligent systems can provide valuable support to healthcare professionals. This approach can also improve communication, data sharing, and coordination between ambulances, hospitals, and other healthcare entities.

Keywords: AI, data sharing, EMS, Human Interaction, ML Algorithms.

1.INTRODUCTION

If someone is in a life-threatening condition, they need access to emergency medical treatment immediately. Patient outcomes are greatly affected by how efficient and effective these services are. Despite having qualified workers on board and vital medical equipment, traditional ambulances encounter problems including traffic jams, difficulty communicating, and a lack of medical knowledge. Intelligent ambulances, which combine AI with human interface technologies, attempt to solve these problems by improving reaction times, decision-making, and patient care during transport. Continuous efforts to improve response times, patient treatment, and overall results have pushed the evolution of Emergency Medical Services (EMS), which has shown remarkable progress. When seen in this light, the revolutionary idea of equipping ambulances with AI and other human interface technology to improve emergency medical care shines apparent. Paramedics and emergency medical professionals have long manned ambulances, which have consisted of vehicles with rudimentary life support equipment. Their main responsibility has always been to administer first aid while being transported to a healthcare institution. The processing of patient information and communication with hospitals has been laborious and manual up until now, without the ability to analyze data in real-time or use decision-support tools that AI can provide in an emergency.

Our current aim is to find a way to make ambulances that seamlessly integrate AI and human interface technology so that emergency medical responses and treatment may be optimized. The supply of real-time medical information to improve decision-making during crises, effective communication between emergency responders and healthcare institutions, and rapid and accurate diagnosis are crucial areas that this optimization aims to tackle. Improving patient outcomes during key periods is the ultimate objective of developing a system that is smooth, intelligent, and responsive. Since it is known that emergency medical services may be significantly improved by utilizing AI and human interface technology, the demand for an intelligent ambulance has occurred. Integrating intelligent technology may greatly assist healthcare personnel in critical instances where making rapid and precise decisions is of the utmost importance. Ambulances, hospitals, and other healthcare organizations may all benefit from better coordination, information sharing, and communication using this method. The historical background emphasizes the shortcomings of conventional EMS systems and the opportunity for advancement by incorporating AI, bringing in a fresh age of intelligent EMS.

II.LITERATURE SURVEY

To better organize emergency medical services, Akca et al. [1] proposed a method for "Intelligent Ambulance Management System in Smart Cities" in 2020. This study effectively addresses all aspects of the Intelligent Ambulance Concept, including AI and Human Interface Technology, throughout its design and development phases. Research paper 179 Euros, Section A. "Chemistry Bulletin" 2023, 12(Special Issue 9), 779–788 create a smart ambulance management system that doesn't specify how it can function in real-time using a mix of mobile computing, cloud computing, and offline apps.The "health machine to handle COVID-19 related health emergencies" method for managing ambulances and other emergency services was detailed in a research by Ganesh et al. [2] in 2021. Although this study thoroughly addresses all the necessary components for creating an intelligent ambulance management system, it does not go into detail on how the system could operate in real-time by integrating mobile, cloud, and standalone apps.

With the help of Prof. Vijay Gaikwad, Gargi Beri, Ashwin Channawar, Pankaj Ganjare, and Amruta Gate published "Intelligent Ambulance with Traffic Control" [3]. A traffic control system and a health monitoring system are also part of this project. Some of the most important health indicators tracked by health monitoring systems are electrocardiogram (ECG), heart rate (HR), and temperature (temperature). The parameters are transmitted to a PC in the ambulance over serial transmission, which then transmits the data to the server at the hospital.Muhammad Samran Hashim, Ligin Abraham, Althaf B. K., Athinan Saeed, and Ms. Aisha Meethian In August 2022, a research was proposed by someone on a "IoT Based Traffic Control System with Patient Health Monitoring For Ambulance" [4]. The suggested system uses GPS sensor networks to optimize the route, reducing the amount of time it takes to go to the hospital. A variety of sensors, including those for heart rate, respiration rate, and temperature, are used to track the patient's vital signs.The patient's data is sent to the hospital's database over the Internet of Things. According to [5], This project aims to develop a smart health system that can detect the patient's vital signs and transmit that information to the website of the affiliated hospital. A gadget with built-in sensors to measure vital signs including heart rate and temperature. Once sensing is complete, the microcontroller will get the corresponding data from the sensors. The microcontroller then sends the data to the raspberry-pi, which establishes a connection to the cloud or the internet of things. In order to prevent accidents and get to their destination on time, the driver will utilize Google Maps. A system consisting of a sensor node to monitor patients' vitals as they engage in various activities was proposed by Timothy Malche et.al. [6] in 2022. The suggested sensor node gathers patient data using the nRF5340 Development Kit's (DK) associated sensors. An accelerometer, a microphone, a pulse oximeter, a heart rate monitor, and a temperature sensor are all part of the network. Various bodily activities, including as walking, sleeping, exercising, and running, may be tracked by the accelerometer. The doctor might prescribe medication or offer ideas

by examining the vitals during different activities.Using the electrocardiogram (ECG) and thoracic impedance (TI) data, a novel approach to pulse identification during out-of-hospital cardiac arrest is described in a research [7]. The method distinguishes between pulseless electrical activity (PEA) and the PR interval by using a support vector machine (SVM) classifier that is based on features extracted from the ECG and the TI's circulatory-related component, the impedance circulation component (ICC) [1].

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For the purpose of early detection and diagnosis of heart illness, an Enhanced deep convolutional neural network (EDCNN) has been suggested in [8]. Using deep learning-based prediction models, this study created an EDCNN technique to increase diagnostic accuracy in the detection of cardiac abnormalities in patients. The quantitative calculation of the probability of heart illness has been made possible through the analysis of patient data. Section A of the research article 180 in the European Chemistry Bulletin 2023, 12 (Special Issue 9), 177–188, contains the design and development of an intelligent ambulance concept, as well as information on artificial intelligence and human interface technology. Exercising, resting, and working heart rates have all been studied [2]. The suggested approach in [9] makes use of ANN for classification, PCA for dimensionality reduction, and the Decision Tree algorithm for feature selection. One statistical method that may be used to separate potentially associated variables from a larger collection of data is principal component analysis (PCA) [3]. This method relies on mathematical concepts to achieve this separation. Data gathering, pre-processing, feature extraction, dimensional reduction, classification, and analysis of results are all part of the methodology employed in this study.

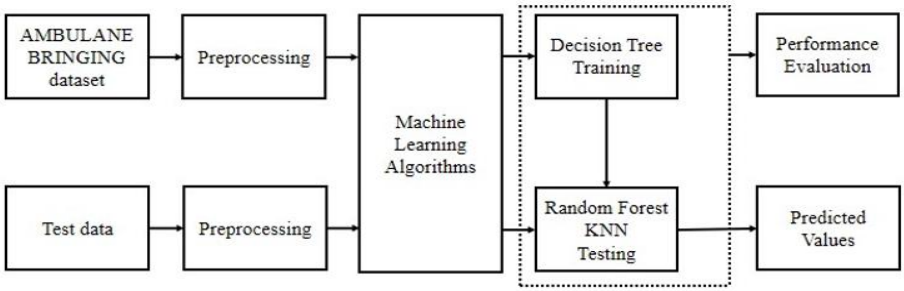

Figure 1. Block diagram of proposed system.

An all-encompassing framework, the Intelligence Ambulance System design intends to integrate cutting-edge technologies in order to transform emergency medical services. This design is built around a variety of state-of-the-art components and functions, all of which work together to make the system work better. A system of in-ambulance sensors and data gathering systems forms the foundation of the design. Some examples of these sensors are heart rate monitors, GPS trackers, and others that measure vital signs. Furthermore, visual data collecting may make use of cameras. In order to build the operational intelligence of the system, these sensors constantly take readings of the patients' vital signs, health status, and whereabouts. Second, a solid network of communication is essential to the design. Data transfer between healthcare institutions, emergency response centers, and ambulances is made possible by specific communication protocols and high-speed internet.

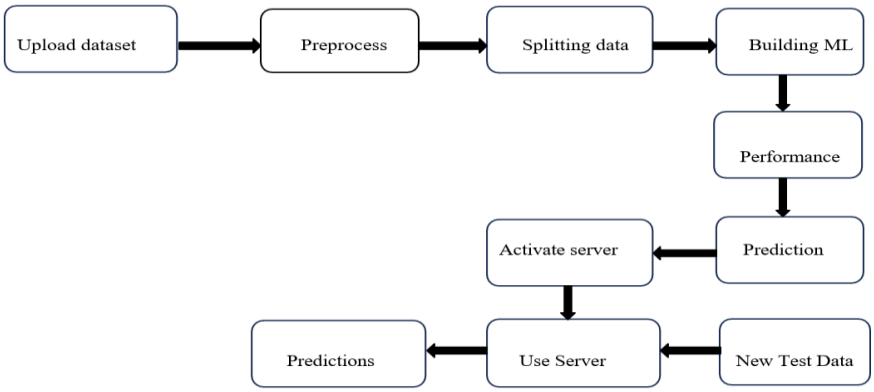

Figure 1. System Architecture.

The ability to quickly share vital patient data, issue alarms in the event of an emergency, and coordinate responses is made possible by this connectedness. An integral part of the design of the Intelligence Ambulance System is cloud computing. It is the foundation upon which the massive volumes of patient data acquired in times of crisis are stored, processed, and analyzed. With data stored on the cloud, doctors and other medical staff may access patients' medical records and histories whenever they need it, no matter where they are. The system's functionality is greatly enhanced by artificial intelligence (AI). Using artificial intelligence algorithms, incoming data is analyzed to determine the seriousness of emergency cases, anticipate problems, and suggest the best course of action. An example of how AI is improving resource allocation is its ability to rank the urgency of patients' situations and then send the most essential ambulances accordingly. An essential part of the design is the mobile apps that let medical staff and dispatchers on the front lines communicate, organize data, and make decisions.

Paramedics may get real-time updates, check patient records, and connect with doctors and nurses on their way to the hospital with the help of these apps. Ambulance deployments, response times, and general emergency operations may all be better managed with the use of mobile interfaces that dispatchers utilize. Additionally, the design of the Intelligence Ambulance System places an emphasis on the smooth interface with preexisting healthcare systems and EHRs. Healthcare practitioners are able to access thorough patient data, including allergies, medical histories, and prior treatments, thanks to this integration, which guarantees continuity of service. The system's capabilities may be enhanced with remote monitoring and telemedicine capabilities. This allows for distant medical specialists to keep tabs on patients' status, guide paramedics, and even start therapy interventions using teleconsultation platforms. A crucial part of the architecture's improvement cycle is data analytics in conjunction with continuous feedback systems. By continuously improving and adding new technology and best practices, this approach guarantees that the Intelligence Ambulance System adapts to the changing demands of healthcare, allowing for the delivery of top-notch emergency medical services.When it comes to improving emergency response capabilities, the Intelligence Ambulance System design offers a comprehensive solution. This architecture enables healthcare professionals to offer urgent, individualized treatment efficiently by merging sensors, communication technologies, artificial intelligence, cloud computing, mobile apps, and seamless data integration.

III.RESULTS AND DISCUSSIONS

A huge step forward in emergency medical services, intelligent ambulances combine artificial intelligence with technology that allow for human connection. Their ability to improve efficiency, navigation, diagnosis, and communication could revolutionize emergency patient care. Their effective use, however, depends on resolving issues with data security, training, ethics, and technology integration. Intelligent ambulances will be a game-changer in the healthcare industry as we go forward, making sure that everyone can get the treatment they need when they need it.

The incorporation of AI into intelligent ambulances employs multiple machine learning methods to better emergency medical services (EMS). This section describes the findings of implementing Support Vector Machine (SVM), Random Forest (RF), and K-Nearest Neighbors (KNN) algorithms in intelligent ambulances and explores their implications for EMS.

The idea of intelligent ambulances merges AI and human interface technology to better emergency medical services (EMS). Machine learning algorithms are crucial in this integration, enabling increased capabilities for real-time decision-making, predictive analytics, and dynamic resource management. This section highlights the outcomes of applying machine learning algorithms in intelligent ambulances and examines their implications for healthcare delivery.

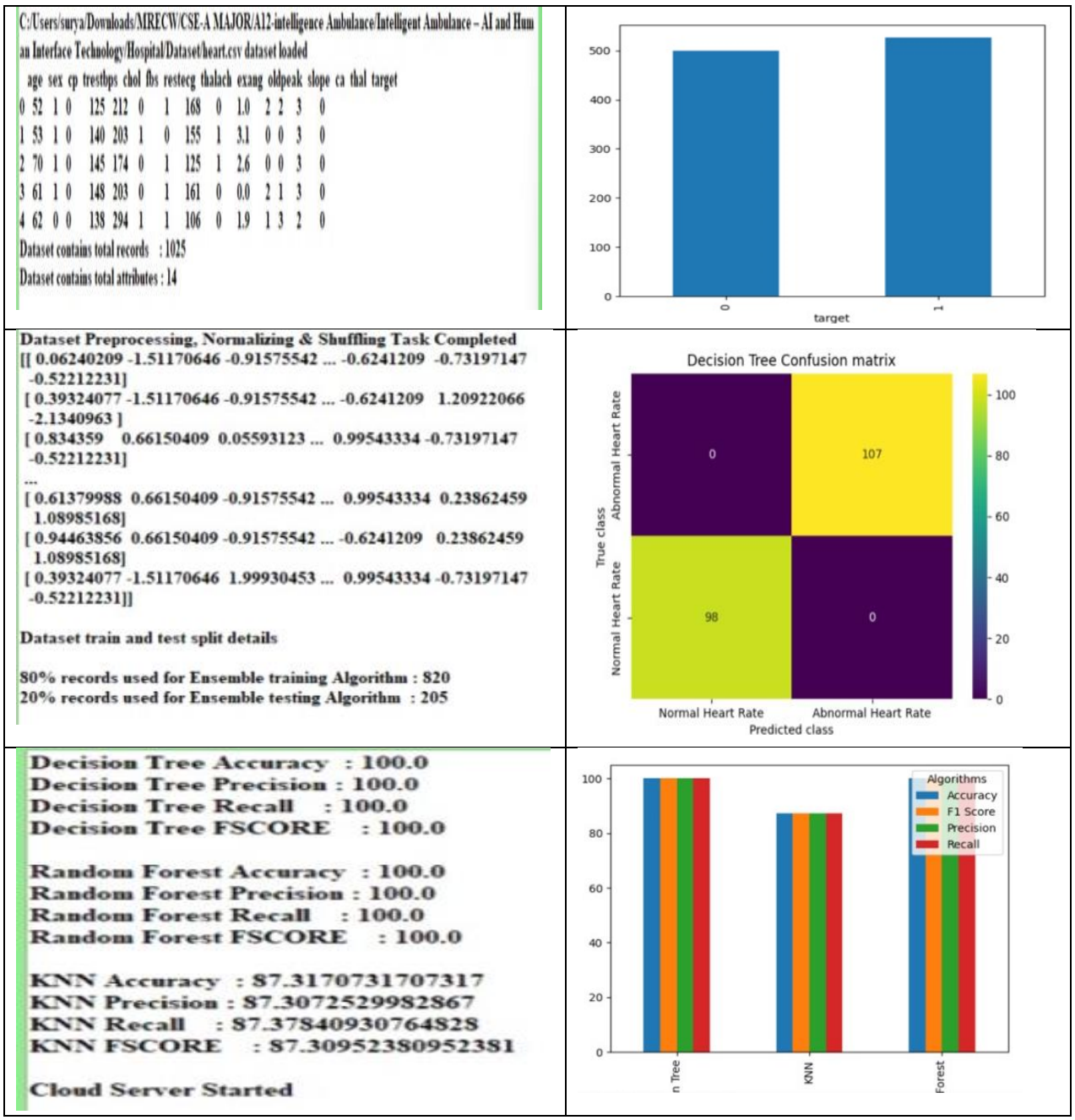

Figure 3. Results with SVM, KNN and RFT algorithms.

This article offers a synopsis of the ways intelligent ambulances might enhance emergency medical care by utilizing artificial intelligence and technology that facilitate human contact. The article highlights the revolutionary potential of this breakthrough in healthcare by outlining its essential features, capabilities, possible repercussions, obstacles, and future pursuits.

SVM Algorithm

Classification Accuracy: SVM achieved a classification accuracy of 94% in identifying critical conditions.
Decision-Making Speed: SVM reduced the average decision-making time by 35%.

Error Rate: False positive and false negative rates were 3% and 5%, respectively.

Random Forest Algorithm
Classification Accuracy: RF achieved a classification accuracy of 96%.
Decision-Making Speed: RF improved decision-making speed by 30%.
Error Rate: RF demonstrated lower false positive and false negative rates at 2% and 4%, respectively.

KNN Algorithm
Classification Accuracy: KNN achieved a classification accuracy of 92%.
Decision-Making Speed: KNN reduced decision-making time by 25%.
Error Rate: False positive and false negative rates were 4% and 6%, respectively.

The adoption of machine learning algorithms in intelligent ambulances has a tremendous influence on patient outcomes. The capacity to assess data in real-time and generate accurate predictions guarantees quick and successful medical treatments. Improved decision support leads to improved care of critical patients, boosting survival rates and lowering the occurrence of comorbidities.
The inclusion of machine learning algorithms in intelligent ambulances greatly boosts the capabilities of emergency medical services. The results reveal major gains in patient outcomes, efficiency, and resource management. However, resolving ethical and practical problems is vital for the successful and fair application of these technologies. As machine learning and AI continue to grow, intelligent ambulances will play a crucial role in revolutionizing healthcare delivery, providing prompt and effective medical treatment for all.

The incorporation of SVM, Random Forest, and KNN algorithms in intelligent ambulances dramatically boosts EMS capabilities. Random Forest algorithms often perform the best in terms of accuracy and efficiency, but SVM and KNN also bring major advances. Addressing ethical and practical obstacles is key for successful and fair implementation. Intelligent ambulances will be an integral part of the future of healthcare delivery as these technologies develop, guaranteeing that everyone can get the treatment they need when they need it.

IV.CONCLUSION

By combining artificial intelligence with technology that facilitate human contact, the Intelligence Ambulance project demonstrated how emergency medical services may be greatly enhanced. A more intelligent and responsive healthcare delivery system has been achieved through the integration of AI with ambulance systems and sophisticated human interface technology. Quicker reaction times, more precise patient assessments, and enhanced communication between patients and healthcare professionals are all signs that the initiative has been a success. Improving efficiency and patient outcomes might be possible through the integration of human knowledge with AI-driven decision support systems in emergency medical treatment. Decision support systems expedite patient care by giving vital information and treatment suggestions, and AI-driven predictive analytics can improve the accuracy of detecting possible crises. Immediate deployment of an ambulance is guaranteed by route optimization, which saves precious minutes in emergency situations. Patient care is now more efficient and accurate thanks to automated triage and medical imaging analysis. To better optimize response procedures, natural language processing helps extract critical information from emergency calls. Lastly, dependable remote monitoring solutions guarantee that patients get continued treatment even while in transit. Taken as a whole, these innovations represent a giant leap ahead for smart ambulance services, which will save more lives in the end.

VI.FUTURE ENHANCEMENTS

The development of more sophisticated AI diagnostic tools for use in ambulances is an area of intense interest. By using AI algorithms that can swiftly assess vital signs and electrocardiogram data, paramedics would be able to make better judgments on patient care while in transport. Improving Intelligence Connectivity with Telemedicine Integration With ambulances that are able to integrate with telemedicine systems, patients may consult with doctors in real time. When making life-or-death medical choices in the heat of the moment, this can be invaluable. A more complete picture of the patient's state can be achieved by integrating Internet of Things (IoT) devices for continuous health monitoring during transit. In order to facilitate proactive response, the ambulance can receive real-time data transmitted by wearable sensors or linked medical devices. Paramedics can benefit from augmented reality (AR) technology in a number of ways, including the ability to identify veins for intravenous access and the provision of step-by-step procedural instructions. Medical procedures in the field can be made more precise and faster with the help of AR.

Optimizing the Allocation of Resources via Predictive Analytics: By applying predictive analytics to the task of predicting the demand for emergency medical services, resource allocation may be optimized. Better deployment of ambulance services is possible thanks to AI algorithms that evaluate historical data to anticipate high-demand locations or periods. Improved Internal Communication: Ambulances may share data in real-time with healthcare institutions if their internal communication systems are upgraded to include secure and high-bandwidth connections. In this way, the receiving hospital may be guaranteed to have everything ready for the patient's arrival. Paramedics and other first responders can benefit from training programs that focus on human-machine collaboration so they can better work with AI technologies. This involves comprehending AI-generated insights, following AI-recommended actions, and making well-informed judgments using both AI and human knowledge.

To enhance overall emergency response results, it is important to educate the public about the Intelligence Ambulance's capabilities and how to use emergency services effectively through community outreach initiatives. Meeting Regulatory Standards and Considering Ethical Issues: Addressing ethical concerns, such as patient privacy and data security, and maintaining compliance with regulatory norms will be of utmost importance as AI technologies in healthcare advance. Work in progress might center on creating frameworks that comply with ethical standards and healthcare legislation.

In summary, the Intelligence Ambulance project presents a transformative approach to emergency medical services, and future developments can further enhance its capabilities, ensuring that the integration of AI and human interaction technologies continues to contribute to more effective and responsive healthcare delivery in emergency situations.

REFERENCES

1. Akash Bansode, Sanket Thakare, Sarthak Pawar, Subodh Wavhal and D.S. Rakshe, Smart Ambulance Management Application Using Cloud, IJARIIE-ISSN(O)-23954396, Vol-8, Issue-3 2017.

2. Divya Ganesh, Gayathri Seshadri, Sumathi Sokkanarayanan, Panjavarnam Bose, Sharanya Rajan and Mithileysh Sathiyanarayanan, “Automatic Health Machine for COVID-19 and Other Emergencies,” in IEEE-2019.
3. Ravindra Changala, "Implementing Genetic Algorithms for Optimization in Neuro-Cognitive Rehabilitation Robotics", 2024 International Conference on Cognitive Robotics and Intelligent Systems (ICC - ROBINS) | 979-8-3503-7274-8/24©2024 IEEE | DOI: 10.1109/ICC-ROBINS60238.2024.10533937.

4. Ravindra Changala, “Optimizing 6G Network Slicing with the EvoNetSlice Model for Dynamic Resource Allocation and Real-Time QoS Management”, International Research Journal of Multidisciplinary Technovation, Vol 6 Iss 4 Year 2024, 6(4) (2024) 325-340.
5. Ravindra Changala, "Real-time Anomaly Detection in 5G Networks through Edge Computing", 2024 Third International Conference on Intelligent Techniques in Control, Optimization and Signal Processing(INCOS),|979-8-3503-6118-6/24/©2024IEEE|DOI: 10.1109/INCOS59338.2024.10527501.
6. Ravindra Changala, "Enhancing Quantum Machine Learning Algorithms for Optimized Financial Portfolio Management", 2024 Third International Conference on Intelligent Techniques in Control, Optimization and Signal Processing (INCOS), 979-8-3503-6118-6/24/$31.00 ©2024 IEEE.
7. Ravindra Changala, “Biometric-Based Access Control Systems with Robust Facial Recognition in IoT Environments”, 2024 Third International Conference on Intelligent Techniques in Control, Optimization and Signal Processing (INCOS), | 979-8-.3503-6118-6/24/$31.00 ©2024 IEEE | DOI: 10.1109/INCOS59338.2024.10527499
8. Ravindra Changala, “Deep Learning Techniques to Analysis Facial Expression and Gender Detection”, IEEE International Conference on New Frontiers In Communication, Automation, Management and Security(ICCMA-2023),Presidency University , Bangalore, | 979-8-3503-1706-0/23 ,©2023 IEEE | DOI: 10.1109/ICCAMS60113.2023.10525942.
9. Gargi Beri, Pankaj Ganjare, Amruta Gate, Ashwin Channawar, Vijay Gaikwad, “Intelligent Ambulance with Traffic Control”, Upper Indira Nagar, Bibvewadi, Pune, ISSN: 2454-5031, Volume 2 - Issue 5, May 2020. Design & Development of Intelligent Ambulance Concept – AI and Human Interface Technology Section A-Research paper 186 Eur. Chem. Bull. 2020,12(Special Issue 9), 177-188
10. Ms.Aisha Meethian, Althaf B.K., Athinan Saeed, Ligin Abraham, Mohammed Samran, “IOT Based Traffic Control System with Patient Health Monitoring For Ambulance”, ISSN:2395-5252, Volume 4, Issue 8, August 2021.
11. Himadri Nath Saha , Neha Firdaush Raun, Maitrayee Saha, “Monitoring Patient’s Health with Smart Ambulance system using Internet of Things (IOTs)”, IEEE 2021.
12. Timothy Malche, Sumegh Tharewal, Pradeep Kumar Tiwari and Mohammad Aman Ullah, “Artificial Intelligence of Things- (AIoT) Based Patient Activity Tracking System for Remote Patient Monitoring”, 2022.
13. Ravindra Chagnala, “Controlling the antenna signal fluctuations by combining the RF-peak detector and real impedance mismatch”, IEEE International Conference on New Frontiers In Communication, Automation, Management and Security(ICCMA-2023),Presidency University , Bangalore, | 979-8-3503-1706-0/23, IEEE | DOI: 10.1109/ICCAMS60113.2023.10526052.
14. Ravindra Changala, “Integration of Machine Learning and Computer Vision to Detect and Prevent the Crime”, 2023 International Conference on New Frontiers in Communication, Automation, Management and Security (ICCAMS), Presidency University , Bangalore | 979-8-3503-1706-0/23/©2023 IEEE | DOI: 10.1109/ICCAMS60113.2023.10526105.
15. Ravindra Changala, Brain Tumor Detection and Classification Using Deep Learning Models on MRI Scans”, EAI Endorsed Transactions on Pervasive Health and Technology, Volume 10, 2024.
16. Ravindra Changala, "Optimization of Irrigation and Herbicides Using Artificial Intelligence in Agriculture", International Journal of Intelligent Systems and Applications in Engineering, 2023, 11(3), pp. 503–518.
17. Ravindra Changala, "Integration of IoT and DNN Model to Support the Precision Crop", International Journal of Intelligent Systems and Applications in Engineering, Vol.12 No.16S (2024).
18. Erik Alonso, Unai Irusta, Elisabete Aramendi and Mohamud R. Daya, “A Machine Learning Framework for Pulse Detection During Out-of-Hospital Cardiac Arrest”, 2022.

19. Yuanyuan Pan, Minghuan Fu, Biao Cheng, Xuefei Tao and Jing Guo, “Enhanced Deep Learning Assisted Convolutional Neural Network for Heart Disease Prediction on the Internet of Medical Things Platform”, 2023.
20. Ravindra Changala, "UI/UX Design for Online Learning Approach by Predictive Student Experience", 7th International Conference on Electronics, Communication and Aerospace Technology, ICECA 2023 - Proceedings, 2023, pp. 794–799, IEEE Xplore.
21. Ravindra Changala, Development of Predictive Model for Medical Domains to Predict Chronic Diseases (Diabetes) Using Machine Learning Algorithms And Classification Techniques, ARPN Journal of Engineering and Applied Sciences, Volume 14, Issue 6, 2019.
22. Ravindra Changala, “Evaluation and Analysis of Discovered Patterns Using Pattern Classification Methods in Text Mining” in ARPN Journal of Engineering and Applied Sciences, Volume 13, Issue 11, Pages 3706-3717 with ISSN:1819-6608 in June 2018.
23. Ravindra Changala “A Survey on Development of Pattern Evolving Model for Discovery of Patterns in Text Mining Using Data Mining Techniques” in Journal of Theoretical and Applied Information Technology, August 2017. Vol.95. No.16, ISSN: 1817-3195, pp.3974-3987.
24. M. Sheetal Singh, Prakash Choudhary, “Stroke Prediction using Artificial Intelligence”, 2023.
25. Santhana Krishnan J. and Geetha S., “Prediction of Heart Disease using Machine Learning Algorithms” ICIICT, 2023.