International Journal of New Media Studies (IJNMS), ISSN: 2394-4331
Volume 10 Issue 1, January-June, 2023, Impact Factor: 7.786

Intelligent Internet of Drone Things

Vibhuti Charan

Prince Technical College, India

Abstract

Internet of Drone Things (IoDT) is a branch of (IoT) focused on the development of drone technology & its use in various industries. Through the use of sensors, cameras, and advanced AI, IoDT has the capability to connect drones with other devices, such as tablets, phones, and computers, and create a collaborative environment between them. This environment enables the drones to resist climatic conditions, explore new terrain and industrial sites, observe current events from third-party points of view, monitor agricultural systems and wildlife habitats, inspect infrastructure, and more. IoDT is quickly becoming an effective tool for many businesses and government agencies, as it provides them with a cost-effective and efficient way to monitor and collect data. Drone-assisted IoV allows vehicles on the road to use the drones to detect traffic congestions and navigate efficiently, as well as communicate with other devices on the road. This will help reduce traffic congestion and accidents wherever the application is deployed. In addition, IoDT can be used for many security purposes, such as surveillance, monitoring of borders, and for search and rescue missions. Drones with advanced AI can detect suspicious activity and alert law enforcement, allowing them to respond quickly and appropriately. Overall, IoDT is a powerful tool that has enabled the development of many powerful and effective applications, including those mentioned above. In the coming years, it is certain that IoDT will continue to develop and become an even more powerful and effective technology. Through this research we have developed It is a novel secure IoDT system designed to provide enhanced data security and ensure continuous availability of data transmission in drone-enabled environments. It is a cognitive-based security system that utilizes bio-inspired algorithms such as swarm intelligence and artificial neural networks to autonomously create and reconfigure trust zones, used for authentication and data exchange. It also uses an advanced congestion detection algorithm to detect congested areas within the environment, hence allowing for better data routing in the most efficient way.

Keywords: IOT, Sensors, Internet of drone things (IoDT), Internet of vehicles (IoV)

Introduction

IoV is an interconnected system of vehicles, transportation networks, and other connected devices that are designed to create a self-organizing, efficient, and safe transportation experience [1]. It is a network of vehicles linked to each other through the Internet and equipped with sensors, processors, and actuators [2].

The IoV aims to improve the overall safety of roadways by providing the vehicles with the ability to communicate with each other and the environment, thereby allowing for the formation of infrastructure networks [3]. This network, in turn, can then be used to monitor roadways in real-time and reduce human errors, as well as increase the efficiency of routing and navigation [4].

The IoV combines data from various sources to provide drivers with real-time feedback on traffic conditions and other safety features. It can also provide assistance in preventing accidents and guiding drivers in the most efficient routes [5].Overall, the IoV is an innovative and efficient system that has the potential to provide a better and safer driving experience for drivers, while also reducing traffic congestion and improving the overall quality of life [6].

IoV-based networks face several challenges when it comes to their implementation. One of these challenges is link disconnection, which is caused when one vehicle or multiple nodes become disconnected from the network [7]. This can cause a significant disruption to network operations as the system might not be able to transfer data and information accurately.

Other challenges include improper resource allocation and high computational costs [8]. When a network is overcrowded or certain processes take too long to execute, resources can become misallocated. This can lead to significantly lower performance and an increase in the overall computational costs associated with the system [9]. Finally, the computational costs for an IoV-based system can be high. As each device in the network needs to have its own independent processing power, the more nodes there are, the higher the costs [10].

UAVs combined with IoT enables a aerial network to be established, overcoming issues of network

coverage and spatial-temporal closures of terrestrial IoT networks. UAVs will be responsible for conveying information and data between intersections of vehicles, thus improving network performance and solving a lot of the challenges e. g. link Disconnection, improper resource allocation, high computational costs [11]. UAVs provide a more dynamic and cost-effective solution for transmitting data between vehicles in the IoV[12]. Lastly, the use of UAVs can potentially reduce the overall infrastructure costs required, as data transmission could be achieved within the network itself with minimal use of additional infrastructure [13].

Recently, VANETs have been integrated into super-fast networks. These network structures are capable of providing much higher data transfer speeds than standard networks and can support mission-critical applications. Super-fast networks add additional hops and power to ensure that cars and drones in VANETs can quickly provide warnings to other vehicles and travel between nodes with little time delay [14]. These networks use advanced wireless technology, better antenna design and data compression techniques to ensure that data is quickly and accurately transferred. This helps to ensure that road safety is increased and that vehicles can reach their destinations faster and with fewer interruptions [15].

The use of drones in VANETs can help reduce the amount of traffic congestion that can occur in these networks. Drones can quickly identify and report traffic hazards, roads congested with vehicles, or areas with high road speed [16]. They can then share this information with other vehicles in the VANET, allowing them to anticipate and avoid certain areas where congestion is likely to occur [17]. By providing a high-speed and reliable network of communication between nodes in the VANET, drones can help other vehicles communicate with each other and make informed decisions on the best route to take to reach their destination without encountering traffic congestion or other obstructions [18]. This can help save time, money and reduce the environmental impact of cars stuck in traffic [19].

Drones can maximize the integrity of the VANETs network by providing a reliable backup link to the main network resources. By monitoring the network traffic in real-time, drones can detect malfunctioning devices and warn other vehicles if an emergency event occurs [20]. By using their communication capabilities, drones can quickly alert other vehicles in the vicinity of any risks. For example, drones could identify an accident or alert drivers of an imminent traffic jam [21]. Additionally, drones can provide a constant stream of data to the network, which can help the network detect and prevent hacking or malicious attacks [22]. By providing an additional layer of surveillance, drones help maintain the integrity of the network by preventing any unauthorized or malicious access. As a result, VANETs are safer and more reliable [23].

There are few issues as well, First, to effectively incorporate the drones in the VANET, an appropriate protocol stack has to be developed [24]. The protocol stack must ensure the seamless communication among the drones and other vehicles that are part of the VANET. Second, an efficient power management strategy should be developed in order to ensure that the drones have enough energy to fly and remain connected with the VANET [25]. Third, autonomous navigation algorithms need to be developed to enable the drones to safely manoeuvre around obstacles or other vehicles. Fourth, a secure network infrastructure needs to be established to protect the data gathered by the drones [26]. Finally, machine learning algorithms should be designed to optimize the routing of the data within the VANET [27].

Due to the mobile nature of VANETs, they are subject to a variety of security threats. For example, vehicles in the network can be subject to malicious attacks that could maliciously modify the messages exchanged in the network, or disrupt the communication between vehicles [28]. These types of attacks can lead to dangerous situations due to the autonomous nature of the vehicles. Furthermore, there is a risk of data leakage, as well as the risk of malicious actors trying to introduce false data into the network [29]. Additionally, distributed denial of service attacks are also possible, which could prevent legitimate communication from taking place[30].

One major contribution of this drone base research study is its investigation into the effectiveness of technologies such as blockchain, AI, 5G, UAVs, and fog computing as they relate to the security and reliability of VANETs [31]. These technologies can be utilized in order to ensure a secure VANET infrastructure, as well as mitigating the risk of distributed denial of service attacks. Additionally, the research also discussed potential scenarios for using UAVs to improve communication range and reliability in urban areas. Lastly, the research also provided insights on the potential use of blockchain technologies to further secure VANET data and communications [32].

Simulations

Across industries, simulations are commonly used to test goods, systems, processes, and even concepts. By running realistic simulations, companies can get a better understanding of the long-term effects of their decisions and the possible outcomes [33]. Testing goods can help to ensure that they meet their performance specifications, while systems and process simulations can uncover potential problems and inefficiencies. Simulations of concepts then allow companies to review the potential of new concepts and technologies [34] . Overall, simulations

enable companies to experiment and research potential solutions or processes in a safe and cost-effective manner before committing any resources[35].

Digital Twins

A digital twin is a digital model of a physical environment that uses sensor data to analyze how that environment performs, reacts, and changes. It is a simulator of the external environment, and allows companies to detect changes in the environment and application performance over time [35]. These digital twins can be used to monitor changing conditions, optimize performance, and provide an accurate picture of the external environment. This can also identify risks and opportunities and provide valuable insights that can be applied to business decisions [36].

By gathering data from the physical environment, digital twins can accurately represent the current state of the environment and predict future behaviour. DT allows for real-time monitoring, better decision making, more efficient maintenance and operations, and improved customer engagement [37]. As technology advances, digital twin capabilities become more sophisticated and robust so companies can stay ahead of their competition as well as anticipate and solve future problems [38].

IOV

V2X or Vehicle-to-Everything communications can create an digital environment due to the data collected by the auto-connectivity. This data can be used to create digital analogues of physical environment, goods and services and in turn create digital twins [39]. These digital twins can provide predictive analytics, better governmental control and data sharing across multiple stakeholders. They can also extend the range of services provided by manufacturers and retailers in order to increase customer satisfaction [40].

IOD

The IoD is an Internet-of-Things application that uses unmanned aerial systems (UAS) that are connected to the Internet. These drones can be connected to each other as well as to centralized systems for communication, navigation, coordination, and other services. The IoD enables drones to fly autonomously, follow pre-programmed routes, and access real-time data from the environment to provide data for other applications, such as automated surveillance and delivery services. Real-time data insights from the IoT of Drones can allow for more efficient monitoring and faster response times in emergency situations. Additionally, the IoD can improve the efficiency of parking, traffic management, delivery, and maintenance operations by providing better data-driven decision-making capabilities [41].

Research Issues & Futuristic Recommendations

1. Drone Traffic Management: Drone traffic management is an important research domain in designing efficient algorithms for ensuring safe air traffic flow. Research is needed to apply data-driven approaches to better understand drone behaviour and examine scheduling and routing protocols that can optimize drone navigation paths.

2. Drone Security and Safety: Unmanned aerial systems are considered vulnerable to cyber-security threats, making research into making them more secure and safe a priority. Research is needed to improve pre-existing security protocols, and to develop better security measures, protocols, and architectures to protect data transmission to and from the UAS, as well as to protect sensor information and user privacy.

3. Data Curation and Analytics: For the IoD to be effective, its datasets must be of sufficient quality, curated and cleaned. Research is needed to develop better data curation and analytics techniques to effectively explore, manage and understand IoD datasets.

4. Real-Time Data Management: Real-time data collected by drones needs to be efficiently managed and processed to support time-critical operations, such as automated surveillance, delivery, and maintenance services. Research is needed to develop efficient architectures and algorithms to support real-time data management.

5. Human-Drone Interaction: Research is needed to optimize human-drone interaction and to effectively design interfaces that allow users to efficiently counteract the unpredictability and randomness of drones in various scenarios [42,43].

Conclusion

Data the tics utilizes advanced real-time analytics to make sense of data in order to generate insights and to enable the implementation of intelligent decision making. Machine learning, on the other hand, enables computers to learn from and adapt to new data and tasks without being explicitly programmed. This technology is used in the development of AI and autonomous systems, allowing for improved accuracy in predictive analysis, and for optimization and automation of tasks. Combining these technologies has enabled the development of intelligent systems that can accurately analyze data from the various domains of the IoT, IoV and IoD, resulting in improved efficiency and effectiveness of services and activities.Combining these technologies allows for intelligent systems that can accurately analyze data from these domains, resulting in

improved efficiency and effectiveness of activities and services. This allows for a more comprehensive, comprehensive, and comprehensive approach to monitoring, controlling, and responding to data from these fields.

References

[1]. Rathore, R.S., Sangwan, S. and Kaiwartya, O., 2021. Towards Trusted Green Computing for Wireless Sensor Networks: Multi Metric Optimization Approach. *Adhoc& Sensor Wireless Networks*, *49*.

[2]. Rathore, B., 2023. Textile Industry 4.0: A Review of Sustainability in Manufacturing. *International Journal of New Media Studies (IJNMS)*, *10*(1), 38–43.

[3]. Rathore, B., 2023. Future of Textile: Sustainable Manufacturing & Prediction via ChatGPT. *Eduzone: International Peer Reviewed/Refereed Multidisciplinary Journal*, *12*(1), pp.52-62.

[4]. Rathore, R.S., Sangwan, S., Kaiwartya, O. and Aggarwal, G., 2021. Green communication for next-generation wireless systems: optimization strategies, challenges, solutions, and future aspects. *Wireless Communications and Mobile Computing*, *2021*, pp.1-38.

[5]. Singh, U.P. and Rathore, R.S., 2012. An efficient distributed group key management using hierarchical approach with ECDH and symmetric algorithm. *J. Comput. Eng. Intel. Syst*, *3*(7), pp.32-41.

[6]. Rathore, B., 2021. Fashion Transformation 4.0: Beyond Digitalization & Marketing in Fashion Industry. *Eduzone: International Peer Reviewed/Refereed Multidisciplinary Journal*, *10*(2), pp.54-59.

[7]. Rattan, V., Sinha, E.M., Bali, V. and Rathore, R.S., 2010. E-Commerce Security using PKI approach. *International Journal on Computer Science and Engineering*, *2*(5), pp.1439-1444.

[8]. Rathore, R.S., Sangwan, S., Mazumdar, S., Kaiwartya, O., Adhikari, K., Kharel, R. and Song, H., 2020. W-GUN: Whale optimization for energy and delay-centric green underwater networks. *Sensors*, *20*(5), p.1377.

[9]. Rathore, R.S., Kaiwartya, O., Qureshi, K.N., Javed, I.T., Nagmeldin, W., Abdelmaboud, A. and Crespi, N., 2022. Towards enabling fault tolerance and reliable green communications in next-generation wireless systems. *Applied Sciences*, *12*(17), p.8870.

[10]. Rathore, B., 2022. Textile Industry 4.0 Transformation for Sustainable Development: Prediction in Manufacturing & Proposed Hybrid Sustainable Practices. *Eduzone: International Peer Reviewed/Refereed Multidisciplinary Journal*, *11*(1), pp.223-241.

[11]. Acharya UR. Computer-based classification of eye diseases: Proceedings of the 28th IEEE EMBS Annual International Conferenece, New York City, 30 August-3 September 2006.

[12]. Habrat M, Piorkowski A. Cell detection in corneal endothelial images using directional filters. Image Processing and Communications Challenges 7; Springer; 2016:113-123.

[13]. Rathore, R.S., Hewage, C., Kaiwartya, O. and Lloret, J., 2022. In-vehicle communication cyber security: challenges and solutions. *Sensors*, *22*(17), p.6679.

[14]. Khasawneh, A.M., Singh, P., Aggarwal, G., Rathore, R.S. and Kaiwartya, O., 2022. E-Mobility Advisor for Connected and Autonomous Vehicles Environments. *Adhoc& Sensor Wireless Networks*, *53*.

[15]. Kumar, S., Rathore, R.S., Mahmud, M., Kaiwartya, O. and Lloret, J., 2022. BEST—Blockchain-Enabled Secure and Trusted Public Emergency Services for Smart Cities Environment. *Sensors*, *22*(15), p.5733.

[16]. Jha, S.K., Prakash, S., Rathore, R.S., Mahmud, M., Kaiwartya, O. and Lloret, J., 2022. Quality-of-service-centric design and analysis of unmanned aerial vehicles. *Sensors*, *22*(15), p.5477.

[17]. Kumar, M., Kumar, S., Kashyap, P.K., Aggarwal, G., Rathore, R.S., Kaiwartya, O. and Lloret, J., 2022. Green communication in internet of things: A hybrid bio-inspired intelligent approach. *Sensors*, *22*(10), p.3910.

[18]. Rathore, R.S., Sangwan, S., Adhikari, K. and Kharel, R., 2020. Modified echo state network enabled dynamic duty cycle for optimal opportunistic routing in EH-WSNs. *Electronics*, *9*(1), p.98.

[19]. Rathore, R.S., Sangwan, S., Prakash, S., Adhikari, K., Kharel, R. and Cao, Y., 2020. Hybrid WGWO: whale grey wolf optimization-based novel energy-efficient clustering for EH-WSNs. *EURASIP Journal on Wireless Communications and Networking*, *2020*(1), pp.1-28.

[20]. Singh, U.P. and Rathore, R.S., 2013. Distributed Hierarchical Group Key Management using Elliptic Curve and Hash Function. *International Journal of Computer Applications*, *61*(19).

[21]. Bali, V., Rathore, R.S. and Sirohi, A., 2010. Routing Protocol for MANETs: A Survey. *IUP Journal of Computer Sciences*, *4*(3).

[22]. Bali, V. and Rathore, R.S., 2010. A NEW HIERARCHICAL TRANSACTION MODEL FOR MOBILE ADHOC NETWORK ENVIRONMENT. *International Journal on Computer Science and Engineering*, *2*(3).

[23]. Singhal, S. and Rathore, R.S., 2015. Detailed Review of Image Based Steganographic Techniques. *IJCST*, *6*, pp.93-95.

[24]. Kumar, V. and Rathore, R.S., 2018, October. Security issues with virtualization in cloud

computing. In *2018 International Conference on Advances in Computing, Communication Control and Networking (ICACCCN)* (pp. 487-491). IEEE.

[25]. Sharma, P. and Rathore, R.S., 2015. Three Level Cloud Computing Security Model. *International Journal of Computer Applications*, *119*(2).

[26]. Bali, V., Rathore, R.S., Sirohi, A. and Verma, P., 2009, August. Information Technology Architectures for Grid Computing and Applications. In *2009 Fourth International Multi-Conference on Computing in the Global Information Technology* (pp. 52-56). IEEE.

[27]. Bali, V., Rathore, R.S. and Sirohi, A., 2010. Performance analysis of priority scheme in ATM network. *International Journal of Computer Applications*, *1*(13), pp.26-31.

[28]. Bali, V., Rathore, R.S., Sirohi, A. and Verma, P., 2009, December. A Framework to Provide a Bidirectional Abstraction of the Asymmetric Network to Routing Protocols. In *2009 Second International Conference on Emerging Trends in Engineering & Technology* (pp. 1143-1150). IEEE.

[29]. Rathore, B., 2022. Impact of Green Marketing on Sustainable Business Development. Cardiff Metropolitan University. Presentation.

[30]. Dixit, R., Gupta, S., Rathore, R.S. and Gupta, S., 2015. A novel approach to priority based focused crawler. *International Journal of Computer Applications*, *116*(19).

[31]. Tomar, R. and Rathore, R.S., 2016. Privacy Preserving in TPA using Secured Encryption Technique for Secure Cloud. *International Journal of Computer Applications*, *138*(8).

[32]. Tomar, R. and Rathore, R.S., 2016. A Survey on Privacy Preserving in TPA Using Secured Encryption Technique for Secure Cloud. *International Advanced Research Journal in Science, Engineering and Technology*, *3*(4), pp.83-86.

[33]. Bali, V., Rathore, R.S., Sirohi, A. and Verma, P., 2009. Clustering Technique Approach to Detect the Special Patterns for Medical Video Mining. *Advances in Data Management*, p.140.

[34]. Bali, V., Rathore, R.S., Sirohi, A. and Verma, P., 2009. Architectural Options and Challenges for Broadband Satellite ATM networks. *Recent Developments in Computing and Its Applications*, p.155.

[35]. Rathore, B., 2023. Digital Transformation 4.0: A Case Study of LK Bennett from Marketing Perspectives. *International Journal of Enhanced Research in Management & Computer Applications*, *10*(11), pp.45-54.

[36]. Bhatnagar, D. and Rathore, R.S., CLOUD COMPUTING: SECURITY ISSUES AND SECURITY MEASURES.

[37]. Srivastava, S.N., Kshatriya, S. and Rathore, R.S., 2017. Search Engine Optimization in E-Commerce Sites. *International Research Journal of Engineering and Technology (IRJET)*, *4*(5), pp.153-155.

[38]. Rathore, B., 2023. Integration of Artificial Intelligence & It's Practices in Apparel Industry. *International Journal of New Media Studies (IJNMS)*, *10*(1), pp.25-37.

[39]. Bali, V., Rathore, R.S. and Sirohi, A., Adaptive Analysis of Throughput in Mobile Admhoc Network (IEEEm802. 11).

[40]. Rathore, B., 2023. Future of AI & Generation Alpha: ChatGPT beyond Boundaries. *Eduzone: International Peer Reviewed/Refereed Multidisciplinary Journal*, *12*(1), pp.63-68.

[41]. Kumar, V. and Singh Rathore, R., 2016. A Review on Natural Language Processing. *International Journal Of Engineering Development And Research*.

[42]. Rathore, B., 2022. Supply Chain 4.0: Sustainable Operations in Fashion Industry. *International Journal of New Media Studies (IJNMS)*, *9*(2), pp.8-13.

[43]. Rathore, B., 2023. Digital Transformation 4.0: Integration of Artificial Intelligence & Metaverse in Marketing. *Eduzone: International Peer Reviewed/Refereed Multidisciplinary Journal*, *12*(1), pp.42-48.