



IJITCE

ISSN 2347- 3657

International Journal of Information Technology & Computer Engineering

www.ijitce.com



Email : ijitce.editor@gmail.com or editor@ijitce.com

USING BLOCKCHAIN FOR VERIFICATION AND VALIDATE CERTIFICATES

B PAVANI PRIYANKA¹, T SUNIL KUMAR REDDY², A DHANASEKHAR REDDY³, K LAKSHMAN KUMAR⁴

¹P.G Scholar, Department of MCA, Sri Venkatesa Perumal College of Engineering & Technology, Puttur, Email: pavanipriya208@gmail.com

²Professor, Department of CSE, Sri Venkatesa Perumal College of Engineering & Technology, Puttur, Email: sunilreddy.vit@gmail.com

³Assistant Professor, Department of MCA, Sri Venkatesa Perumal College of Engineering & Technology, Puttur, Email: ghanasekhar918@gmail.com

⁴Assistant Professor, Department of CSE, Sri Venkatesa Perumal College of Engineering & Technology, Puttur, Email: lakshman5804@gmail.com

Abstract: Our blockchain-based approach addresses scholarly accreditation digitization and verification issues. Paper authentications are digitalized and shielded by tumultuous hash codes. These computerized endorsements are kept on a blockchain for sealed, straightforward verification. A certificate validation portable application allows clients to approve their certificates safely and rapidly. The Indian Ministry of Education noticed that document verification is troublesome and fake declarations are normal inferable from unfortunate enemy of falsification strategies. The blockchain-based digital certificate component in our answer battles testament misrepresentation. Blockchain's permanence guarantees digital certificate honesty and certainty, reestablishing trust in authentication holders and giving specialists. We distinguish blockchain-based certificate verification security needs and close holes and imperfections. Paper certificates are confirmed by cell phone examining or online questions utilizing QR codes and request string codes created by the framework. Our venture gives areas of strength for a to digital certificate administration and verification, further developing schooling security and certainty.

Index Terms: blockchain, digital certificate, hashing, a chaotic algorithm, Verification and Validation, Ethereum, Student

1. INTRODUCTION

Blockchain, created by Satoshi Nakamoto in 2008, has reformed information sharing through decentralized and straightforward records [1]. This venture includes making an Android application for safe certificate verification. Current graduation recognitions and records incorporate delicate data that can be altered, requiring a successful method for checking their legitimacy and forestall unapproved access [2].

Cloud-based frameworks used to get electronic certificates in education institutions are helpless against security breaks and unlawful access. Blockchain innovation gives a solid, sealed structure for putting away and approving computerized certificates [3].

Blockchain and hashing calculations guarantee that computerized certificates come from confided in sources and are not adulterated. Blockchain's decentralization eliminates declaration check,

bringing down regulatory above and further developing proficiency [4].

The decrease of certificates imitations is a significant advantage of blockchain certificate verification. Putting graduation recognitions on a blockchain works on their security, realness, and mystery, helping schooling system certainty [5].

Computerized report security depends on advances like computerized marks. Advanced marks confirm, trustworthiness, and non-disavow, further developing certificate validation security [6].

Blockchain and computerized marks make certificate capacity safer, decreasing the risk of unlawful access and change. This consolidated technique further develops certificate validation integrity and dependability [7].

We make a safe computerized certificate validation application utilizing these innovations. The application's testament check interface makes it simple to verify certificates [8].

At last, blockchain technology and digital signatures can get and validate education institution digital certificates. By utilizing blockchain's decentralized and straightforward nature, we further develop graduation certificate security, validity, and secrecy, boosting education system trust. This undertaking fabricated a protected and proficient program for ensuring computerized certificates, boosting education's standing.

2. LITERATURE SURVEY

As of late, blockchain innovation has stood out for its capability to change a few areas, including

computerized certificate administration. This writing audit analyzes blockchain and smart contract research on advanced certificate verification.

Cheng et al. [1] address advanced certificate administration utilizing blockchain and smart contracts. Blockchain innovation is utilized to get and decentralize advanced certificate issuing and verification in their review.

Wang et al. [2] propose blockchain-based testament and repudiation straightforwardness. Their review centers testament the executives receptiveness and inspects how blockchain innovation could further develop endorsement issuance and repudiation security.

Madala et al. [3] use blockchain to investigate testament straightforwardness, showing combatting authentication extortion and manipulation potential. Their examination looks at blockchain-based authentication straightforwardness advancements to further develop computerized testament security and unwavering quality.

Zhang and Mama [4] give a blockchain-based [32]decentralized computerized testament renouncement instrument. Their exploration influences blockchain to smooth out and get computerized endorsement renouncement.

Baldi et al. [5] investigate certificate validation utilizing public records and blockchains, adding that blockchain innovation further develops computerized certificate integrity and validity. They concentrate on open records and blockchain for safe, sealed certificate validation.

Kumavat et al. [6] propose blockchain-based certificate verification. Their exploration plans to make a blockchain-based stage for protected and proficient certificate verification to verify digital certificates in different spaces.

Sunitha Kumari and Saveetha [7] explore blockchain and smart contracts for advanced report confirmation. Their examination shows that blockchain innovation can defend and straightforwardly confirm advanced archives, including certificates.

Saleh et al. [8] propose blockchain-based instructive degree verification. Their examination plans to make a decentralized stage to approve instructive certificates and guarantee their authenticity.

Huynh et al. [9] investigate blockchain-based advanced certificate issuance and verification. Their review explores blockchain-based certificate giving and check, a protected and straightforward computerized certificate the executives framework.

Shah and Kumar [10] propose a blockchain-based sealed birth testament framework. Their venture utilizes blockchain to shield and changelessly oversee birth authentication records.

Generally speaking, the writing survey shows expanded interest in blockchain innovation for computerized certificate administration.[34] Blockchain and shrewd agreements are being utilized by scientists across fields to further develop computerized authentication security, uprightness, and straightforwardness. These investigations exhibit blockchain innovation's capability to change certificate administration by offering protected and

productive stages for computerized certificate verification across spaces.

3. METHODOLOGY

a) Proposed Work:

A blockchain-based computerized certificate stage would change instructive qualification issuance and verification.

Computerized certificates will be safely put away and overseen on a decentralized blockchain network. Blockchain innovation will get endorsement information by putting away it permanently and carefully designed.

Computerized certificates will be given to understudies in the wake of finishing scholastic projects. The responsible foundation will carefully sign and record declarations on the blockchain for security and obviousness.

A straightforward and easy to understand check technique will permit businesses, instructive establishments, and different partners to approve computerized certifications. Members can really look at testament backer, recipient, and issuance date on the blockchain by filtering QR codes or contributing question strings.

Computerized certificates will be shielded from duplicating by the framework. The information in each certificate will be exclusively perceived and cryptographically scrambled, making it practically difficult to manufacture.

b) System Architecture:

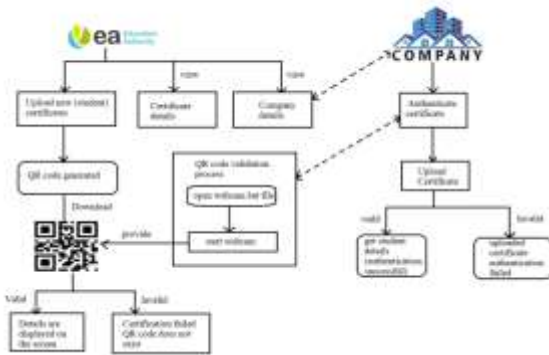


Fig1 Proposed Architecture

The system architecture incorporates the Instruction Authority and Company.

The Schooling Authority design contains modules for understudy certificate transfers, QR code age, and certificate subtleties seeing. A QR code[1] with scrambled certificate data is made in the wake of presenting an certificate. The framework really looks at checked certificates for legitimacy and showcases information if legitimate or comes up short assuming that the QR code is invalid. The framework likewise shows corporate information for confirmation.

The Company architecture permits declaration validation and transferring. Companies can verify certificates by examining QR codes or submitting them. Assuming the certificate is real, the framework checks understudy data; in any case, validation fizzles. This methodology ensures firms acquire right understudy certificates data, improving recruiting certainty and verification.[36]

The framework configuration permits instruction specialists and partnerships to consistently check understudy accreditations safely and dependably.

c) Modules:

To implement this project we used the following modules are Education Authority & Company.

These modules description are given below:

A) Educational Authority Login:

The Educational Authority Login module lets training authority administrator’s sign in with their username and secret phrase. This verification strategy concedes the administrator secure admittance to the framework’s regulatory highlights, permitting them to manage and screen school tasks.

i) Upload Certificates: Sign in as a head to transfer understudy data and certificates. This module lets administrators safely transfer and store understudy data and certificates, smoothing out instructive record organization.

ii) View Certificate details: Admins might see blockchain certificate subtleties. This capacity lets administrators examine certificate subtleties, giving receptiveness and working on check.

iii) View Company Details: Admins can see certificate verification organizations. This instrument permits administrators to see enlisted firms, helping correspondence and coordinated effort between instructive specialists and certification verification associations.

B) Company Login:

Company users can enroll and sign in utilizing the Organization Login module. Giving qualifications and information lets organization clients register.

Individuals can utilize their username and secret key to get to the framework's elements after enrollment. The login ability permits venture clients to partake in certificate authentication and verification.

i) Authenticate Certificate: Company users can filter and transfer for verification. This usefulness allows firms to verify m certificates. Companies can rapidly look at understudy qualifications by checking and transferring certificates, supporting employing trust.

C) Scanner Module:

i) QR Code Scanning: Educational institutions and companies separately work the QR Code Checking module for powerful certificate verification. Instructive foundations and endeavors might check endorsement QR codes utilizing this module. Filtering these QR codes recovers certificate information from the framework, empowering fast and exact authentication realness verification and supporting confidence in the verification cycle.

ii) QR Code Vérification: Users might examine QR codes on certificates to recover information from the blockchain utilizing the QR Code Verification module. This technique verifies certificate validity rapidly and safely. Clients may quickly check endorsement legitimacy by examining QR codes to get to blockchain information. This worked on verification technique helps certainty and reliability for instructive foundations and certificate authentication organizations.

iii) Certificate Validation: Certificate Validation verifies certificates' blockchain QR codes to guarantee their validness. For client certainty, the module verifies the certificate's authenticity on the off chance

that the QR code is on the blockchain. This sped up verification method guarantees that certifications given for check are authentic, helping certainty and reliability for instructive foundations, partnerships, and different partners.

d) Blokckain Integration:

Ethereum blockchain innovation gets declaration information. Each declaration and its data are saved as Ethereum blockchain exchanges, making them carefully designed and unchangeable.

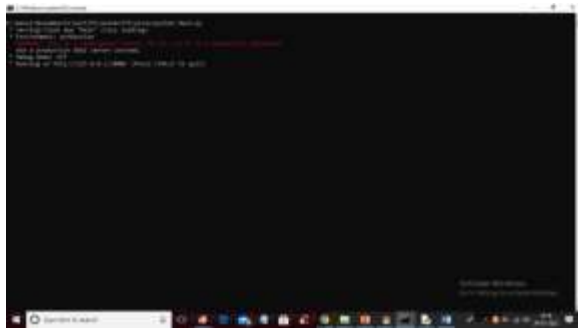
Ethereum has Strength smart contracts. These savvy contracts store and validate endorsement information. Smart contractssave authentication information.

Blockchain innovation creates guaranteed advanced marks and hash values through cryptographic hashing. Each authentication contains computerized marks and hash codes that approve its legitimacy when seen or examined.[38]

QR codes are framed from blockchain testament hash codes and advanced marks. QR codes are on real testaments. In the wake of examining a declaration's QR code, the undertaking's innovation checks its authenticity utilizing blockchain information.

4. EXPERIMENTAL RESULTS

Double tap 'run.bat' to begin Python server and acquire following result.



Above screen shows Python FLASK server sent off. Open program and visit <http://127.0.0.1:5000/record> and press enter to see underneath page.



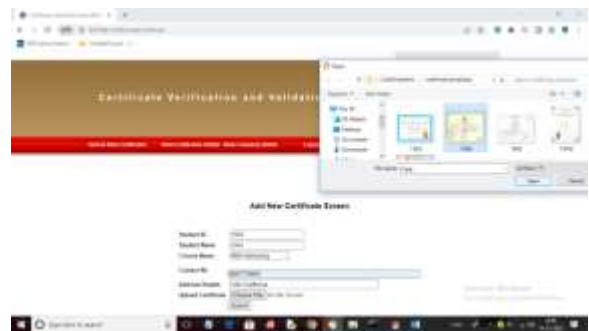
The login screen shows up in the wake of clicking 'Educational Authority Login' above.



After login, administrator will see following screen.



Above screen, administrator might click 'Upload New Certificates' to transfer certificate.



In above screen, administrator adds understudy data, transfers authentication, and presses 'Submit' to get underneath yield.



In above screen, understudy subtleties are added and computerized marks are created and saved in Blockchain for submitted certificates. Administrator might click 'Click Here to Download QR Code image' to download QR CODE and get underneath result.[40]



The program status bar shows a QR code picture downloaded, which understudies can save money on their telephones. Administrator may now get to all Blockchain affirmations by clicking 'access certificates Details'.



The above screen shows Blockchain certificates of same or new understudies, transfer date and time, advanced signature, and QR CODE picture. Clicking "View Companies Details" lets administrator view enlisted organizations.



In the above board, administrator might peruse enlisted firms, logout, and information exchange new organization for verification.



In above interface, firm enters information exchange data and presses button to save in Blockchain. Yield is beneath.



The above screen shows business information exchange wrapped up. Click 'business Login Here' to get to the login screen.



In above screen company login, then, at that point, underneath screen



Above screen, firm might click 'Authenticate Certificate' to submit understudy certificate copy and verify.



In above screen company can upload certificate and get below details if authenticated



In above page, firm can analyze all submitted certificate information and confirmation progress in last segment. They might transfer and actually check any certificate.



In above screen I am uploading another certificate and below is the output



In above screen we can see Authentication failed for uploaded certificate.

Presently association or instructive establishment might validate certificate by filtering QR code. Double

tap 'RunWebCam.bat' document to get following result.



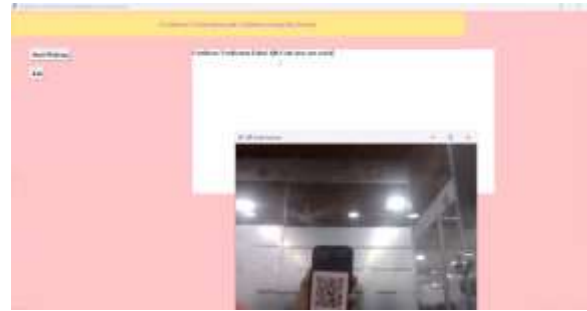
In above screen click on 'Start Webcam' button to start camera and get below output



In above webcam from mobile they need to scan QR CODE like below screen



When we present a QR code, Blockchain will extricate all certificate information and show them in the message box above. Check the wrong CODE and get the beneath yield.



In above screen we got message as Certificate validation failed as QR code does not exists

5. CONCLUSION

At last, blockchain innovation in our proposed framework has a few advantages, including information security. The gigantic, open-access blockchain record stores and approves indistinguishable information from every hub, killing declaration phony. This keeps endorsements safe and alter safe, helping trust.

The framework's straightforward certificate application and programmed issuance gives partner straightforwardness and openness. The innovation makes certificate data uninhibitedly available to organizations and associations, helping check certainty.

Our undertaking digitizes and computerizes certificate verification, saving instructive foundations and

organizations time. Blockchain's unchanging nature guarantees that qualifications are permanent and save instructive information across time.

Users may effortlessly submit, confirm, and access certificates through the task's point of interaction, making it advantageous for instructive establishments and organizations. Blockchain[1] innovation further develops testament the executives security, straightforwardness, and productivity, helping all verification parties.

6. FUTURE SCOPE

Coordinating artificial intelligence, ML, and the IoT into the framework has tremendous potential for development. AI and ML calculations might assist with breaking down endorsement information, recognize extortion propensities, and further develop misrepresentation location. IoT gadgets may likewise safely move testament data across partners, further developing information security and availability.

Beginning with instructive endorsements, the framework might be extended to incorporate proficient capabilities, licenses, and certifications. The arrangement smoothes out certificate verification across organizations and spaces by offering a predictable stage for dealing with different certificates, further developing effectiveness, straightforwardness, and trust in certificate validation tasks. This improvement makes the framework a versatile accreditation the executives answer for a few areas.

REFERENCES

[1] Jiin-Chiou Cheng; Narn-Yih Lee; Chien Chi; Yi-Hua Chen, "Blockchain and Smart Contract for Digital

Certificate" IEEE International Conference on Applied System Invention (ICASI),2018.

[2] Wang Z., Lin J., Cai Q., Wang Q., Jing J., Zha D. (2019) Blockchain-Based Certificate Transparency and Revocation Transparency. In: Zohar A. et al. (eds) Financial Cryptography and Data Security. FC 2018. Lecture Notes in Computer Science, vol 10958. Springer, Berlin, Heidelberg.

[3] D. S. V. Madala, M. P. Jhanwar, and A. Chattopadhyay, "Certificate Transparency Using Blockchain," 2018 IEEE International Conference on Data Mining Workshops (ICDMW), Singapore, Singapore, 2018, pp. 71-80, doi: 10.1109/ICDMW.2018.00018.

[4] Aisong Zhang and Xinxin Ma, "Decentralized Digital Certificate Revocation System Based on Blockchain", Journal of Physics: Conference Series, Volume 1069, 3rd Annual International Conference on Information System and Artificial Intelligence (ISAI2018) 22-24 June 2018, Suzhou.

[5] Marco Baldi, Franco Chiaraluce, Emanuele Frontoni, Giuseppe Gottardi, Daniele Sciarroni, and Luca Spalazzi "Certificate Validation through Public Ledgers and Blockchains In Proceedings of the First Italian Conference on Cybersecurity.

[6] Nitin Kumavat, Swapnil Mengade, Dishant Desai, JesalVarolia, " Certificate Verification System using Blockchain" Computer Engineering Department, Mumbai University.

[7] S.Sunitha kumari, D.Saveetha "Blockchain and Smart Contract for Digital Document Verification"

Department of Information Technology- SRM Institute of Science and Technology.

[8] Omars Saleh, osman ghazali, muhammad ehsan rana, "Blockchain based framework for educational certificates verification" Studies, Planning and Follow-up Directorate, Ministry of Higher Education and Scientific Research, Baghdad, Iraq. School of Computing, University Utara Malaysia, Kedah, Malaysia.

[9] Trong Thua Huynh, Trung Tru Huynh, Dang Khoa Pham, Anh Khoa Ngo, "Issuing and Verifying Digital Certificates with Blockchain" <https://dx.doi.org/10.1109/ATC.2018.8587428>.

[10] Maharshi Shah, Priyanka Kumar, "Tamper Proof Birth Certificate Using Blockchain Technology" International Journal of Recent Technology and Engineering (IJRTE).

[11] A.Gayathiri; J.J.ayachitra; S. Matilda, et. al., "Certificate validation using blockchain" published in IEEE open Access, available at <https://ieeexplore.ieee.org/document/9201988>.

[12] Mrs. R. Suganthalakshmi, Mrs. G. Chandra Praba, Mrs. K. Abhirami, Mrs. S. Puvaneswari, et. al., "BLOCKCHAIN BASED CERTIFICATE VALIDATION SYSTEM" published in IEEE open Access, available at https://www.irjmets.com/uploadedfiles/paper/issue_7_july_2022/28889/final/fin_irjmets1659003745.pdf

[13] Ravi Singh Lamkoti, Devdoot Maji, Hitesh Shetty, Prof. Bharati Gondhalekar , et. al., "Certificate Verification using Blockchain and Generation of Transcript " published in science direct open Access,

available at <https://www.ijert.org/research/certificate-verification-using-blockchain-and-generation-of-transcript-IJERTV10IS030260.pdf>.

[14] Shadab Alam,Huda Abdullah,Rafan Abdulhaq,Asmaa Hayawi , et. al., "A Blockchain-based framework for secure Educational Credentials" published in science directopen Access, available at <https://www.researchgate.net/publication/351356935>.

[15] Md. Mijanur Rahman, Md. Tanzinul Kabir Tonmoy, Saifur Rahman Shihab, Riya Farhana, et. al., "Blockchain-Based Certificate Authentication System with Enabling Correction" published in research gate open Access, available at <https://www.scirp.org/journal/paperinformation?paperid=124027>

[16] Manoj R, Sandeep Joshi, "Securing academic certificate verification with blockchain-based algorithmic rules", 2023 IEEE 4th International Multidisciplinary Conference on Engineering Technology (IMCET), pp.242-247, 2023.

[17] Felix Irwanto, Jessica Jodis, Emily Indrakusuma, Anderes Gui, Richard, "Decentralized Identity (DID) for Know Your Customer (KYC) Process in the Banking Industry", 2023 IEEE 9th International Conference on Computing, Engineering and Design (ICCED), pp.1-6, 2023.

[18] Suraj Jha, Aachal Modak, Rohini Pise, Sonali Patil, "Certifier Dapp - Decentralized and Secured Certification System Using Blockchain", 2023 IEEE International Conference on Blockchain and Distributed Systems Security (ICBDS), pp.1-6, 2023.

- [19] Yazan Abu Hammoudeh, Mohammad Qatawneh, Orieb AbuAlghanam, Mohammed A Almaiah, "Digital Certificate Validation Using Blockchain: A Survey", 2023 International Conference on Information Technology (ICIT), pp.506-510, 2023.
- [20] Shaik Khaleelullah, Sai Teja Vangapalli, Malavika Gaddam, Vitesh Sai Hanumakonda, Uday Kiran Goud Gangapuram, "Verification of Academic Records Using Hyperledger Fabric and IPFS", 2023 3rd International Conference on Pervasive Computing and Social Networking (ICPCSN), pp.210-217, 2023.
- [21] Harsh Bari, Nidhi Patel, "Generalized Immutable Ledger (GILED) using Blockchain Technology", 2023 IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS), pp.1-9, 2023.
- [22] Subhajit Halder, H. Ajin Kumar, Shantanu Lavu, Reeja S R, "Digital Degree Issuing and Verification Using Blockchain", 2022 Fourth International Conference on Cognitive Computing and Information Processing (CCIP), pp.1-4, 2022.
- [23] Amjad Aldweesh, Huda Alatwi, Mohammad Alauthman, Mouhammd Alkasassbeh, "SRP-Blockchain: A Framework for Scientific Research Profile on the Blockchain", 2022 International Conference on Emerging Trends in Computing and Engineering Applications (ETCEA), pp.1-6, 2022.
- [24] M. N. Birje, R. H. Goudar, C. M Rakshitha, Manisha T. Tapale, "A Review on Layered Architecture and Application domains of Blockchain Technology", 2022 International Conference on Electrical, Computer and Energy Technologies (ICECET), pp.1-5, 2022.
- [25] Adam Shettima Musti, Shri Kant, Tejaswi Khanna, "DegChain: Development of Blockchain Framework for Generation and Verification of Educational Certificates", 2022 IEEE 7th International conference for Convergence in Technology (I2CT), pp.1-7, 2022.
- [26] Saha Reno, Mamun Ahmed, Saima Ahmed Jui, Shamma Dilshad, "Securing Certificate Management System Using Hyperledger Based Private Blockchain", 2022 International Conference on Innovations in Science, Engineering and Technology (ICISSET), pp.46-51, 2022.
- [27] Shafayet Mahamud, Syada Tasmia Alvi, "A Framework for Covid-19 Vaccine Management System Using Blockchain Technology", 2021 4th International Conference on Recent Trends in Computer Science and Technology (ICRTCST), pp.417-422, 2022.
- [28] Rutuja D. Sanjekar, Balaji M. Patil, "Techniques of Securing Educational Document using Blockchain and IPFS based System: A Review", 2022 International Conference for Advancement in Technology (ICONAT), pp.1-8, 2022.
- [29] Md. Suman Reza, Sujit Biswas, Abdullah Alghamdi, Mesfer Alrizq, Anupam Kumar Bairagi, Mehedi Masud, "ACC: Blockchain Based Trusted Management of Academic Credentials", 2021 IEEE International Symposium on Smart Electronic Systems (iSES), pp.438-443, 2021.
- [30] Andres Heredia, Maria-Jose Barros, Gabriel Barros-Gavilanes, "Decentralizing Certificates Issuance Through Blockchain", 2021 International

Conference on Electrical, Computer and Energy Technologies (ICECET), pp.1-6, 2021.

[31] G.Viswanath, “Hybrid encryption framework for securing big data storage in multi-cloud environment”, Evolutionary intelligence, vol.14, 2021, pp.691-698.

[32]Viswanath Gudditi, “Adaptive Light Weight Encryption Algorithm for Securing Multi-Cloud Storage”, Turkish Journal of Computer and Mathematics Education (TURCOMAT), vol.12, 2021, pp.545-552.

[33] Viswanath Gudditi, “A Smart Recommendation System for Medicine using Intelligent NLP Techniques”, 2022 International Conference on Automation, Computing and Renewable Systems (ICACRS), 2022, pp.1081-1084.

[34]G.Viswanath, “Enhancing power unbiased cooperative media access control protocol in manets”, International Journal of Engineering Inventions, 2014, vol.4, pp.8-12.

[35]Viswanath G, “A Hybrid Particle Swarm Optimization and C4.5 for Network Intrusion Detection and Prevention System”, 2024, International Journal of Computing, DOI: <https://doi.org/10.47839/ijc.23.1.3442>, vol.23, 2024, pp.109-115.

[36]G.Viswanath, “A Real Time online Food Ordering application based DJANGO Restfull Framework”, Juni Khyat, vol.13, 2023, pp.154-162.

[37]Gudditi Viswanath, “Distributed Utility-Based Energy Efficient Cooperative Medium Access Control in MANETS”, 2014, International Journal of Engineering Inventions, vol.4, pp.08-12.

[38] G.Viswanath,“ A Real-Time Video Based Vehicle Classification, Detection And Counting System”, 2023, Industrial Engineering Journal, vol.52, pp.474-480.

[39]G.Viswanath, “A Real- Time Case Scenario Based On Url Phishing Detection Through Login Urls ”, 2023, Material Science Technology, vol.22, pp.103-108.

[40] Manmohan Singh,Susheel Kumar Tiwari, G. Swapna, Kirti Verma, Vikas Prasad, Vinod Patidar, Dharmendra Sharma and Hemant Mewada, “A Drug-Target Interaction Prediction Based on Supervised Probabilistic Classification” published in Journal of Computer Science, Available at: <https://pdfs.semanticscholar.org/69ac/f07f2e756b79181e4f1e75f9e0f275a56b8e.pdf>