Blockchain Enhanced Web Application for Anonymous Drug Abuse Reporting and Recovery in the Indian Context

Nebin Mathew John
Department of Computer Science and Engineering
Amal Jyothi College of Engineering
Kanjirapally, Kerala, India
nebinmathewjohn2024@cs.ajce.in

Vivek Manojkumar Nair
Department of Computer Science and Engineering
Amal Jyothi College of Engineering
Kanjirapally, Kerala, India
vivekmanojkumar2024@cs.ajce.in

Sam Stephen Thomas
Department of Computer Science and Engineering
Amal Jyothi College of Engineering
Kanjirapally, Kerala, India
samstephenthomas2024@cs.ajce.in

Abstract— **This paper presents a comprehensive web application designed to address the pressing issue of drug abuse in India. The application, underpinned by blockchain technology, provides a secure and anonymous platform for reporting drug abuse incidents and supporting recovery efforts. The unique socio-cultural landscape of India is taken into account, with the aim of fostering community engagement, motivating recovery, and combating the stigma associated with addiction. The integration of blockchain technology ensures user privacy and streamlines reward redemption, enhancing the overall user experience. This comprehensive solution represents a significant step forward in India's fight against drug abuse. The paper delves into the societal norms and recovery challenges in India that often discourage open discussions about addiction, leading to reluctance in seeking help and recovery. It also highlights the inefficiencies in current reporting mechanisms that lack anonymity, putting whistleblowers at risk. This discourages reporting and undermines efforts to curb drug abuse. The proposed application addresses this issue by providing a secure, anonymous reporting channel. Furthermore, traditional recovery methods face challenges in engaging individuals due to cultural barriers and social stigma. The application's recovery section incorporates motivational content and success stories tailored to resonate with India's cultural context. The paper also discusses the design and functionality of the anonymous reporting section and the recovery support section of the application. Blockchain integration for security and transparency is another key aspect covered in this paper. Blockchain technology guarantees anonymity, ensuring the safety of whistleblowers and contributing to efficient reward redemption. Users' earned tokens are securely stored in their blockchain accounts, enabling direct token to coupon conversion. This eliminates the need to navigate forums and ensures a seamless experience. The web application, fortified by blockchain technology, stands as a beacon of hope in India's fight against drug abuse, offering a transformative approach that respects the country's unique cultural context. It empowers individuals, ensuring their privacy while fostering community engagement and overcoming the pervasive stigma surrounding addiction.**

I. INTRODUCTION

Against the backdrop of India's diverse cultural tapestry, the battle against drug abuse has transformed from a societal concern to a resounding moral imperative. The pervasive stigma surrounding addiction has cultivated a culture of silence, leaving individuals ensnared by substance abuse isolated, unsupported, and often struggling in the shadows. As

instances of drug abuse continue to surge across the nation, it is imperative to recognize that the ripples of this crisis extend far beyond the individuals directly affected. Families fracture, communities falter, and society at large grapples with the reverberations of this escalating epidemic. In this sobering context, the prevailing reporting mechanisms reveal a critical inadequacy. The absence of robust safeguards and a veil of anonymity for whistleblowers serves as a glaring deterrent, stifling the vital flow of information necessary to combat drug abuse effectively. Moreover, traditional recovery initiatives, while well-intentioned, confront their own formidable challenges. Deep-seated cultural norms and the persistent stigma associated with addiction often obstruct their efficacy in engaging and rehabilitating individuals. This paper unfurls a groundbreaking web application poised to revolutionize India's approach to drug abuse intervention.

A. Drug Abuse Crisis in India

India faces a severe drug abuse crisis deeply entrenched in its cultural, social, and economic landscape. According to the National Drug Dependence Treatment Centre (NDDTC), approximately 16 crore individuals in India require active intervention for substance abuse issues. The statistics on drug abuse, including alcohol, opioids, cannabis, and sedatives, depicted in Table 1, underscore the gravity of the situation. Compounded by societal norms fostering silence and stigma around addiction, many individuals are deterred from seeking help. Recent reports from the United Nations Office on Drugs and Crime (UNODC) reveal India's role as a major transit country for illicit drugs, particularly heroin and opium, originating from the Golden Crescent and Golden Triangle. India's geographical position, with porous borders, has exacerbated drug smuggling and production activities, posing significant challenges for law enforcement agencies.

B. Drug Production and Smuggling

India, situated amidst opium-producing regions, serves as a significant transit point for drugs. It faces a considerable challenge in curbing drug smuggling and trafficking due to its extensive coastline, porous borders, and a growing network of drug cartels. Reports from the Narcotics Control Bureau (NCB) indicate that major drug trafficking routes pass through ports in cities such as Mumbai, Chennai, and Kolkata, making these areas particularly vulnerable to drug infiltration. Criminal networks have employed various methods, including concealment in cargo shipments, usage of fishing boats, and exploiting air transport to smuggle drugs across the borders.

C. Socio-economic Losses due to Drug Abuse

Drug abuse in India presents multifaceted challenges, extending beyond health implications to significant socioeconomic repercussions. Substance abuse contributes to

various adverse outcomes, including violence, accidents, decreased productivity, and escalating healthcare expenses. The UNODC World Drug Report 2023 underscores the escalating illicit drug markets globally and the ensuing strains on health services and law enforcement. With over 296 million individuals worldwide reported using drugs in 2021, marking a 23% increase over the past decade (as shown in Table 1), the magnitude of the issue is evident. In India, opioid consumption has surged five-fold since 2004, exacerbating the crisis. Moreover, drug addiction fosters social and emotional problems, straining interpersonal relationships and negatively affecting individuals' mental and emotional well-being. The statistics underscore the pervasive nature of substance abuse in India, transcending age groups and highlighting its extensive impact nationwide. According to the National Crime Records Bureau, between 2017 and 2019, over 2,300 deaths in India were attributed to drug overdose. Most fatalities occurred in the 30-45 age group, with Rajasthan recording the highest number at 338, followed by Karnataka at 239, and Uttar Pradesh at 236. Globally, the Global Burden of Disease Study estimated that illicit drugs claimed nearly 7.5 lakh lives in 2017 alone, with India accounting for approximately 22,000 of these deaths. These figures underscore the urgent need for comprehensive strategies to address drug abuse and its repercussions on both individual and societal levels.

TABLE 1

STATISTICS ON DRUG ABUSE IN INDIA

Substance	Users (age 10-17 years)	Users (age 18-75 years)
Alcohol	30 Lakh	15.01 Crore
Cannabis	20 Lakh	2.90 Crore
Opioids	40 Lakh	1.86 Crore
Sedatives	20 Lakh	1.05 Crore
Inhalants	30 Lakh	51.25 Crore
Hallucinogens	2 Lakh	11.01 Crore
ATS	4 Lakh	15.47 Crore
Cocaine	2 Lakh	9.40 Crore

D. Visionary Web Application

Unveiling a visionary web application, this project revolutionizes India's approach to drug abuse intervention by seamlessly integrating anonymous reporting and a robust recovery support system fortified by blockchain technology. It aims to bridge the gap between archaic methodologies and modern interventions, offering hope for those affected by drug abuse and catalyzing a transformative journey towards recovery, rehabilitation, and healing. To combat this crisis, concerted efforts must be made on multiple fronts, including intensified education campaigns, bolstering community-based support systems, adopting technology-driven approaches by law enforcement, implementing stricter regulations, and investing in research and treatment methodologies. It is a moral imperative and societal obligation to marshal resources

and determination towards combating drug abuse in India, fostering compassion, understanding, and support for a brighter, drug-free future.

II.   RELATED WORKS

This section provides an overview of existing research on anonymous reporting, privacy, and incentive mechanisms, contextualizing our proposed solution. We draw inspiration from a seminal paper on a Blockchain-based reporting model, shaping our approach in such a way that it empowers users to send anonymous announcements in non-fully trusted networks, providing incentives for reporting without fear of retaliation and create a system that is transparent and tamper resistant that helps to further bolster user trust, as validated by theoretical analysis and extensive experiments.

A. Threshold Authentication

Threshold authentication, a cornerstone in secure communications, addresses the challenge of establishing trust in environments where complete trust cannot be assumed, such as mobile internet networks. Pioneering work in this domain introduces a revolutionary approach to threshold authentication. This innovative system empowers nondeterministic mobile users to vote on reporting incidents through cryptographic signatures, allowing for the transmission of anonymous announcements in networks characterized by partial trust. This influential concept significantly guided our approach, aiming to ensure user identity privacy and message reliability throughout the reporting process, even in non-fully trusted environments. [2]

B. Blockchain Integration for Security and Privacy

The integration of blockchain technology has emerged as a powerful tool in ensuring security and privacy in various domains, including anonymous reporting systems. Seminal work in this field introduces a Blockchain-based incentive anonymous reporting system, designed to address the reluctance of individuals to report incidents due to concerns about privacy and potential retaliation. By employing blockchain, the system safeguards the integrity and immutability of reported data, providing a level of security that is paramount in maintaining user trust. This influential approach guided our decision to leverage blockchain for security and privacy, underscoring our commitment to safeguarding the confidentiality and reliability of reported information.[6]

C. Incentive Mechanisms and Blockchain

The establishment of trust networks has been instrumental in fostering reliable relationships among users. Pioneering work in the realm of blockchain technology introduces a

system that employs incentives to motivate users to report incidents while ensuring their identity remains confidential. The transparency, openness, and tamper resistance of account information and transaction records within this system provide a robust foundation for accountability. This groundbreaking approach inspired our incentive framework, which encompasses reputation mechanisms, currency incentives, and reciprocity mechanisms. By drawing from these principles, our solution aims to enhance user engagement and contribution, all while upholding user privacy. We envision a reporting platform that not only encourages individuals to come forward with valuable information but also establishes a culture of trust and accountability within the community. [4]

D. Leveraging Virtual Platforms for Drug Recovery Support

Virtual platforms have emerged as promising tools for supporting individuals in their journey towards drug recovery. Leveraging social media forums and online communities, such as Reddit, researchers have explored innovative approaches to provide personalized assistance and guidance to those struggling with addiction. Through linguistic analysis and machine learning, studies have identified linguistic patterns indicative of different stages of recovery, allowing for the development of classifiers to distinguish between posts related to addiction and those reflective of recovery progress. Additionally, methodologies for personalized mentor recommendation have been proposed, matching addicted users expressing an intention to recover with mentors who have successfully overcome similar challenges. These virtual support systems offer valuable insights into support-seeking behaviors and response dynamics, contributing to a deeper understanding of social support mechanisms in online health communities and providing strategies to maximize support resources for individuals seeking recovery assistance. [9]

III.   BACKGROUND

A. Drug Reporting and Tip-offs in India

In India, the Narcotics Control Bureau (NCB) leads drug law enforcement efforts, but existing reporting mechanisms often lack anonymity, deterring individuals from reporting due to fear of retaliation. Some cities, like Mumbai, have established anonymous helplines to encourage citizens to report drug-related information, but their success rates remain undisclosed, hindering assessment of their effectiveness. Spontaneous reporting, commonly used for Adverse Drug Reactions (ADRs), involves health professionals or patients voluntarily reporting reactions linked to drug use to an ADR Monitoring Centre (AMC).

B. Disadvantages of Current Reporting Mechanisms

- The current reporting mechanisms in India have several disadvantages. Firstly, they often lack anonymity, which can put whistleblowers at risk and discourage reporting. This lack of anonymity can lead to fear of retribution, as whistleblowers may face threats or even physical harm for their actions. This fear can be particularly acute in cases involving powerful drug cartels or organized crime groups.

- Secondly, these mechanisms may not be accessible to everyone, particularly those in rural areas or those without access to technology. This digital divide can prevent many individuals from reporting drug abuse incidents, further exacerbating the issue.

- Lastly, there is often a lack of follow-up on reports made, which can lead to a sense of disillusionment among those who do report. Without clear communication about the status of their report or the actions taken as a result, individuals may feel that their efforts are in vain and be less likely to report in the future.

C. Recovery Methods in India

In India, the Ministry of Social Justice \& Empowerment has implemented the Scheme of Prevention of Alcoholism and Substance Abuse since 1985-86. This scheme offers various services like awareness campaigns, counseling, and rehabilitation for the holistic recovery of addicts. It adopts a community-based approach, focusing on primary prevention (encouraging abstinence), secondary prevention (changing behavior), and tertiary prevention (treatment and reintegration). However, traditional methods struggle due to cultural barriers and stigma. Our application's recovery section addresses these challenges by providing culturally relevant motivational content and success stories.

D. Stigma Around Drug Recovery in India

Stigma surrounding drug recovery in India significantly hampers individuals' access to care and the quality of support they receive. This societal stigma, rooted in cultural norms that discourage open discussions about addiction, leads to reluctance in seeking help and recovery. Individuals with substance use disorders (SUDs) are often unfairly viewed as unpredictable, dangerous, and morally responsible for their condition. This stigma not only impedes access to treatment but also affects the overall well-being of individuals, contributing to the low treatment uptake rates, with only 18\% of those with drug use disorders receiving adequate care. Addressing this stigma is vital for enhancing the effectiveness of recovery efforts in India.

IV.   METHODOLOGY

The initiative employs a dual-pronged strategy, combining the Community-Engaged Reporting Ecosystem with the Virtual Substance Use Disorder (SUD) Rehabilitation Platform. This integrated approach maximizes impact by proactively engaging communities in reporting and offering personalized support for individuals in recovery. This synergistic strategy aims to create a more effective and sustainable solution to combat drug abuse in India.

A. COMMUNITY-ENGAGED REPORTING ECOSYSTEM

1. Anonymized Reporting Process

The platform employs a multi-faceted strategy to ensure absolute anonymity in the reporting process. Upon submission, a report triggers the generation of a unique, encrypted identifier that is securely stored apart from the report's actual content. This meticulous separation guarantees that even in the event of a database breach, there remains no direct correlation between the report and the user's identity. Moreover, the system employs sophisticated cryptographic techniques to further obfuscate the user's location and device particulars, rendering any attempt to backtrack the report to its origin nearly impossible. To augment security, reports are transmitted through an encrypted channel, adding an extra layer of protection against potential eavesdropping. Furthermore, the platform implements periodic key rotation and employs state-of-the-art hashing algorithms to safeguard the integrity and confidentiality of all stored data. In the event of a successful report leading to law enforcement intervention, access to the reporter's identity is guarded by stringent legal protocols, ensuring that the whistleblower's information is divulged only under lawful circumstances and with utmost care for their safety and privacy. This comprehensive approach to anonymization not only fortifies user confidence in the reporting process but also establishes a resilient foundation for our platform's role in combating substance abuse within the community.

2. Customized Report Form Fields

The platform emphasizes the generation of precise and comprehensive reports through the implementation of customizable form fields. This pivotal feature allows users to select from a diverse array of predefined categories, enabling them to intricately detail incidents or suspects. By providing this structured framework, the platform ensures that each report is enriched with essential information vital for authorities to undertake thorough and effective investigations. This tailored approach not only empowers users to convey their observations accurately but also equips law enforcement agencies with the requisite data to expedite their proceedings. In essence, the inclusion of customizable form fields stands as

a critical component in elevating the quality and depth of reports, bolstering the overall efficacy of the reporting ecosystem.
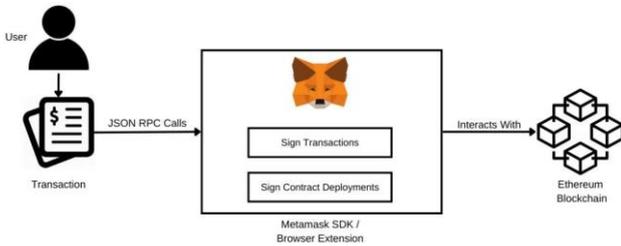
Fig. 1. Metamask Signed Transactions

3. Blockchain-Based User Authentication

The platform integrates an advanced blockchain-based authentication system, dynamically generating cryptographic key pairs upon registration initiation. This includes public keys for unique identification within the blockchain network and securely stored private keys for user authentication. Leveraging specialized smart contracts deployed on the Ethereum blockchain using Truffle and Ganache, the platform manages user authentication by associating public keys with corresponding accounts and storing essential user details securely. To ensure transaction security and efficiency, the system employs a self-signing method, specifying gas prices and fetching private encoded keys from ABI files. Data storage within smart contracts is structured to accommodate diverse formats such as text, dates, images, URLs, and base64-encoded strings, enabling direct retrieval for admin dashboards from the frontend without relying on backend databases. Continuous ledger monitoring maintains transaction integrity, mitigating tampering risks. This meticulous approach, coupled with robust data management practices, underscores the platform's unwavering dedication to security and user autonomy in a highly trusted environment.
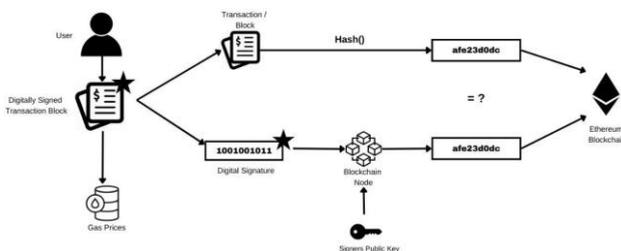
Fig. 2. Self-Signed Transactions

4. Self-Signing Transactions without 3rd-Party Providers

To ensure secure and efficient transactions within the platform, an innovative self-signing methodology is employed, which eliminates the need for reliance on

third-party providers like MetaMask. Unlike traditional decentralized approaches where users typically utilize MetaMask for transaction signing as depicted in Fig 1, the platform's architecture takes into account potential limitations users may face in accessing blockchain accounts or MetaMask extensions, particularly among those unfamiliar with blockchain technology.

This unique methodology integrates various cutting-edge technologies, including Web3.js, Truffle Suite, Ganache, and Node.js, enabling direct transaction handling based on real-time gas prices and optimal efficiency. Gas prices are dynamically calculated from Ethereum network APIs to determine transaction fees, while private key management is securely facilitated through Node.js encryption techniques as seen in Fig 2. Transaction encoding adheres to Application Binary Interface (ABI) specifications, ensuring compatibility and reliability during interactions with smart contracts. By circumventing dependencies on third-party providers like MetaMask as seen in Fig 3., the system streamlines transaction processing, offering users a seamless and secure transaction environment. Web3.js facilitates smooth communication with Ethereum nodes, ensuring efficient transaction propagation and providing real-time feedback to users regarding transaction status. Despite challenges such as reliance on users for secure private key management and complexities in predicting gas costs accurately, this methodology prioritizes user experience, significantly enhancing user autonomy and security within the Ethereum blockchain ecosystem.
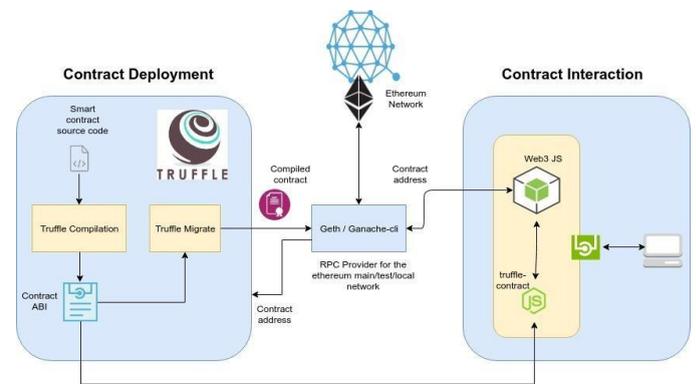
Fig. 3. Contract Deployment and Interactions

5. Sophisticated Spam Filtering and Report Prioritization Mechanisms

The platform integrates a sophisticated spam filtering and report prioritization system, leveraging specific algorithms and mechanisms to enhance accuracy and efficiency. Upon receiving a report, the system conducts an in-depth analysis of its attributes, including content, frequency, and sender behavior, utilizing machine learning models to scrutinize textual content for common spam patterns and perform

behavioral analysis. Reports flagged as potential spam undergo a secondary review process, integrating third-party Node.js libraries and advanced natural language processing (NLP) algorithms to detect subtle linguistic cues associated with spam-like content. Operating in real-time, the system promptly identifies and isolates suspicious reports, ensuring that only genuine and trustworthy reports proceed to the investigation phase. Additionally, the platform implements measures such as sophisticated IP banning mechanisms, temporary IP bans for suspicious activity, bot protection mechanisms, CAPTCHA integration, and user acknowledgments for report legitimacy. The dynamic and adaptable nature of the spam filtering algorithms ensures resilience against evolving spam tactics, providing a highly secure and reliable reporting environment. This comprehensive approach effectively mitigates spam and streamlines report prioritization, enabling swift and efficient responses to critical community issues through meticulously implemented systems leveraging advanced technologies.
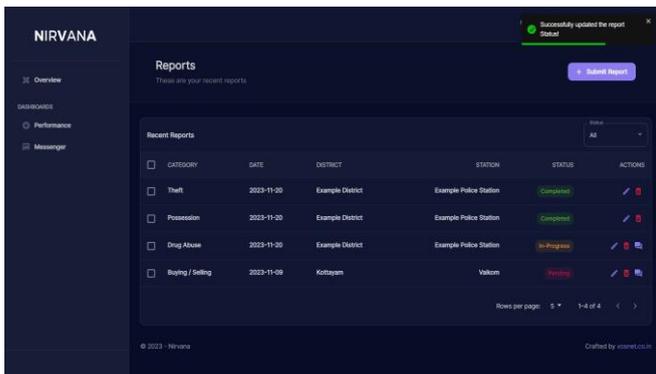
Fig. 4. Report Management Dashboard for Authorities

6. Robust Management Terminal for Authorities

The platform introduces a cutting-edge report management system as seen in Fig 4, tailored specifically for authorities, providing a centralized hub equipped with powerful tools and features to streamline the handling of incoming reports. This comprehensive terminal offers an intuitive dashboard granting authorities a holistic view of all reports, categorized based on severity, geographical relevance, and other criteria, enabling prioritization of critical cases. Advanced filtering options and search capabilities facilitate swift identification and resolution of reports requiring immediate attention, while robust encryption protocols ensure confidentiality in communications with reporting users. Furthermore, the terminal boasts advanced case management functionalities, allowing authorities to track investigation progress, manage evidence, and collaborate seamlessly with fellow investigators. Incorporating features like active report status, live analytics,

report segregation by jurisdiction, and potential spam tracking, the terminal provides real-time insights and efficient mitigation strategies. This comprehensive methodology ensures the report management terminal equips authorities with the capabilities needed to address reports swiftly, thoroughly, and with utmost precision, enhancing overall efficiency and effectiveness of law enforcement efforts within the platform.

B. IRTUAL SUBSTANCE USE DISORDER (SUD) REHABILITATION

The methodology for the Virtual Substance Use Disorder (SUD) Rehabilitation platform is structured around several critical components, commencing with the meticulous process of user registration and authentication. It is as follows:

1. User Authentication and Profiling:

The platform is structured around several critical components, commencing with the meticulous process of user registration and authentication. Through a blockchain-based authentication system, users engage in a secure registration process, providing requisite details while ensuring the confidentiality of their identities. Following registration, an intricate user profiling phase ensues, leveraging advanced algorithms to analyze user data comprehensively. This analysis facilitates a nuanced understanding of individual needs, enabling the platform to tailor interventions and treatment plans with precision. By delving deep into user characteristics and behavioral patterns, the platform optimizes its ability to deliver personalized and effective rehabilitation strategies, thereby maximizing the chances of successful recovery outcomes.

2. Engaging Features and Analytical Insights:

The application incorporates a diverse array of interactive functionalities tailored to enhance user engagement and support therapeutic progress. Alongside daily task management and progress tracking, users can leverage journaling capabilities to express their thoughts and emotions, fostering self-awareness and introspection. Surveys and questionnaires offer structured feedback mechanisms, empowering users to articulate their experiences while providing counselors with valuable insights. Furthermore, personalized reminders and notifications ensure users remain connected and motivated throughout their journey. By tracking user interactions with the app, including task completion rates, time spent on different sections, and frequency of journaling, counselors can tailor interventions more effectively. Reminders and notifications play a crucial role in maintaining user engagement, providing timely prompts for tasks, appointments, or self-care activities.

3. Incentive Framework:

The incentive framework is intricately designed to leverage blockchain technology for secure and transparent reward distribution. Upon active participation in rehabilitation programs or contributing to the platform's objectives, users earn tokens stored securely within their blockchain wallet addresses. The process involves interaction with Web3.js, a JavaScript library that enables communication with Ethereum blockchain nodes directly from web applications. Users can redeem their earned tokens through various methods, depending on the platform's integration. Non-fungible tokens (NFTs) can represent unique digital assets or experiences, providing users with exclusive rewards or privileges. Furthermore, integration with e-commerce platforms enables token redemption for coupons or discounts on relevant products or services. This redemption process is facilitated by interacting with smart contracts through decentralized applications (DApps) using wallet applications like MetaMask.

4. Web3 Based Secure Video Consultation and Chat:

The platform includes a robust blockchain-based video consultation and chat feature, ensuring secure and direct connectivity between patients and therapists while preserving anonymity and confidentiality. Leveraging blockchain technology guarantees end-to-end encryption and data integrity, safeguarding sensitive information shared during sessions. It uses Ethereum for decentralized and immutable data storage, alongside utilizing the WebRTC (Web Real-Time Communication) protocol for real-time video communication. Through this, direct peer-to-peer video streaming occurs without intermediaries, ensuring privacy. User identities are encrypted and securely stored on the blockchain to maintain anonymity, with each session generating unique cryptographic keypairs for authentication and encryption.

V.   CONCLUSION

In conclusion, the proposed web application represents a groundbreaking solution to combat drug abuse in India, addressing the challenges of reporting, recovery, and societal stigma through innovative technology and community engagement. By leveraging blockchain technology, the platform ensures user privacy and security, fostering trust and confidence in the reporting process. Through the integration of advanced features tailored to India's socio-cultural context, such as customizable report forms and motivational content, the application empowers individuals to seek help and support. The dual-pronged approach of the Community-Engaged Reporting Ecosystem and the Virtual Substance Use Disorder (SUD) Rehabilitation Platform maximizes impact by proactively involving communities in reporting and providing personalized support for individuals in recovery. With a focus

on anonymity, user engagement, and data security, the platform stands as a beacon of hope in India's fight against drug abuse, offering a transformative solution that respects cultural sensitivities while fostering community resilience and support.

References

[1]   S. Nakamoto. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System.[Online]. Available: https://bitcoin.org/bitcoin.pdf

[2]   J. Shao, X. Lin, R. Lu, and C. Zuo, A threshold anonymous authentication protocol for VANETs, IEEE Trans. Veh. Technol., vol. 65, no.3, pp. 17111720, Mar. 2016. doi: 10.1109/TVT.2015.2405853.

[3]   Yanping Wang , Xiaofen Wang , Hong-Ning Dai, Xiaosong Zhangand Muhammad Imran, "A Data Reporting Protocol With Revocable Anonymous Authentication for Edge-Assisted Intelligent Transport Systems" IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS, VOL. 19, NO. 6, JUNE 2023.

[4]   S. Zou, J. Xi, S. Wang, Y. Lu and G. Xu, "Reportcoin: A Novel Blockchain-Based Incentive Anonymous Reporting System," in IEEE Access, vol. 7, pp. 65544-65559, 2019.

[5]   I. Gutiérrez-Agüero, S. Anguita, X. Larrucea, A. Gomez-Goiri and B. Urquizu, "Burnable Pseudo-Identity: A Non-Binding Anonymous Identity Method for Ethereum," in IEEE Access, vol. 9, pp. 108912-108923, 2021

[6]   Y. Li, Y. Yu, R. Chen, X. Du, and M. Guizani, "Integrity- Chain: Provable data possession for decentralized stor- age," IEEE J. Sel. Areas Commun., vol. 38, no. 6, pp. 1205–1217, Jun. 2020.

[7]   Pierre-Marie Pédrot, Nicolas Tabareau, ",An Effectful Way to Eliminate Addiction to Dependence" 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.

[8]   B. Ansari and S. Du, "Investigating User-Generated Content in an Online Drug Recovery Forum: Lessons for Successful Computer-Mediated Communication of Social Support," in IEEE Journal of Biomedical and Health Informatics, vol. 26, no. 11, pp. 5695-5703, Nov. 2022

[9]   S. Ghosh, J. Misra, S. Ghosh and S. Podder, "Utilizing Social Media for Identifying Drug Addiction and Recovery Intervention," 2020 IEEE International Conference on Big Data (Big Data), Atlanta, GA, USA, 2020