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Blockchain-enabled Smart Contracts in Healthcare and Voting Systems: A Review Paper

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Abstract- — Everybody throws around the term "blockchain" these days, like it's some secret sauce. But smart contracts are where things actually start to get interesting. Forget endless forms and relying on someone's handshake; smart contracts handle things automatically. They're just coded agreements that trigger themselves no middlemen, no second-guessing if someone's being honest. You know what you're getting. This review looks at how smart contracts are changing the game in two touchy areas: healthcare and voting, where trust and privacy can't be taken lightly. Dealing with healthcare is usually a hassle. People lose records, insurance companies bounce you around, and privacy feels flimsy. With smart contracts, you're in charge of your data, claims happen faster, and private info stays private. Doctors can share what they need to, without breaking the rules. Voting? It's had trust issues forever people aren't sure their votes count for anything. Smart contracts clean things up. They make voting more transparent, help stop fraud, and lock down the results. You can check your ballot and know nobody's changing numbers behind the scenes. Of course, it's not all smooth sailing blockchain slows down when things get big, laws haven't caught up, some of the interfaces are confusing, and big organizations don't like change. This paper covers what works, what needs help, and where things could go next.

Keywords- Blockchain, Smart Contracts, Healthcare, Voting Systems, Data Security, Transparency, Trust, Automation

I. INTRODUCTION

Hardly anyone escapes the hype around blockchain now. You hear about it everywhere, and honestly, it gets attention for a reason. It spreads out power and keeps records straight. The big piece is smart contracts little programs that handle rules and actions so you don't have to trust someone to follow through.

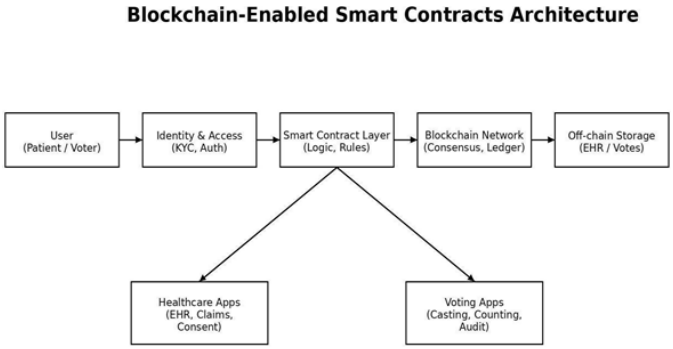
Healthcare and voting systems drown in outdated processes, mistakes happen, and people lose faith. Smart contracts aim to fix that by automating decisions and keeping things easy to check.

This review breaks down what blockchain and smart contracts actually are, shows how
they're working in medicine and elections, points out what's still broken, and takes a look at what's coming.

II. BLOCKCHAIN AND SMART CONTRACTS: AN OVERVIEW

2.1 What is Blockchain?

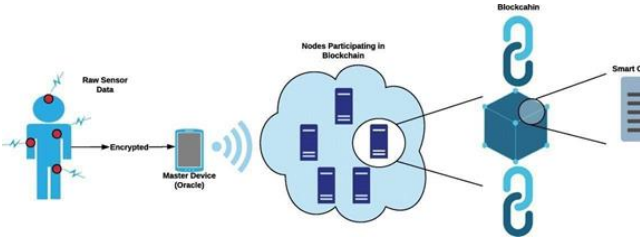
Think about a shared spreadsheet copied to everyone. Nobody can just delete rows or fake an edit without it lighting up for all to see. Every entry is chained to the last one, making cheating next to impossible. Hospitals and elections could use protection like that.



2.2 Smart Contracts

Smart contracts work like a vending machine for deals you drop in the input, the code checks it, and if it's right, it spits out the result automatically. Everything is out in the open, and when something triggers the contract like someone orders medicine, or casts a vote the contract does the rest. It's tough to fudge what happened, because every move gets recorded. The whole thing is pretty much bulletproof.

III. APPLICATIONS OF SMART CONTRACTS IN HEALTHCARE



3.1 Patient Records Management

Switching doctors? Normally, it's a mess-tracking down who's got your info, or wondering if someone's peeking at stuff they shouldn't. Smart contracts hand the controls to you: you pick who can see your records and shut them out whenever you like. You still have proof of who looked and when, so nothing gets lost or abused.

For example, a smart contract can ensure that only authorized doctors or healthcare providers can view or modify a patient's medical history. Patients themselves can control their data, granting or revoking permissions as needed. This approach preserves privacy and enhances trust by providing a transparent audit trail of all access and modifications, thereby preventing unauthorized tampering (Engelhardt, 2017).

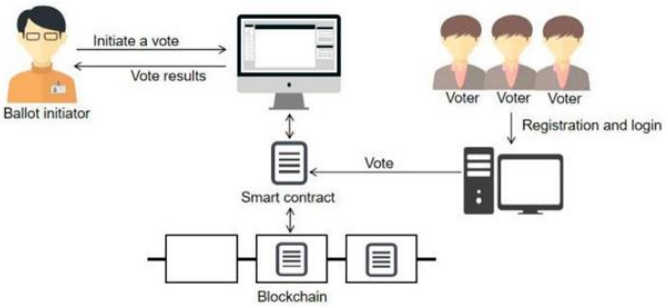
3.2 Insurance Claims Processing

Insurance claims are usually slow, messy, and open to all kinds of mistakes. Smart contracts speed this up-when your claim fits the policy, payment triggers right away or denial is final, with the whole story out in the open. No more going in circles.

3.3 Data Sharing and Interoperability

Doctors need all the facts to help you, but privacy laws are strict. With smart contracts, you decide who gets access, exactly what they see, and for how long. Sharing works, privacy holds, and every action is tracked so you know the system's playing by the rules.

IV. APPLICATIONS OF SMART CONTRACTS IN VOTING SYSTEMS



4.1 Secure Voter Registration

Elections run into trouble double registrations, fake voters, and all sorts of shady business. Blockchain helps clamp down on that. Voter lists stay clean, verified, and locked, so nobody can mess things up behind the curtain.

4.2 Transparent Vote Casting

Lots of people don't think their votes matter. With blockchain, each vote is logged as a digital transaction you can see. Auditing is possible, and even though privacy is protected, everyone gets a clear look at the process.

4.3 Accurate Vote Counting and Result Declaration

Hand-counting ballots is slow, and even machines make errors. Smart contracts tally votes instantly, track the process, and keep a tamper-proof record. Results come quick and clean, without any funny business.

V. BENEFITS OF BLOCKCHAIN-ENABLED SMART CONTRACTS

So, why bother switching to smart contracts?

- Fast: No more slow paperwork.
- Safe: Privacy and rules are built into the system.
- Open: You can check the details any time.
- Trustworthy: Nobody runs the show alone, so cheating gets tough.

For medicine and voting, those changes actually put people first for once.

VI. CHALLENGES AND LIMITATIONS

Still, a few problems won't leave quietly:

- Scaling: Systems get slow and pricey when lots of users pile on.
- Legal problems: Older laws just aren't made for smart contracts yet.
- Tech hurdles: Most people aren't comfortable using blockchain.
- Resistance: Big organizations move like molasses, even when better tech is available. It'll take more work to get past these roadblocks.

VII. FUTURE DIRECTIONS

People want blockchains that are faster, cheaper, and smarter. The big push is about connecting different blockchains, making them simple for regular people, and actually teaching folks how this tech works.

VIII. CONCLUSION

Adding smart contracts to blockchain could make healthcare and voting systems a lot better more fair, more reliable, and a whole lot smoother. Sure, problems like scaling and legal messes need work, but the tech has real potential. As it matures, these systems might finally build the trust people have been asking for.

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