MSc Computer Science

Exploring Solutions to Internet Voting in Government Elections in the UK

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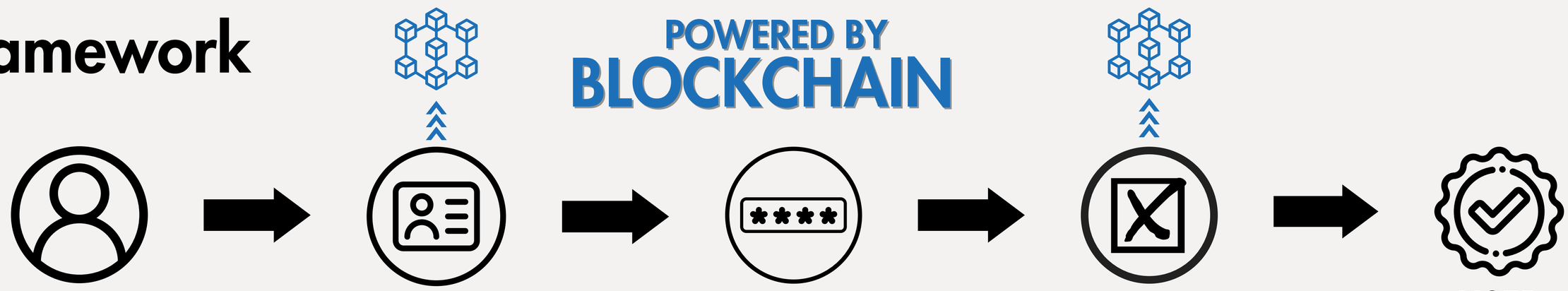
Internet voting is where votes are cast remotely online. These systems exist primarily in theory except for a few countries like Estonia (Scytl, 2021). The reluctance to roll out Internet Voting in the UK stems from security and transparency concerns (Mackenzie, 2019) and the research questions aim to explore a complete solution. **This project proposes a framework that checks user identification, allowing users to vote with a secret word, of their choosing, that verifies the vote they have cast using blockchain technology.**

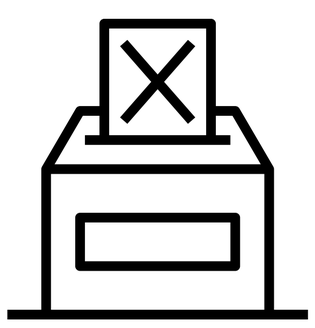
Research Outcomes

1. Can an internet e-voting system identification check be remote whilst ensuring accuracy and voter anonymity?
2. Would an internet e-voting system compromise the security of the vote casting?
3. Can an internet e-voting system provide two-way transparency between voter and governing body?

Framework



What we know now



Changing the voting system in the UK is not easy. This was evidenced on the 4th May 2023, when voters were newly required to show photo identification before voting (Uberoi and Johnston, 2023). This had a mixed response which went as far as some poll clerks receiving abuse from voters (Sefton Council, 2023).

Internet voting has many advantages, such as accessibility and cutting down on the costs of paper voting (Mackenzie, 2019). To establish a fair voting protocol, principles such as accuracy and being untraceable (Denis González et al., 2022) need to be upheld. Blockchain often features in proposed systems, but more research is required to produce a secure end-to-end system (Shanthinii, Usha and Prittopaul, 2023). Blockchain can also be a challenging concept to understand compared to the simplicity of paper voting. To be publicly accepted the voter will need to trust that their vote will be counted as intended.

Making changes to the voting protocol would require strong support from the UK public to be a success. The questions posed for this project summarise the concerns around e-voting that would need to be addressed to successfully incorporate e-voting into government elections in the UK.

What we are doing

An internet voting tool has been developed using the proposed framework so that voters will be able to be remotely identified and self-verify their vote, ensuring it is the vote they cast. The final design will incorporate two blockchain databases that store the votes and user information completely separately, to protect anonymity. A survey for the prototype is underway that captures the participant's views and understanding of both e-voting and blockchain, before and after testing the tool. The survey also captures the level of comfort the participant would have with a tool created using this framework.

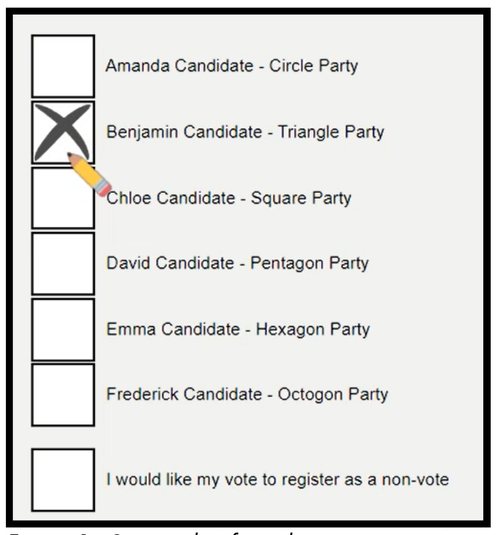


Figure 1 - Screen shot from the voting prototype

The results of this data will be summarised alongside testing the effectiveness of an online identification system with the use of the secret word and verification. Overall, the combined features of the tool offer an original approach to e-voting and will be evaluated to determine if it can satisfy all the criteria to be a viable voting system.

What next?

The results of the survey and tests will be analysed alongside a literature review and other examples of internet e-voting frameworks. The outcome is to establish if an e-voting model could satisfy all three research questions, and if not - why not? The results will add further insight into how to form a robust end-to-end e-voting system.

References

Denis González, C., Frias Mena, D., Massó Muñoz, A., Rojas, O. and Sosa-Gómez, G. (2022). Electronic Voting System Using an Enterprise Blockchain. Applied Sciences, 12(2), p.531. doi:https://doi.org/10.3390/app12020531.

Mackenzie, N. (2019). Why can't British people vote electronically? Cost, fraud and security all have parts to play. Metro. Available at: https://metro.co.uk/2019/12/11/general-election-voting-online-would-be-a-mess-and-prone-to-hacking-11584494/ (Accessed: 23 Apr. 2023).

Scytl (2021). Which Countries Use Online Voting? EDGE Elections. Available at: https://medium.com/edge-elections/which-countries-use-online-voting-3f7300ce2f0. (Accessed: 23 Jul. 2023).

Sefton Council (2023). Sefton Council leader 'appalled' at abuse of polling station staff over ID requirements. [online] www.sefton.gov.uk. Available at: https://www.sefton.gov.uk/mysefton-news/latest-news/sefton-council-leader-appalled-at-abuse-of-polling-station-staff-over-id-requirements/ (Accessed: 23 Jul. 2023).

Shanthinii, S.P., Usha, M. and Prittopaul, P. (2023). A Survey Based on Online Voting System Using Blockchain Technology. pp.209–216. doi:https://doi.org/10.1007/978-981-19-7169-3_19.

Uberoi, E. and Johnston, N. (2023). Voter ID. commonslibrary.parliament.uk. Available at: https://commonslibrary.parliament.uk/research-briefings/cbp-9187/ (Accessed: 23 Jul. 2023).