School of Computer
Science and Informatics

INITIAL PLAN:

Designing an E-Voting System for political elections in the United Kingdom

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Project Description

Currently, voting in UK elections is carried out by collecting votes written with pen and paper at registered polling stations, or by citizens sending their written votes via the post. This old-fashioned approach is unlike that of countries such as The United States, The Philippines, or India, which utilise a digital voting method in some form. With the constant growth of technology, it raises the question: 'Why hasn't the United Kingdom adopted a more modern, efficient approach to voting?". The aim of this project is to research why the United Kingdom favours the traditional approach of pen-and-paper voting over an E-Voting system, and to propose an innovative E-Voting system tailored for British politics, laws, and regulations.

As a Computer Science student, I am constantly looking for ways to make traditional practices (such as voting) more efficient and straightforward by utilizing technological elements. I have been voting in both local and general elections since turning eighteen and have always questioned the fact that my local polling station utilises the old-fashioned pen-and-paper approach, compared to the E-Voting systems I had perceived from American films and TV programmes. Whilst I was discussing project proposals with the faculty of Computer Science at Cardiff University, I was drawn to a suggestion of an developing an E-Voting system for British local and general elections. This is where I learnt for the first time that it was not just my local polling station that preferred the traditional approach to voting, but the whole country. My curious nature and lack of knowledge regarding the matter took over, and I realised that this straightforward project proposal is fairly complex. To develop a new and innovative E-Voting system for the United Kingdom, we must first understand why the United Kingdom has not already opted for an E-Voting system, and how other countries (such as the United States) have developed theirs.

One could argue that the traditional pen-and-paper voting system has worked well for the United Kingdom, especially since the introduction of postal and proxy voting in 1918 *(UK Parliament, 1918),* Postal voting allows a UK citizen to vote by posting their ballot paper to the UK government, whilst proxy voting allows a UK citizen to delegate their voting power to a representative, to vote on their behalf. The traditional system requires no technological knowledge, making it favourable for the older generation who have not grown up around technology the way our youth have. Whilst the proxy/postal has proved beneficial for allowing people with disabilities, people working away, or on an extended visit overseas to vote, there is still much room for improvement regarding the British voting system. In 2016, a government report found postal voting to be vulnerable to "fraud, undue influence, theft and tampering" *(Pickles, 2016),* and I believe that a proxy voting system is also vulnerable, as the appointed representative could change the requested vote at the polling station, with little to no risk of being caught committing electoral fraud. It should also be worth noting that whilst requesting a postal voting ballot paper does not require a reason for request in England, Wales, and Scotland, it is a requirement in Northern Ireland. If you live in Northern Ireland, and you have a disability that is not officially recognised or diagnosed, you may not be able to vote if the government declines your request for a postal vote. Upon researching postal and proxy voting, it became apparent that there are many problems and vulnerabilities with our system, as well as inconveniences for certain people with disabilities in Northern Ireland. An E-Voting system, allowing users to vote remotely online could be extremely beneficial for the United Kingdom, if the correct measures related to data quality, security, privacy, and safety are properly implemented during development.

The problem is a sufficient challenge for this project module, as there are many different areas to research relevant to the fields of Computer Science and Politics. In the context of Politics, extensive research of UK voting laws, rules, and regulations must be conducted, as well as research on the E-voting of other countries and their history. In the context of Computer Science, proper implementation of data processing and data quality techniques must be used, as well as mechanisms to safeguard safety, privacy, and security for all users (both voters and the officials responsible for managing and administering voting). To properly implement these features, I must first define the overall aim and objectives of my project. These aims and objectives are not related to the design requirements that will later be implemented into the E-voting system.

Aims and Objectives

The overall aim of this project is to develop a prototype or MVP for an E-voting system to be used during elections in the United Kingdom, that closely follows UK voting regulations, as well as implementing relevant safety and security features to combat the problems raised by proxy and postal voting. This will be done over the course of 11 weeks, with both front-end and back-end design being worked on. The objectives for this project are as follows:

- Design an application that is visually pleasing, and easy-to-use for anyone regardless of their technological knowledge.
- Ensure that the application complies with UK voting laws and regulations and is relevant to the current general or local election that requires UK citizens to vote.
- Implement the prototype/MVP including upmost important functionality elements to ensure that the voting system is safe and does not allow any opportunity for intentional or accidental electoral fraud.
- Carry out testing and evaluation of the prototype/MVP to ensure that it functions as intended.

The first objective poses little to no risks. I am a highly creative individual, and I am confident that my digital design skills will allow me to meet this objective comfortably.

The second objective will require extensive research into the UK laws, rules, and regulations related to elections. I will also have to research design requirements for this project, which will be very closely related to the voting regulations. Assuming that all relevant research is done properly, and the app content is relevant to any upcoming elections, there are little to no risks for this objective.

The third objective is far more complex, as cybersecurity oriented back-end programming must be implemented correctly for the application to combat the current problems associated with proxy voting. Extensive research into cybersecurity will be required prior to beginning the programming process, as I will be required to learn more about this specific field of computer science before I can effectively implement the correct safety measures.

The last objective will require human evaluation/testing, done by my peers. The only risk for this objective is that I would require approval from the ethics committee to allow others to test my prototype/MVP. If I apply for ethics approval relatively early into the project, I should receive approval long before I begin testing and evaluation.

Feasibility

Overall, I cannot find any key issues that may affect the feasibility of this project. Whilst there are legal issues surrounding UK Voting rules and regulations, the legal information is available to the public through the GOV.UK website. Carefully following these guidelines when designing the front-end of my application should not prove to be a challenging task.

There are however some limitations that must be bought into consideration before beginning this project. Firstly, my restricted knowledge of cyber-security may slow down the process of developing the back-end programming. To ensure that I have enough time to research and implement cybersecurity-oriented programming in my application, I must allocate a large chunk of my work time to this.

It is worth mentioning that to meet the final objective (conducting surveys and interviews), I will require ethical approval from the ethics board. A delay in ethics approval could be devastating if ethics approval is requested late, therefore as a risk mitigation, requesting ethics approval should be one of the first tasks conducted in the process of designing the E-Voting application, as I am hoping to involve human users to assist with the final objective; Carrying out testing and evaluation of the prototype to ensure that it functions as intended.

Those points aside, I see no further issues that may affect feasibility, or impose a limitation affecting the research, designing, and programming tasks required for this project.

Work Plan

Week 1 (29/01)

- Begin research into E-voting systems from across the world.
- Research the history of Britain's pen-and-paper voting system.
- Complete the Initial Plan; propose a work-in-progress Title, Project Description, Aims and Objectives, and Work Plan. **(Deliverable: to be completed by 05/02)** **(Milestone)**
- Half an hour meeting with supervisor (Tuesday).

Week 2 (05/02)

- Continue research into Britain's voting history, including: Laws, Regulations, Rules, and any major historical changes.
- Research Cybersecurity oriented programming.
- Begin sketching an incredibly early design of the front-end prototype.
- Complete research of E-voting systems.
- Half an hour meeting with supervisor (Friday).

Week 3 (12/02)

- Complete research into the voting history of other countries that are in some way associated with E-voting, including: Laws, Regulations, Rules, and any major historical changes.
- Continue research into Cybersecurity oriented programming; focusing on what will need to be implemented into my prototype.
- Continue sketching an early design of the front-end prototype.
- Begin establishing design requirements based on the established problem.
- Half an hour meeting with supervisor (Friday).

  (commitment: Kickboxing Tournament during the weekend)

Week 4 (19/02)

- Complete research into Cybersecurity oriented programming.
- Complete sketch(es) of early front-end design. **(Milestone)**
- Begin implementation of front-end design using software such as Axure for prototyping.
- Finish establishing design requirements. **(Milestone)**
- Half an hour meeting with supervisor (Friday).

Week 5 (26/02)

- Complete first design of front-end prototype. **(Milestone)**
- Begin back-end programming, paying close attention to what I have learnt from my research into cybersecurity.
- Half an hour meeting with supervisor (Friday).

Week 6 (04/03)

- Continue back-end programming.
- Apply for ethics approval. **(Milestone)**
- Half an hour meeting with supervisor (Friday).

Week 7 (11/03) SPRING BREAK

- Complete back-end programming. **(Milestone)**
- Re-design front-end prototype to compliment back-end programming if necessary.
- Half an hour meeting with supervisor (Friday).

  (commitment: week-long trip to Norway (can continue work during downtime)

Week 8 (18/03)

- Ensure final report is currently up to date with everything.
- Assuming ethics approval is granted; begin human testing and evaluation. **(Milestone)**
- Half an hour meeting with supervisor (Friday).

  EASTER RECESS

Week 9 (15/04)

- Complete testing and evaluation; and make any necessary changes to prototype. **(Milestone)**
- Half an hour meeting with supervisor (Friday).

Week 10 (22/04)

- Work on final report.
- Half an hour meeting with supervisor (Friday).

Week 11 (29/04)

- Work on final report.
- Half an hour meeting with supervisor (Friday).

Week 12 (06/05)

- Finish final report.
- Half an hour meeting with supervisor (Friday).
- Submit final report **(Deliverable: to be completed by 10/05)**

Bibliography

1. 1918 representation of the People Act - UK Parliament. Available at: https://www.parliament.uk/about/living-heritage/transformingsociety/electionsvoting/womenvote/case-study-the-right-to-vote/the-right-to-vote/birmingham-and-the-equal-franchise/1918-representation-of-the-people-act/
2. Pickles, Eric (11 August 2016). “Securing the ballot, Report of Sir Eric Pickles' review into electoral fraud". United Kingdom Government. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/545416/eric_pickles_report_electoral_fraud.pdf