Part One

I confirm that I have considered the ethical considerations my research proposal gives rise to and will obtain ethical clearance from my university as soon as possible after submitting my proposal and before data collection begins

✅ confirm

Task One

This section is going to outline how the agricultural crowdfunding investment research will comply with or be guided by these ethical principles and guidelines outlined below:

a. **Data management and storage**
   This project will collect stakeholders' personal data, investments, intellectual property, and any other relevant information. Therefore, robust security measures will be implemented. Data will be encrypted using Django and other needed systems to safeguard data. Also, data access will be based on authorization, tailored to the specific role of the user. The administrator will have access to all the data collected, but the farmer and user will not. Farmers will not have access to their colleagues' projects, but investors will. Data will be managed well to preserve the privacy of its users.

b. **A possibility of discovering anomalies in existing systems**
   During the testing process, security vulnerabilities and other anomalies may be exposed, and these will be solved immediately for the safety of users. In cases where fraudulent activities are discovered when the project is deployed for use, the involved parties will be handled per necessary laws, and if background checks and details are required, their data will be retrieved as per the Ghana Data Protection Act, 2012 (Act 843), section 20a (Republic of Ghana, 2012).

c. **High possibility of using already existing algorithms or code snippets**
   This project will incorporate existing open-source libraries and existing Application Programming Interfaces (APIs) (for example, OpenAI API for the chatbot, e-signature API, and others if needed); however, this project will avoid plagiarism and intellectual theft by attributing and acknowledging the necessary sources when used. Also, the project will use secure existing algorithms or code to avoid security vulnerabilities.

d. **Ethical approval from the University or data sources**
   This platform will not require taking surveys or external datasets aside from personal details that will be required for creating an account, and intellectual property, which will be collected with the consent of the user. This research will also adhere to the ethical principles of this university.

e. **Consideration for Elders and Juveniles**

This project will require stakeholders to be 18 years and above, because 18 years is the minimum legal age in Ghana for one to attain full legal rights and responsibilities and enter into legal contracts, hence juveniles will not be permitted on the platform. Special provisions will be made for the elderly and vulnerable to educate them on the details in simpler and understandable languages. Data will be handled well to prevent discrimination.

f. **Risk of Labelling and Categorization during Research**

This project will avoid any categorization or labelling of its users in order to avoid cases of favouritism, stigmatization. We aim to promote inclusion and respect for all users regardless of financial status, cultural background, and other labels. Regular check-ins or gathering feedback will be made to check and solve cases of favouritism, labelling, or marginalization that might creep in.

g. **Research impact on employment and social standing**

Feedback forms will be made anonymous to avoid hate and harm, and complaints about users will not be explicitly displayed to avoid being indirectly avoided (by investors or farmers) or hated by others. Failed projects will not be discarded unless they are observed to be involved in any fraudulent activities or intellectual property theft, but rather, they can be guided or referred to experts to refine their projects

h. **Access to records of personal or confidential information**

Sensitive data will be handled strictly. This project will incorporate authorization such that the role of a user will determine the data they have access to or the permissions they have (Farmers cannot view other farmers' projects, and investors can view farmers' profiles and projects; the admin has access to all data on the platform). Policies and ethical standards that govern user privacy will be upheld.

i. **Deception in research**

This research adheres to transparency and authenticity; hence, no deceptive methods will be involved in this study. Stakeholders and participants will be informed about the purpose and main objective of the project, and their consent will be taken before any data collection. Also, the purpose of the data collection will be clearly communicated per the Ghana Data Protection Act, 2012 (Act 843).
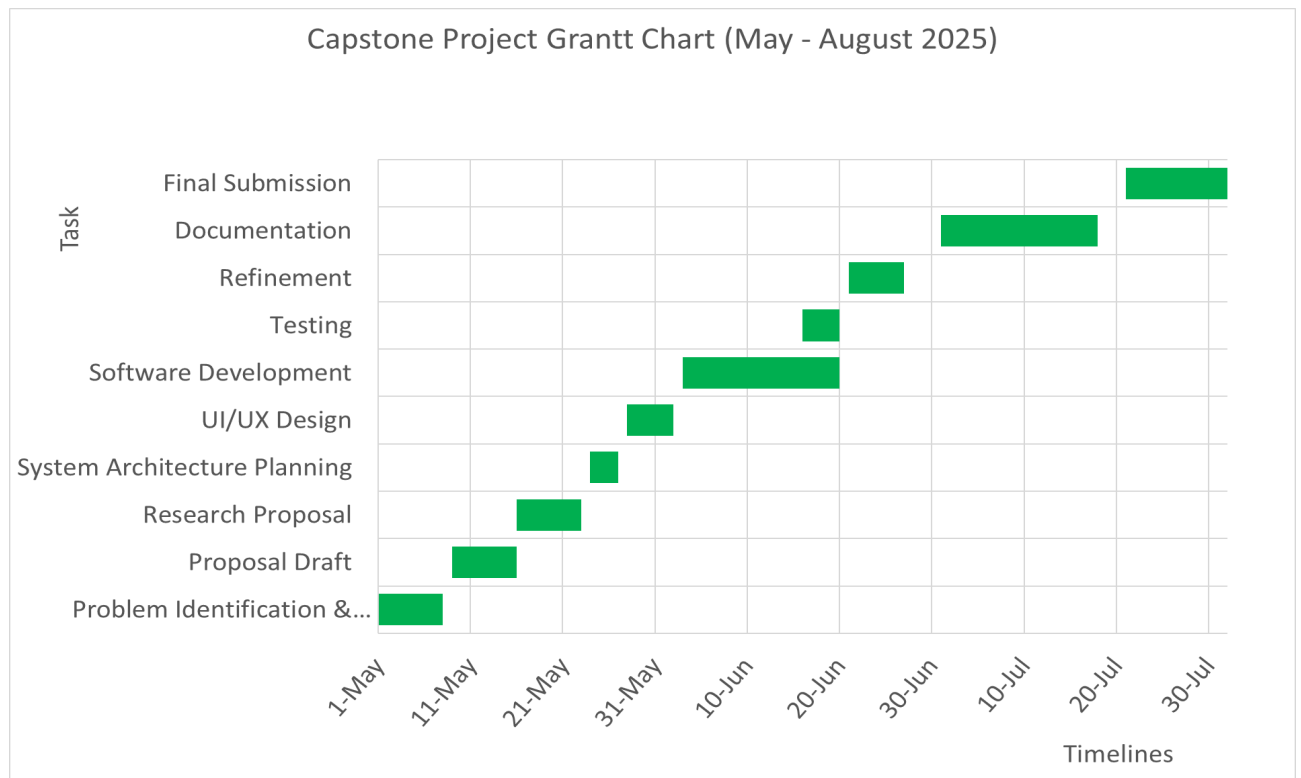
j. **Sensitive research topics**

Sensitive topics will be handled with professionalism and sensitivity. Financial disputes, intellectual theft, land disputes, and other issues may arise; however, these will be handled with a commitment to ethics and principles, including confidentiality, respect for cultural diversity, and the dignity of all involved individuals.

k. **Local or regional regulatory guidelines that you are adhering to**

This research will abide by ethical standards and moral principles from the Ghana Data Protection Act, 2012 (Act 843) and Akenten Appiah-Menka University of Skill Training and Entrepreneurial Development (AAMUSTED) policy on research and publication ethics.

Task Two

Capstone Project Grantt Chart (May - August 2025)

II. Stakeholder Impact

This research project involves several stakeholders, including farmers, investors, policymakers, and software developers. The ethical implications for these stakeholders are outlined as follows:

1. Software Developers: Implementation of software designs, infrastructure, security protocols, and adherence to the standard software ethics.
2. Investors: Required to adhere to ethical standards related to intellectual property by signing a Non-Disclosure Agreement (NDA), safeguarding personal data, and ensuring their consent is taken.
3. Farmers: Safeguarding their data and ensuring that their consent is taken
4. Policy makers and administrators: are expected to adhere to all data and intellectual property ethics, and also uphold system security and privacy standards.

III. Relevant ethical frameworks

This research project will adhere to these international and local ethical frameworks

International Agencies

1. **World Intellectual Property Organization (WIPO) Ethics Framework.**
   The WIPO is a specialized agency of the United Nations (UN). The organization aims to deliver a high-quality integrity and ethics system. WIPO works and actions are based on three fundamental pillars: independence, impartiality, and confidentiality (WIPO, 2020). The WIPO relies on 13 core values and principles. Some of the WIPO principles:
   a. Integrity: This research must adhere to the standards of the WIPO ethical standards in handling farmers' and agripreneurs' agricultural ideas and innovations. Implementing Non-Disclosure Agreements (NDAs) and e-signatures on the project is essential to prevent intellectual theft, hence ensuring compliance with the WIPO ethical framework.
   b. Confidentiality and impartiality: This project will safeguard the sensitive data of farmers and investors and also seek users' consent before using their data for any purpose. All users on the platform will have equal rights and privileges with no favouritism in alignment with the WIPO ethics requirements.

2. **Consultative Group on International Agricultural Research (CGIAR) ethics framework.**
   The CGIAR is a global collaboration between 15 international agricultural research centres that conduct research into agriculture, forestry and many others (Department of Foreign Affairs and Trade, 2012). CGIAR adheres to 5 values, including integrity, dignity and respect, sustainability, excellence and innovation and partnership (CGIAR System Management Board, 2019).
   a. Dignity and respect: CGIAR encourages diversity and inclusion, highlighting the need to treat everyone with respect and dignity. This project aims to promote diversity and inclusion by giving equal opportunities for both genders and marginalized communities to invest in projects or showcase their initiatives to attract potential investors. It also aims to be inclusive by offering equal chances to both newcomers to farming and those with existing farming experience. Unlike platforms such as GrowForMe, which often have requirements related to land ownership or prior farming experience for funding (because one must provide farm location when signing up as a farmer), this project will ensure that all stakeholders are treated with respect and dignity.
   b. Sustainability: This project aims to promote agricultural initiatives and innovations that contribute to increased agricultural productivity, enhance food security, and protect the country's natural resources, aligning with CGIAR's long-term and committed to environmental, economic food security, safety, and global prosperity.

c. Partnership: This project is designed to foster collaboration among all stakeholders by actively involving them in both the development and testing phases. We will engage a diverse group, including farmers and investors, for testing of the software and gather their feedback for the product's refinement. Also, we will implement a feedback mechanism, which includes detailed feedback forms for every user interacting with the software.

3. IEEE-CS/ACM Joint Task Force on Software Engineering Ethics

The IEEE ethics for engineers elaborates on the fact that public interest should be placed above all, and engineers should act in the public interest and products and modifications should meet professional standards and other principles (IEEE Computer Society, n.d.) (IEEE-CS/ACM Joint Task, 2001). This research will employ the agile methodology, which involves collaborating with your customer and enhancing rapid feedback, to develop a solution that will be of public interest.

Local Agencies

1. **Ghana Data Protection Act, 2012 (Act 843)**
   This is a legislative law that was passed to protect the privacy and personal data of individuals in Ghana. This project aims to directly collect data from its stakeholders or users and no other sources unless fraudulent activities are suspected, under section 20a. The data collection process will prioritize user privacy by ensuring openness and transparency regarding the intended use of the data. Robust security measures will be implemented to safeguard the data by encrypting data, enabling authentication and authorization, and also encouraging the use of strong passwords and implementing password hashing, to achieve sections 17(f), (g), and (a). Data collected will also be related to the user's activities on the platform as demanded by section 22 (Republic of Ghana, 2012).

2. **Akenten Appiah-Menka University of Skill Training and Entrepreneurial Development (AAMUSTED) policy on research and publication ethics.**
   AAMUSTED promotes the adherence to ten general ethical principles by researchers and four other internationally accepted moral principles of research ethics (AAMUSTED, 2024). AAMUSTED advocates:
   a. Non-exploitation: This project has no aim of exploiting research participants or vulnerable people, either financially or otherwise. All data collection will adhere to all the ethics codes from the Ghana Data Protection Act, Act 843, and other reputable institutions mentioned. And no fee will be demanded from users as either profit or a fee for using the software solution.
   b. Respect for cultural differences: This project will take into consideration the cultural beliefs, values, and norms of its audience, respecting the beliefs of

every user and taking into consideration the cultural norms of an individual when reaching out for information or feedback.

By adhering to these ethical considerations, this study aims to uphold integrity, respect, confidentiality, and other listed principles while ensuring the safety of all participants and stakeholders.

REFERENCES

Akenten Appiah-Menka University of Skill Training and Entrepreneurial Development (AAMUSTED). (2024). *Policy on research and publications ethics* [PDF]. https://aamusted.edu.gh/wp-content/uploads/2024/10/Policy-on-Research-Ethics_Final.pdf

CGIAR System Management Board. (2019, October 3). *CGIAR ethics framework: Leveraging our culture and values to achieve our vision.* https://cgspace.cgiar.org/server/api/core/bitstreams/31b90533-5620-4163-bb56-cba65fe765ad/content

Department of Foreign Affairs and Trade. (2012). *Australian multilateral assessment: Consultative Group on International Agricultural Research (CGIAR)*. Australian Government. https://www.dfat.gov.au/sites/default/files/cgiar-assessment.pdf

IEEE Computer Society. (n.d.). *Code of ethics*. https://www.computer.org/education/code-of-ethics

IEEE-CS/ACM Joint Task Force on Software Engineering Ethics and Professional Practices. (2001). *Software engineering code of ethics and professional practice*. Science and Engineering Ethics, 7(2), 231–238. https://www.researchgate.net/publication/278417404_Software_Engineering_Code_of_Ethics_and_Professional_Practice

Republic of Ghana. (2012). *Data Protection Act, 2012 (Act 843)*. https://nita.gov.gh/wp-content/uploads/2017/12/Data-Protection-Act-2012-Act-843.pdf

World Intellectual Property Organization. (2020). *Ethics and innovation: 10 years WIPO Ethics Office* (WIPO Publication No. 1072E/2020). https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1072.pdf