System Requirements

This document outlines the specific functional and non-functional requirements of the envisaged system. These requirements were derived through a series of interviews with Mr. Steve Andrews.

Functional Requirements

Functional Requirements [0] : Chicken coop door

The following set of functional requirements pertain to the chicken coop door of the envisaged system.

[F - 0.0]	The coop door shall have the ability to be remotely opened.
Priority	1 (High)
Purpose(s)	This shall ease the burden on the client as they are not required to be present each morning to let the chickens out.

[F - 0.1]	The coop door shall have the ability to be remotely closed.
Priority	1 (High)
Purpose	This shall ease the burden on the client as they are not required to be present each evening to lock the chickens in to protect them from predators.

[F - 0.2]	The coop door shall provide the ability to be opened manually with a button.
Priority	1 (High)
Purpose	This allows for the client to manage the chickens manually if they so choose.

[F - 0.3]	The coop door shall provide the ability to be closed manually with a button.
Priority	1 (High)
Purpose	This allows for the client to manage the chickens manually if they so choose.

[F - 0.4]	The door shall be able to be set to automatically open at a given time.
Priority	1 (High)
Purpose	This allows the client to set up a common routine for when the chickens will be let out in the morning.

[F - 0.5]	The door shall be able to be set to automatically close at a given time.
Priority	1 (High)
Purpose	This allows the client to set up a common routine for when the chicken coop door closes in the evening.

[F - 0.6]	The door shall have controllable cut off time in which the door opens irregardless of other settings.
Priority	1 (High)
Purpose	A safeguard for the chickens in the case that the client forgets or is unable to open the door in the morning.

[F - 0.7]	The door shall have a controllable cut off time in which the door closes irregardless of other settings.
Priority	1 (High)
Purpose	A safeguard for the chickens in the case that the client forgets or is unable to close the door in the evening.

[F - 0.8]	The coop door will detect whether it is securely closed irregardless of the actuator.
Priority	2 (Medium)
Purpose	A safeguard to ensure that the door is guaranteed to be closed, irregardless of the mechanism that is used to open and close it.

[F - 0.9]	The coop door shall be securely locked in place when closed.
Priority	2 (Medium)
Purpose	A safeguard to ensure that either the chickens themselves or a predator is unable to lift the coop door when closed.

Functional Requirements [1] : Electric fence monitor

The following set of functional requirements pertain to the electric fence of the envisaged system.

[F - 1.0]	The voltage of the electric fence will be monitored to ensure that it is not grounding.
Priority	2 (Medium)
Purpose	This monitor will alert the client if the electric fence has dropped below a voltage threshold so that it can be put back to its intended operation, deterring predators.

[F - 1.1]	The system shall check for breaks in the electric fence.
Priority	2 (Medium)
Purpose	The system shall check for continuity between multiple points of the fence to ensure that there are no breaks and that the perimeter is still live.

Functional Requirements [2] : Water monitoring

The following set of functional requirements pertain to the water monitoring of the envisaged system.

[F - 2.0]	The level of fresh water shall be monitored.
Priority	2 (Medium)
Purpose	This is to ensure that the chickens are not without water for a prolonged period of time.

Functional Requirements [3] : Coop condition monitoring

The following set of functional requirements pertain to the internal conditions of the coop for the envisaged system.

[F - 3.0]	The system shall monitor the humidity in the chicken coop.
Priority	1 (Medium)
Purpose	To provide feedback to the client so they can ensure the chickens are at the optimum humidity for egg production and overall health.

[F - 3.1]	The system shall monitor the temperature in the chicken coop.
Priority	1 (High)
Purpose	To provide feedback to the client so they can ensure the chickens are at the optimum temperature for egg production and overall health.

[F - 3.2]	The system shall monitor the air quality in the chicken coop.
Priority	1 (Medium)
Purpose	To provide feedback to the client so they can ensure the chickens are not exposed to inadequate air conditions, potentially resulting in respiratory / other adverse health problems.

Functional Requirements [4] : System visualisation and control

The following set of functional requirements pertain to the control and visualisation of the envisaged system.

[F - 4.0]	The system shall present the real-time monitored data of all sensors in a single location.
Priority	1 (High)
Purpose	This allows the client to easily see the status of the entire coop at a single location.

[F - 4.1]	The system is able to be accessed from all major desktop operating systems (e.g. Windows, Mac OS, Linux).
Priority	1 (High)
Purpose	To allow the client to view the system from any major desktop operating system and pass control to anyone using one of these devices.

[F - 4.2]	The system is able to be accessed from all major mobile operating systems (i.e. Android, iOS)
Priority	1 (High)
Purpose	To allow the client to view the system from any mobile device and pass control to anyone using one of these devices.

[F - 4.3]	The system will log all operations that have occurred.
Priority	1 (High)
Purpose	This provides the client a detailed description of all events that have occurred in the order they have occurred, providing visibility of the system.

Functional Requirements [5] : Egg Recognition

The following set of functional requirements pertain to the egg recognition of the envisaged system.

[F - 5.0]	The system will accurately detect the presence of eggs
Priority	2 (Medium)
Purpose	This provides a way of notifying the client when to collect the eggs.

[F - 5.1]	The system will accurately detect the presence of no eggs
Priority	2 (Medium)
Purpose	This provides a way of updating the system when there are no eggs.

Functional Requirements [6] : Customizable Feedback

The following set of functional requirements pertain to the feedback obtained from the envisaged system.

[F - 6.0]	The system will provide customizable feedback via SMS
Priority	1 (High)
Purpose	The user shall be able to receive customizable feedback from the system via SMS when events occur.

[F - 6.1]	The system will provide customizable feedback via Email
Priority	1 (High)
Purpose	The user shall be able to receive customizable feedback from the system via email when events occur.

[F - 6.2]	The system will provide customizable feedback via Mobile Push Notifications
Priority	3 (Low)
Purpose	The user shall be able to receive customizable feedback from the system via mobile push notifications

[F - 6.3]	The system will provide customizable feedback via Desktop Push Notifications
Priority	3 (Low)
Purpose	The user shall be able to receive customizable feedback from the system via desktop push notifications

Non-functional Requirements

Non-functional Requirements [0] : Accessibility

The following set of non-functional requirements pertain to the accessibility of the envisaged system.

[NF - 0.0]	System interface shall be accessible to long sighted individuals.
Priority	2 (Medium)
Purpose	Client is long sighted and aims to check on chickens periodically whilst out working on the farm.

[NF - 0.1]	System interface shall be accessible to colour blind individuals.
Priority	2 (Medium)
Purpose	Clients son in law is red-green colorblind and often oversees the management of the chickens.

[NF - 0.2]	System interface shall have optimised modes for low and high light.
Priority	3 (Low)
Purpose	The software will be used by the client early morning and late evening in varying light conditions and should be optimised to reduce eye strain.

Non-functional Requirements [1] : Maintainability

The following set of non-functional requirements pertain to the maintenance of the envisaged system.

[NF - 1.0]	**Documentation regarding the system design should be provided.**
Priority	2 (Medium)
Purpose	The client aims to maintain the system for a prolonged period of time and as such requires understanding its implementation.

[NF - 1.1]	**Documentation regarding the components hardware should be provided.**
Priority	2 (Medium)
Purpose	The client aims to maintain the system for a prolonged period of time and as such requires understanding its implementation.

[NF - 1.2]	**Documentation regarding the components software should be provided.**
Priority	2 (Medium)
Purpose	The client aims to maintain the system for a prolonged period of time and as such requires understanding its implementation.

[NF - 1.3]	**On going support will be provided for six months following the installation of the system.**
Priority	1 (High)
Purpose	Being a real world client and aiming to implement the built system into a live environment, support will be required for potential unforeseen complications.

Non-functional Requirements [2] : Availability

The following set of non-functional requirements pertain to the maintenance of the envisaged system.

[NF - 2.0]	System component failure shall not escalate to include other components.
Priority	1 (High)
Purpose	If a sensor component within the system fails this should not cause issues with the other components. This ensures the stability of the system.

[NF - 2.1]	The system is able to be accessed from anywhere with an internet connection.
Priority	1 (High)
Purpose	The client still may require access to the system whilst off-site to ensure the well-being of the chickens.

Non-functional Requirements [3] : Confidentiality

The following set of non-functional requirements pertain to the confidentiality requirements of the data in the envisaged system.

[NF - 3.0]	Systems logs should be secure and not visible to those without authorised access.
Priority	1 (High)
Purpose	The logs of the system if accessed via unauthorized parties may be used for illicit purposes.

[NF - 3.1]	Input data should be kept securely and not visible to those without authorised access.
Priority	1 (High)
Purpose	All data input into the system should be stored securely and only accessible by the system and those with authorised access.

Non-functional Requirements [4] : Efficiency

The following set of non-functional requirements pertain to the efficiency of the envisaged system.

[NF - 4.0]	The system shall be able to support up to 25 concurrent users.
Priority	1 (High)
Purpose	The client often relies on other people helping out on the farm to ensure the chickens are well kept, as such this set of people will require access to the system.

[NF - 4.1]	All performed operations on components should execute within 5 seconds of being applied.
Priority	1 (High)
Purpose	The system should be relatively real time, there should not be a large delay between action and event occurring. Long delays may cause the user to queue multiple events under the assumption the initial has not registered.

Non-functional Requirements [5] : Data Integrity

The following set of non-functional requirements pertain to the integrity of the data of the envisaged system.

[NF - 5.0]	Recorded coop temperature readings must be accurate to ±2 °C.
Priority	1 (High)
Purpose	To ensure that the welfare of the chickens is not compromised, temperature readings of the coop must be accurate to within some specified degree.

[NF - 5.1]	Recorded water level reading must be accurate to ±50 ml.
Priority	1 (High)
Purpose	To ensure that the welfare of the chickens is not compromised, water level readings must be accurate such that the client knows the chickens are with or without water.

[NF - 5.2]	Recorded dust levels must be accurate to ±5μg / m³.
Priority	2 (Medium)
Purpose	To ensure that the welfare of chickens is not compromised and peak laying conditions are maintained, dust level readings must be accurate such that the client is able to mitigate the chance of them developing respiratory problems.

[NF - 5.3]	Recorded humidity readings in the coop must be accurate to ±5%.
Priority	2 (Medium)
Purpose	To ensure that the welfare of the chickens is not compromised and peak laying conditions are maintained, humidity readings must be accurate such that the client is able to mitigate the chance of them developing respiratory problems and frostbite in the cold winter.

[NF - 5.4]	Egg detection must produce accurate readings 90% of the time.
Priority	2 (Medium)
Purpose	To reduce the number of false positives or false negatives, the egg detection module must produce accurate readings so that the client is not deceived into thinking an egg exists, or vice versa.

Non-functional Requirements [6] : Access Security

The following set of non-functional requirements pertain to the access security of the envisaged system.

[NF - 6.0]	Users must login via email and password to gain access to the system.
Priority	1 (High)
Purpose	To ensure that the confidential and sensitive information pertaining to the system is only able to be viewed by authorised personnel.

[NF - 6.1]	Users will be able to logout of the system securely.
Priority	1 (High)
Purpose	To ensure that public or unsecured devices can be logged out of securely without the potential of a third party gaining unauthorised access.

[NF - 6.2]	Users are able to alter their own password at any given time.
Priority	2 (Medium)
Purpose	To ensure that users are able to routinely change potentially compromised passwords mitigating the chances of unauthorised access to the system.

[NF - 6.3]	Input passwords must be greater than eight characters.
Priority	1 (High)
Purpose	Ensures that account passwords cannot be compromised within a small number of combinations.

[NF - 6.4]	Greater than five failed password attempts will begin to exponentially delay the time period between server login responses.
Priority	3 (Low)
Purpose	Ensures that brute force attacks are not able to compromise the system in a trivial amount of time.

[NF - 6.5]	Passwords entered into the system will never be visibly viewable.
Priority	1 (High)
Purpose	Ensures that passwords cannot be compromised via unauthorised users viewing the login attempt of an authorised user.

[NF - 6.7]	System will never store passwords in plaintext form.
Priority	1 (High)
Purpose	Passwords will not be stored in plaintext form such that if the database is compromised the users passwords are not exposed.

[NF - 6.8]	Only the admin can control the access rights of other accounts.
Priority	2 (Medium)
Purpose	Ensures that standard user accounts only have access to certain functionality and information helping avoid potential misuse.

Non-functional Requirements [7] : Reliability

The following set of non-functional requirements pertain to the reliability of the envisaged system.

[NF - 7.0]	All new data reported by the sensor components shall be displayed immediately.
Priority	3 (Low)
Purpose	The client must be confident that the data being displayed accurately reflects the current state of the coop.

[NF - 7.1]	All components should send data reliably 99% of the time.
Priority	2 (Medium)
Purpose	The client must be confident that the data being displayed is almost real-time.

[NF - 7.2]	All physical components shall be able to withstand exposure to british winter weather conditions.
Priority	1 (High)
Purpose	Dependent on the arrangement of the coop components may be required to move over time and as such may be exposed to the elements.

Non-functional Requirements [8] : Usability

The following set of non-functional requirements pertain to the reliability of the envisaged system.

[NF - 8.0]	Users should be able to interact with the system fluently without having used it before.
Priority	3 (Low)
Purpose	The system is designed to ease the burden of managing chickens and as such should be relatively hassle free.

[NF - 8.1]	The main interface of the system should provide helpful hints should the user get confused.
Priority	3 (Low)
Purpose	This helps to ensure that the user does not get aggravated whilst interfacing with the system.

Non-functional Requirements [11] : Verifiability

The following set of non-functional requirements pertain to the verifiability of the envisaged system.

[NF - 11.0]	**Every member in a test group of 15 people will be able to use the UI without fail.**
Priority	3 (Low)
Purpose	This will help to ensure that the user interface is simplistic enough for that most users will be able to use it without issue.

[NF - 11.1]	**The envisaged system will comply with the Animal Welfare Act (2006) and the Welfare of Farmed Animals (2007)**
Priority	1 (High)
Purpose	This ensures that our envisaged system complies with UK laws and regulations about animal welfare.

Non-functional Requirements [12] : Installability

The following set of non-functional requirements pertain to the installability of the envisaged system.

[NF - 12.0]	A component that has fallen offline and brought back online will reconnect to the system automatically.
Priority	2 (Medium)
Purpose	Less work on the client to re-set up the sensors in the event of a sensor issue.

[NF - 12.1]	A component in which is facing connectivity issues once resolved will return to normal operation.
Priority	2 (Medium)
Purpose	Less work on the client to re-set up the sensors in the event of a sensor issue.

Non-functional Requirements [13] : Safety

The following set of non-functional requirements pertain to the safety of the envisaged system.

[NF - 13.0]	The velocity of the shutting chicken coop door must be slow enough to not harm or frighten the chickens.
Priority	1 (High)
Purpose	Ensures that the door does not frighten or damage the chickens when closing as the chickens will have time to move out of the way. This helps to avoid harm coming to the chickens.

[NF - 13.1]	No live electrical components are exposed in the system.
Priority	1 (High)
Purpose	Ensures that any user or chicken touching the system will not get an unexpected electrical injury.

[NF - 13.2]	No sharp components are exposed in the system.
Priority	1 (High)
Purpose	Ensures that making contact with the components will not injure chicken nor human.

The above requirements outline the deliverables of the envisaged system and this document will be used as criteria to dictate if the output of this project satisfies this specification.

Client

Fullname:

Date:

Signature:

Contractors

Fullname: Joanna Zhang

Date: 07/11/2018

Signature:

Fullname: Damon Michael Sweeney

Date: 07/11/2018

Signature: