KOI DISEASE MONITORING SYSTEM

A Capstone Project

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By:

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**CHAPTER 1**

**Introduction**

*Overview of the current state of technology*

Have you ever caught up about an aquatic animal that is often associated with strength of character, perseverance, accomplishment and courage? The said aquatic animal also symbolizes good fortune, wealth, success, prosperity and ambition. Yes, it’s the Koi fish also known with its scientific name *“cyprinus carpio’’*. Koi fishes’ legendary history and natural endurance also led them being associated with longevity of human existence.

Koi fishes are domesticated and tamed version of a common carp fish. Koi fishes are renowned due of the combination of dynamic array of colors that have been shaped and created via strict selective breeding. There are over twenty (20) different varieties of Koi fishes that varies in color, patterns and types of scales. This unique chromatic spectrum of colors makes them one of kind and unique aquatic animal. Koi fish originates from Eastern Asia and usually lives in fresh waters. Due to the appreciations of its beauty and increased popularity in the past century, Koi fishes can commonly be found on ponds or residential fish tanks around the planet. Since Koi fish is abundant and kept in private aquacultures, it is not on the list of endangered species. Having this on our backyard fish pond or on our fish tanks brings us joy and most of us believes that it will give us a tremendously good fortune and prosperity. Therefore, we certainly need to take good care of the said fish. We should also recognize all the information on how to monitor them especially when they are in discomfort and needs immediate assistance.

Based on the thorough research and investigation of the researchers on Bureau of Fisheries and Aquatic Resources (BFAR) and fish’s lovers concerning Koi’s aquaculture, the following problems where identified:

1. Few precise and detailed information relative to the said aquaculture.
2. Some enthusiasts don’t know how to properly feed the said fish properly that sometimes cause them to be unwell or terminally ill;
3. Some people don’t know the signs and symptoms when the Koi are sick;
4. Koi owners don’t know how to give cure to the diseases of their aquatic pets;
5. No known device that can check the quality of water that is suited for Koi;
6. It’s extremely confusing to tell if the pond or fish tank is over populated or not;

Setting up a pond or fish tank full of Koi gives us the benefit for our visual organs and gives us feel the pleasure having just it. But are we aware of the consequences? Could we know if the source of our joy might be experiencing distress? Do we have an option to check them from time to time? Will we be with them if they need aid? Koi is just same as humans; they can also experience trouble especially diseases sometimes from unwell to terminally ill. The researchers proposed to develop a Koi disease monitoring app that give concepts and a method on how to monitor and check the status of the Koi fish and to methodically familiarize their nature. The researchers also provide ideas on how to distinguish if the said koi might be experiencing sickness or might be carrying some diseases.

**Statement of Objectives**

This study aims to design and develop a website, mobile and hardware-based system that can be used as a guide on how to manage Koi fishes.

Specifically, this study aims to:

1. develop a Koi disease monitoring system;
2. develop a platform that guides owners regarding the major diseases that Koi experience and its cure;
3. offer an information on proper ways of feeding the Koi;
4. provide data on the ideal number of Koi that can be handled per given area.
5. integrate hardware that can sense acidity and temperature;
6. evaluate and test developed system using ISO 25010:2011 software engineering standard in terms of product quality and quality in use.

**Conceptual Framework**

The selection of adequate concepts and efficient tools is imperative in the proposal of a Koi Disease Monitoring system. Thus, the following are the essential concepts that contribute to the development and implementation of Koi Disease Monitoring System.

The system under development from this study could be used on any type of browser except Internet Explorer (IE) while any mobile device that supports .apk or .ipa file extensions can suffice to run the mobile application. The hardware that was used in this system is a raspberry pi microcomputer with pH and temperature sensing device. The said system under development use the following frameworks: Angular for website’s front end; React Native for the mobile app; Python Programming Language for the hardware side; and Firebase for the storage, authentication and database.

Before the implementation, this system will be tested and evaluated by some experts and future users.

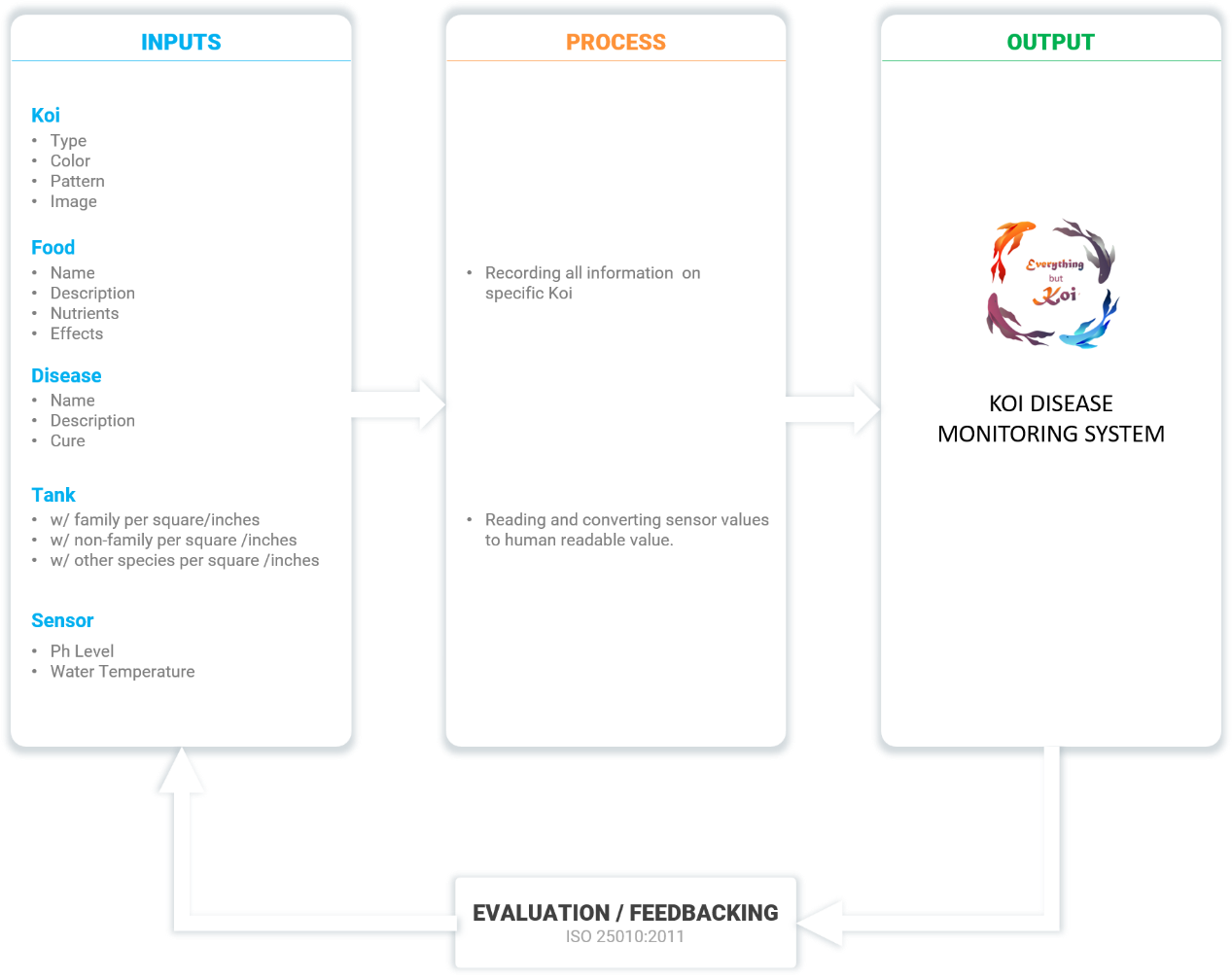


Figure 1. Conceptual Framework

This study is to develop a Koi Disease Monitoring System. Figure 1 shows how the Development started; the researcher gathered all necessary information linked for Koi monitoring. The researchers interviewed fish lovers, Bureau of Fisheries and Aquatic Resources (BFAR) and selective Koi enthusiast about the rising problem in the domestication of Koi Fish. All the information gathered are integrated and processed to perform all functions of the Koi Disease Monitoring system. The said system is dubbed as “Everything but Koi”.

*Definition of terms*

**Koi.** This are colored varieties of the Amur carp that are kept for decorative purposes in outdoor koi ponds or water gardens. ([www.oxfordlearnersdictionaries.com](http://www.oxfordlearnersdictionaries.com)/koi, 2020)

As used in this study, the term refers to the kind of carp fish that brings good luck to the owner.

**Disease.** Itis a particular abnormal condition that negatively affects the structure or function of all or part of an organism, and that is not due to any immediate external injury. ([www.oxfordlearnersdictionaries.com](http://www.oxfordlearnersdictionaries.com)/disease, 2018)

As used in this study, the term refers to the condition that Koi experience that causes them to be sick.

**Monitoring.** It is toobserve and check the progress or quality of (something) over a period of time; keep under systematic review. ([www.oxfordlearnersdictionaries.com](http://www.oxfordlearnersdictionaries.com)/aquaculture, 2020)

As used in this study, the term refers to checking of the koi fishes’ overall status from time to time.

**Fish Tanks.** A large glass container in which fish and other water creatures and plants are kept. ([www.oxfordlearnersdictionaries.com](http://www.oxfordlearnersdictionaries.com)/us/definition/english/aquarium, 2020)

As used in this study, the term refers to containers where Koi fishes are stored.

**Sensors.** A device that can react to light, heat, pressure, etc. in order to make a machine do something or show something

As used in this study, the term refers to devices that sense temperature and acidity of water.

**Aquaculture.** It is the farming of fish, crustaceans, mollusks, aquatic plants, algae, and other organisms. It involves cultivating freshwater and saltwater populations under controlled conditions, and can be contrasted with commercial fishing, which is the harvesting of wild fish.

([www.oxfordlearnersdictionaries.com](http://www.oxfordlearnersdictionaries.com)/aquaculture, 2019)

As used in this study, the term refers to the overall ways of Koi farming.

**Significance of the Study**

The result of the study may benefit the following group of people and entity:

Koi Owners. The study and the system will be beneficial for they can monitor their fish tanks even if they’re away.

Koi Enthusiast. This study will be beneficial to them because they can get additional knowledge on how to take good care of their Kois.

BFAR. This study will be a great help to them because it can help them gain more information on how to manage Koi fish raising industry.

**Scope and Limitations of the Study**

The study aimed to design and develop a system that can be used by anyone who has interest in Koi raising or those who were raising Koi already. The system is limited to the people who are connected to the internet and its service that includes a real-time monitoring of Koi ponds or aquarium with the use of sensing device that detects the acidity and temperature of water. Offline users could contact Bureau of Fisheries and Aquatic Resources (BFAR) phone numbers that is shown on the main page for immediate assistance or guidance.

The system provides all guides and information across different species and types of Koi Fish. The said system is compatible to almost all mobile devices that supports .apk or .ipa file extensions can suffice to run the mobile application.

The Koi Disease Monitoring System will be available in the Play Store for Android users and App Store for iPhone users. No account creation required.

The researchers work directly with the Bureau of Fisheries and Aquatic Resources (BFAR) for the proper terms and guidelines of the application. The application will be using the International Standards Organization (ISO) software engineering quality standard in terms of product quality and quality in use. The application will be evaluated by BFAR, five (5) IT experts, and five (5) Koi enthusiast that will be the future users of the app.