# FISH CAMKIT IMPROVEMENT FORFISHERIES APPLICATION

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**Bachelor of Mechatronics Engineering**

**June 2012**

"I hereby declare that I have read through this report entitle "Fish Camkit Improvement for Fisheries Application" and found that it has comply the partial fulfilment for awarding the degree of Bachelor of Mechatronics with Honours"

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| Date | : | 25 June 2012 |

# Fish Camkit Improvement for Fisheries Application

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A report submitted in partial fulfillment of the requirements for the degree of Bachelor of Mechatronics Engineering with Honours

Faculty of Electrical Engineering
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I declare that this report entitle "Fish Camkit Improvement for Fisheries Application" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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| Name | : | Siti Hajar Binti Raman |
| Date | : | 25 June 2012 |

Dedicated, in thankful appreciation for support, encouragement and understandings to my beloved mother and family.

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## ABSTRACT

Fish measurement refers to the measuring of the length of individual fish and various parts of their anatomy. These length data are used in many area of ichthyology, taxonomy and fisheries biology. So, the best solution is uses method of digital image processing to get the fish length. Using the method, we need to key in the distance fish between digital camera that detected by sensor which is get from fish camkit and the fish image that captured by digital camera to obtain the fish length. This is the reason why fish camkit is designed focuses to get the accurate distance data only. Besides that, the distance data that measure from fish camkit is accurate due to the detail while developed the algorithm. In addition, fish camkit was developed to be more compactable and portable. Finally, the user can easier to match the distance data that store in SD card with the fish picture by using a script by using GUI. In addition, the experiment of this project is to analyze the accuracy of the IR sensor and Ultrasonic sensor when use them at outdoor and indoor environment. The results from the experiment shows that the IR sensor is more suitable to use at indoor environment compared to Ultrasonic sensor. The distance that is suitable to save the distance into SD card for IR sensor at the indoor environment between 10cm until 50cm but at distance 10cm show the very accurate value. Besides that, Ultrasonic sensor is suitable to use at the outdoor environment compared to IR sensor and the best distance to save data is at 50cm.

(269 words)

## ABSTRAK

Pengukuran ikan merujuk kepada mengukur panjang ikan dan pelbagai bahagian anatomi mereka. Data bagi jarak ini di gunakan pada banyak bidang iaitu ilmu pengethuan mengenai ikan, taxonomi and biologi perikanan. Perikanan banyak menggunakan kaedah biasa seperti mengunakan pita pengukur. Oleh itu, penyelesaian yang bagus ialah dengan mengunakan pemprosesan digital imej. Dengan menggunakan cara ini, untuk mendapatkan panjang ikan kita perlu memasukan data jarak ikan dengan kamera digital yang telah dikesan menggunakan penderia yang di peroleh daripada 'fish camkit' dan gambar ikan yang telah di tangkap menggunakan kamera digital. Ini merupakan penyebab kenapa 'fish camkit' di reka untuk menjurus kepada mendapatkan jarak yang tepat sahaja. Selain daripada itu, data jarak yang di peroleh daripada 'fish camkit' adalah tepat disebabkan ketelitian yang dilakukan semasa membina algoritma. Tambahan pula, 'fish camkit' dibina untuk menjadi lebih kecil dan mudah di bawa kemana-mana. Akhir sekali, pengguna mudah untuk memyesuaikan data jarak yang disimpan di dalam kad SD dengan gambar ikan dengan mengunakan skrip oleh GUI. Tmbahan pula, eksperimen untuk projek ini bertujuan untuk menganalisis ketepatan penderia IR and penderia Sonar apabila mereka di gunakan di kawasan luar atau di kawasan dalam. Keputusan daripada eksperimen menunjukkan penderia IR lebih sesuai di gunakan di kawasan tertutup berbanding penderia Sonar. Jarak yang sesuai untuk menyimpan data ke dalam kad SD untuk penderia IR ialah antara 10cm sehingga 50cm tetapi jarak 10cm mempunyai jarak yang lebih tepat. Selain daripada itu, penderia Sonar lebih sesuai di gunakan di kawasan luar berbanding penderia IR dan jarak yang bagus untuk menyimpan data ialah pada 50cm.

(253 patah perkataan)

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| | | |
|---|---|---|
| cm | - | Centimeter |
| IR | - | Infrared |
| US | - | Ultrasonic |
| LCD | - | Liquid Crystal Clear |
| SD | - | Secure Digital |
| USB | - | Universal Serial Bus |

# CHAPTER 1

# INTRODUCTION

## 1.0 Introduction

Fish sizes assessment is a very important factor that affecting the economy of any aquaculture industries and also in the field of fishery research. Various type of successful mechanisms have been developed with the purpose to obtain the fish size information in the industry. However, most of the measuring mechanism are built in a large scale and very costly to afford by the fisherman or researcher. Besides, the mechanism are normally fixed to place and the operation of those mechanism is complicated and hard to manage.

The fish camkit project is design in a small size, light weight and portable means. The mechanism of the device is simple and easy to operate. The completion of this project will eventually outruns the other existing measuring mechanism and helps the fisherman in the development of aquaculture industry, as well as the fishery research activities.

## 1.1 Problem statement

1. Fisheries researcher encounter with the problem when measuring fish length such as too time consuming, expensive cost and inaccurate.
2. Device that exists need direct contact with the fish which is need to catch the fish and measure it. The data need to be record manually.

## 1.2 Project objective

1. To make the fish camkit compact and portable.
2. To develop an algorithm to do the distance measurement conversion and save the data into external SD card.
3. To develop a script to analysis the data in the SD card by using GUI for user application.
4. To do analysis an accuracy of two different sensors (Infrared sensor and Ultrasonic sensor)

## 1.3 Project scope

1. Not involve the internally system of digital camera but only use fish image of it.
2. Use fish image that capture from digital camera brand of Sony W series and distance data that storage in SD card in digital image processing software to get the measurement of fish length.
3. Only use for field test at the fish market and the fisher's man landing area.
4. Limited to only two different types of sensor and difference on the result.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Introduction

Literature review is the importance part and become the first step before implement a project. This chapter will expose research that related to this project to obtain idea. These resources can obtain through internet. As we know, internet is the most important tool that provides the services to people for searching of information. The resources can also be obtained from the references on electronic journal and research paper. This chapter will cover the literature review about the method that exists to measure the fish length and also the review about the sensor that need to be used in this project.

## 2.2 Purpose to Fish Length in Fisheries

Fisheries researchers are responsible to assess the sustainability of fish stock and improve aquaculture production of species. Besides, to understand the link between ecosystem and fisheries productivity, including the impacts of climate change. One of the methods to fulfilled their responsible by measure fish length. Fish length measurement is help to identify the fish species population for the purpose of fish reproduction, recruitment, growth and mortality study.

## 2.3 Method or Devices for Fish Length Measurement

There are many researcher work discussing various method and devices to measure the fish length such as using measuring tape [1], sensor [2], [10], electronic apparatus [3], measuring board [4], camera [5] and computer vision [6] and digital image processing [7][11].

### 2.3.1 Measuring Tape Method

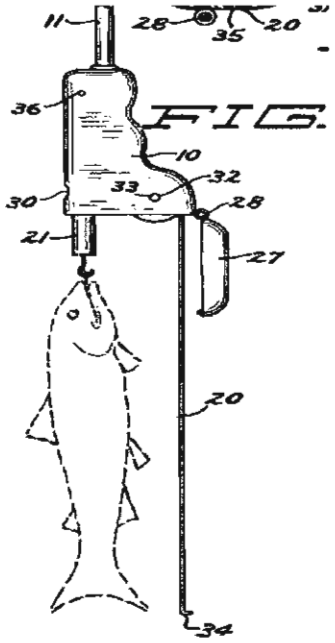


Figure 2.1 Measuring tape and weight's scale

Warndahl had developed a fishing rod handle with a scale for weighing and a tape for measuring fish length [1]. This device provides compact storing area. But, it have disadvantage which is consist small number and marking on a thin strip which is make it difficult to read. The number will not clearly see in image if fisherman wants to capture the measurement using camera because of the number is too small.

### 2.3.2 Sensor Application

Figure 2.2 Fish scale and length measuring sensor

Besides that, Lentine had patterned fish length measuring apparatus that incorporate a digital scale that allow fisherman to get the measurement of weight and length the fish without directly touch it[2]. The device housing attached with a lip grip to grasp the fish mouth. A digital output screen is connected to display the weight of the fish and fish length [2]. To take the reading, the fisherman need to holds the fish vertical and its tail slightly touching the ground or the flat surface. The scale then makes it's a reading using laser-guided ultrasound and the devices detects the reflection from the surface, then generate the length and display on the output screen [2]. The advantages of this devices is allow fisherman using lip grip to lift the fish out of the water, then weigh the fish with a digital scale and measure the length without human interaction. In contrast, it has not the memory that can store the data of length or weight the fish

### 2.3.3 Electronic Apparatus Method

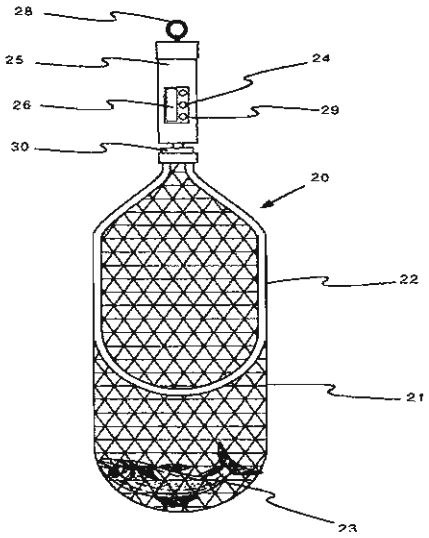


Figure 2.3 Electronic fish length measuring apparatus

Based on the previous work, Greenwood et al. had created a device and method that measure and display the size of a fish that trapped in a net or hang on at any fish support using electronics transducer which is generating a signal that responding to the weight of a fish [3]. Then, electronics transducer will converting and display the signal to indicate fish weight, length or girth. As we can see, the advantage of this device is allowing a person to handle the device use one hand while measure the fish size. So, the other hand is free to do other work. Besides that, it also provide silent handling when using electronic method compared to mechanical methods and also have a water resist apparatus that can be completely immersed under water without damage the electronic components. Unfortunately, this devices also attached with the disadvantages which is the size parameter are converted from weight using previously established mathematical relationship. The formula cannot be apply to any type of fish because it limited to fish type such as Muskellunge, Lake trout, Walleye, Channel catfish, Coho salmon, Steelhead, Largemouth bass, Northern pike, Chinook salmon, Cutthroat trout, Rainbow, Brook and Brown book.

### 2.3.4 Measuring Board Method

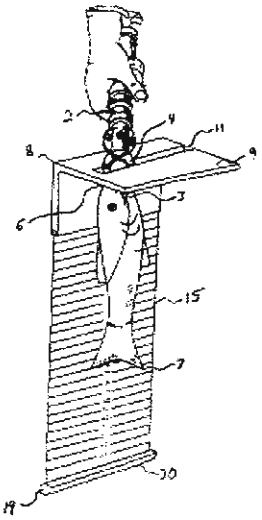

Figure 2.4 Bini's device

Moreover, Bini had provided a compact and portable measuring devices that is quickly and easily attachable to a fish holding devices and provide a readable scale which can be used to easily to identify the fish length and can be easily seen in a picture of the fish and measuring devices even if the image was capture at a distance away [4]. Besides that, the tape able to separate from it base. So that, the tape can be cleaned or replaced after was used in a long period. Then, the ability to separate the base and the tape can also provide an advantage for minimal storage space.