

## A Vibration Processing Analysis Approach to the Development of Fish Feeding Regime System

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### ABSTRACT

**Abstract:** Feeding is important in life cycle of fish, whereas one of the major challenges facing aquaculture industry is the inefficient management of the feeding. Excess feeding results in left over feed which eventually produces negative environmental effect. Feeding fish based on their demand will reduce feed wastage to the bearest minimum and effectively address the problem of water contamination. This paper proposes a feed dispensing algorithm using vibration processing analysis. The intent is to develop a feeding regime system that can identify fish behavioral activities to determine when fish is hungry, and provide them with precise amount of food as demanded. The dataset adopted in this study was obtained using data logger incorporating tri-axial gyroscope, accelerometer and magnetometer. The gyroscope used to determine the changes in angular velocity with respect to x-, y- and z-direction, while accelerometer and magnetometer employed to determine the changes in acceleration in x-, y- and z-direction. These patterns were further process using sliding window analysis. The mechanical differences between these patterns is proposed to be used for classify when fish are hungry from other activities. It is expected that the proposed system will has potential of reducing overfeeding and increase fish productivity.

**Keywords:** Accelerometer, Aquaculture, Feed, Feeding System, Fish, Fish Behavioral Pattern.

### CISDI Journal Reference Format

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### 1. INTRODUCTION

The Exponential increase in fish consumption owing to it been a reliable source of protein has increased the demand for fish worldwide (Grainger, 2002). This continuous inclination which runs for over a decade has catalyzed the growth of aquaculture industry globally (Statistics, 2008). Nevertheless, high protein demand; deficiency in fish supply; Climate change, increment in land rental rate and diseases are some of the reasons researchers are involved in improving and exploring new technologies for the aquaculture industry. This has leads to the development of innovative systems, process and new management approach (Shaari et al., 2011). All these issues might be interrelated with each other. For example, high land rental rate contends the fish farmers to practice intensive fish farming, which means to accommodate high stock density per ponds it requires high degree of control. However, poor management of aquaculture system such as feeding causes water contamination which leads to disease spreading and eventually result to low fish productivity.

The fish feeding process is one of the most important aspects in managing aquaculture system, where the cost of fish feeding is around 40 to 50% of the total production costs (Chang et al., 2005; Al-Zubi et al., 2016). The method of feed delivery is essential to obtain the maximum profit or return by aquaculture entrepreneurs. It has been estimated that over 60% of the feed placed into an aquarium ends up as waste particulates (Timmons & Losordo, 1994; Atoum et al., 2015). The accumulation of this particulates result in the water contamination which further decomposes and produce ammonia-nitrogen and other toxic substances such as hydrogen sulphide that could eventually be harm the growth of the fish. However, the extend of these effects demand on the feeding techniques or mechanism adopted. In the traditional feeding mechanism, fishes are fed by throwing feed unevenly on the surface of the water at fixed schedule such as four meals a day. This scheduled feeding leads to a number of problems such as feed wastage, Non-uniform fish growth and Environmental effect (Krisna et al., 2014; Wu, 1995; Navarrete-Mier, et al., 2010; Reddon & Hurd, 2009 and Binoy, 2015).