Text of the technical presentation

Preface

this group is named Fish Farming water monitoring . the Basic idea of this group project is using the spectrophotometer for monitoring water Quality in Fish Farming aquaculture. The monitoring is done with the objective of improving quality and fisheries Production.

Physics introduction

I want first all Make a short introduction about spectroscopy or the Study of light radiations. The Visible Light is only a small portion of the electromagnetic Spectrum. Wavelength for Visible Light Comes from about 400 nano meters to 750 nanometers. Besides visible light there are ultraviolet radiations, infrared radiations, gamma rays, x-rays, microwave , radio Waves and alternating Current.

The absorption

Light can be absorbed and reflected by any object. If I have a source of light and a target object for example a Liquid Within a Glass container, the light Comes Across the Liquid and a portion of Light is absorbed by the Liquid , while the other portion of Light, is reflected. The Sum of

reflected and absorbed light is Constant. This according to the Law of conservation of energy. So reflected is the complement of absorbed light. The way an object absorb or reflect the light is very peculiar to the material or its composition. By observing how the light is reflected, we can make some hipothesys on Which kind of substance is being   examined. The idea is to analyse water samples with the spectrometer , plot the light frequencies reflected by the water sample, and infer What kind of composition is Within water sample in Order To assess water quality.

The quantities to determine

The important quantities to be determined for the control and   water monitoring of the aquaculture are : fitoplancton e zooplancton (Food for fishes), the percentage of oxygen which is important for the life of fishes ,   the presence of nitrogen dioxide, Nitrogene catabolic ammonia,   the droppings or the dejections produced by fishies, the PH and salinity ,   the accumulation of metals bioxyn chlorinated biphenyls, the temperature, turbidity of water.

The sparkfun spectrophotometer

I have used the spectrophotometer Sparkfun AS7265x connected to the board Arduino, for measuring the wave of light frequencies emitted by the liquid . On this sensors there are three led of light (IR,UV, visible light) and three sensors of light (IR,UV, visible light). The total frequencies measured will be 18, six for each sensor.

The board connection to the spectrometer

I have connected Arduino to the spectrometer sensor and I have taken the measurements of the sample of water contained in the Jar Glass. I have used different samples of water by adding each time different additives and compared the results of the spectrometer. (**Let' s see the graphical plots).**

 By collecting a large number of samples plots we should be able to infer also the unknown sample. This step, needs a huge collection of data, and the building of a regression model, or neural network model. This work is out of the scope of this project. (**Let's see the video of the spectrometer at work).**

The Spectrometer sensor will be installed on a smart buoy together with Solar panels, batteries , antennas and actuators. The board to be used for LoRaWAN network

will be St bl070 LRWAN1. It may be useful also e concentrator iC880A-SPI - LoRaWAN concentrator since we don't know a priori the position of the aquaculture and the distance from the closest gateway concentrator.