**Hydromet Station Maintenance Scheduling System**

**For Department of Science and Technology - CALABARZON**

A Research Proposal

In Partial Fulfillment of the Requirements in

CMSC 190-1 (Special Problems)

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**Introduction**

The Department of Science and Technology (DOST) is the premiere science and technology body in the Philippines charged with the twin mandate of providing central direction, leadership and coordination of all scientific and technological activities, and of formulating policies, programs and projects to support national development. According to the department’s website, one of its functions is to pioneer design and engineering works to complement research and development functions.

The Philippines is a country strong typhoons often visit. Every year, these natural calamities cause damage to the livelihood of the Filipinos. In order to lessen the damages and casualties brought about these typhoons and raise disaster preparedness, “timely and accurate information” (DOST, 2012) is needed. In line with this, many projects have been launched to address this demand. One of the most recent projects is the Nationwide Operational Assessment of Hazards or Project NOAH. The purpose of this program is to mitigate as much disaster it could by monitoring the weather status of a particular area and warning the Department of an approaching disaster.

Project NOAH involves installation of Hydromet Stations: Automated Weather Stations (AWS) and Automated Rain Gauges (ARG). These devices are placed in remote and sometimes harsh environments.  They save human labor by automatically recording weather-related information. In August 2013, when the southwest monsoon caused torrential rains in Metro Manila which resulted into a massive flooding, data acquired from Project NOAH provided the officials a significant amount of time to evacuate residents along the floodplain and no casualties were reported(Alconis, Monggaya, Saddia, Eco, Figueroa, & Lagmaya, 2014). The data collected by these instruments enable meteorologists to study, analyze, and forecast weather conditions. Furthermore, the DOST developed a system to visualize data retrieved from these devices in the Project NOAH web portal at http://noah.dost.gov.ph/. The system uses near real-time data sent from the sensors installed in critical river basins to a central server via GSM network or satellite network (Alconis et. al., 2014). However, these sensors installed in Hydromet Stations also require maintenance. They are prone to send incorrect to no information due to various possible reasons such as the presence of foreign objects on the sensors, the failure of the simcard to send messages to the network, the discharge of the sensor batteries, and other problems. Thus, the DOST conducts regular site maintenance to check the physical conditions of the stations and preserve the integrity of the data being used for Project NOAH.

The main objective of the study is to develop Hydromet Station Maintenance Scheduling System for the Department of Science and Technology (DOST) Region IV-A. Specifically, the study aims to (1) automate the process of keeping track of maintenance records for each Hydromet station, (2) automate the process of creating a maintenance schedule and reminding concerned personnel of incoming maintenance of Hydromet Stations, and (3) develop a system compatible with the sensor data obtained from the Department.

**Scope and Limitation**

Hydromet Stations are situated in different parts of the Philippines. The system that will be developed in this study will only be used under the Department of Science and Technology in Region IV-A or the CALABARZON region.

**Date and Place of Study**

The development of the Hydromet Station Maintenance Scheduling system will be conducted in the Institute of Computer Science, Physical Sciences Building, University of the Philippines Los Baños from January 17, 2017 to April 24, 2017.

**Review of Related Literature**

***Department of Science and Technology (DOST)***

As stated in the DRRM Act 10121, it will be the policy of the State to *uphold the people's constitutional rights to life and property by addressing the root causes of vulnerabilities to disasters, strengthening the country's institutional capacity for disaster risk reduction and management and building the resilience of local communities to disasters including climate change impacts* (Swiss NGO DRR Platform, 2014). The DOST launched the Nationwide Operational Assessment of Hazards or Project NOAH as an early warning device to mitigate disasters caused by a number of typhoons that visits the Philippines yearly.

***Nationwide Operational Assessment of Hazards or Project NOAH***

Since the Philippines is located at the western rim of the Pacific and along the circum-pacific seismic belt (Ring of Fire) it is vulnerable to a number of natural disaster. The location alone of the country makes it one of the most disaster-prone countries in the world (Swiss NGO DRR Platform, 2014). The former president Benigno S. Aquino III directed the DOST to put in place a responsive program for disaster prevention and mitigation (Presidential Communications Operations Office – EDP, 2012). In response to this, the DOST launched the Nationwide Operational Assessment of Hazards or Project NOAH in July 2012.

The Project NOAH is comprised of the following component projects: Hydromet Sensors Development, Doppler System Development, Weather Info Integration for System Enhancement, DREAM-LIDAR, FloodNET, Landslide and Geohazards Mapping, Storm SurgeInundation Mapping, and Disaster Management Using WebGIS (Aracan, 2015). It utilizes the advancement of science and technology, state-of-the-art instruments and methods to construct high resolution hazard maps and information through different media and communication platforms such as the **Google map**. It is developed with the help of other organizations such National Institute of Geological Sciences and the College of Engineering of the University of the Philippines, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Philippine Institute of Volcanology and Seismology (PHIVOLCS), Advanced Science and Technology Institute (ASTI) and the Science and Technology Information Institute (STII) (Lagmay, 2012).

***Automated Record Keeping***

Computers maintain information about your documents, referred to as “metadata,” such as: author’s name, document creation date, date of it last access, etc. A hard copy of the document does not reveal metadata, although certain metadata items may be printed. Depending on what you do with the document after opening it on your computer screen, the actions taken may change the metadata collected about that document.

Although hydromet stations require low maintenance (Advanced Science and Technology Institute (ASTI), 2012), the need to keep track of the repairs and upgrades done on these are important to preserve the integrity of the data these sensors transmit. An automated record keeping will be helpful to make it efficient.

**Methodology**

The Model-View-Controller (MVC) framework is often used to develop web applications. It has three main logical components: the Model, the View, and the Controller. It is often used to separate the presentation logic, business logic, and database logic in client-server architecture. The Model is responsible for the retrieval and storage of information in the database. The View is mainly responsible for the user interface or how the data is displayed. The Controller is the interface between the Model and View components.

1. **Materials**
2. Laravel Framework
3. Hypertext Mark-up Language (HTML)
4. Cascading Stylesheet (CSS)
5. PHP
6. PostgreSQL
7. Javascript
8. **Functional Requirements**

The main purpose of the system is to to develop Hydromet Station Maintenance Scheduling System for the Department of Science and Technology (DOST) Region IV-A.

There will be three types of users:

1) System administrator who will have access to all the features of the system,

2) User with an account who can create reports and edit only those he created, and

3) User without account who can only view the home page and the sensor list.

The system will have three different modules and each module shall have its own features:

1. Sensor Maintenance Schedule
   1. Create Schedule – a function that lets the users create a schedule for checking the conditions and maintaining Hydromet stations
   2. Notify via SMS/e-mail – a function that consistently sends SMS and/or e-mail notifications to concerned personnel until confirmation of his scheduled maintenance is done
   3. Confirm Schedule – a feature that lets a personnel confirm via the system that his scheduled maintenance is done
2. Sensor Maintenance History

View History – a function that lets a user view the sensor status and the maintenance reports submitted for a particular sensor

1. Maintenance Reports
   1. Add Report
   2. Edit Report
   3. View Schedules
2. **Limitations**

Some of the features will be restricted depending on which type of user operates the system. All features and information will be available for the system administrator. Both user with an account and user without an account will only have access to limited information and features.

Data which will be fed to the system will come from the office of the DOST Region IV-A.

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