# WIRELESS SENSOR AND ACTUATOR NETWORK (WSAN) FOR THE MONITORING AND CONTROL OF WATER RESERVOIRS AT THE COLLEGE OF ENGINEERING

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It is always said that “drop of water makes the mighty ocean”. Hence conserve every drop of water. Water must not be allowed to go waste.

But in the case of Knust, most of the source of water is from underground drilled boreholes. The water is pumped into polytanks and laboratories through a mechanized system. A substantial amount of electrical power is consumed when pumping the water. Unfortunately, most of the water in which much electrical energy is used in pumping go waste. This is due to lack of a mechanism to monitor and control the in-flow of water into the polytanks.

To curtail the waste of water and electrical energy and eventually financial loss to the college, efficient system must be implemented to keep track of in-and-out flow of water into the polytanks, especially those at COE library and satellite and communication buildings.

This document seeks to implement a cost-effective but efficient system to monitor and control water level in the polytanks at those two sites. It will also automatically stop the inflow of water in case the polytanks get full. The proposal includes our problem statement, objectives, plan of action(methodology), management plan and conclusions.

# PROBLEM STATEMENT

Water is economically vital natural resource in Knust and anywhere else in the world. The conservation of water and power should be dear to College of Engineering. Water is pumped from underground to fill polytanks in the college. The water gets full and outpour most often due to lack of monitoring and control system.

It is estimated the college losses a significant amount of money every year to repaint the building where the water overflown. Aside this energy consumption is on the rise daily, most especially this “dumsor” periods. Quite apart from these financial losses, there is a popular saying that “you will never know the value of water until the wells dried up”. It is therefore in line of those facts that we are designing and implementing an automated water level monitoring and control system for College of Engineering.

This proposed system will be intelligent to detect the level of water in the polytanks and automatically take an action. Measuring the system, it will be cost-effective but efficient to solve the problem under study.

# OBJECTIVES

The main objective of the project is to design and implement an automated water level monitoring and control system. The system will be implemented with the following specific objectives.

* The design of wireless sensing and actuation network (WSAN)architecture to perform control and monitoring function.
* Implement sensing and actuation units for the proposed architecture.
* Deploy the developed unit at the college of engineering.

The system will be safe to human (ergonomic), energy efficient, easy to implement and economically less costly. In our research, we shall consider how the system will not pollute or ironize the water.

# METHODOLOGY

This section of our proposal explains our plans for obtaining the objectives stated in the previous section.

The first goal of our research is to explain the approach of getting a suitable water level monitoring and control system. We shall review available literature to compare and contrast solutions available.

Secondly, the cost, ergonomic and effectiveness of each of the proposed solutions will be analyzed. These are the basic parameters to consider before resting on a particular solution. Also, software design, simulation and the actual design will follow. Once the system is design we shall implement it at the college to examine it effectiveness.

Finally, we shall formulate simple mathematical model to be able to predict the financial loss to the college as per water wastage and energy consumption.

# MANAGEMENT PLAN

This section explains the cost in terms of finance and time to carry out the project. The research, design and implementation may be completed by 20th March, 2017.

To attain this goal, we shall follow the schedule below.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ACTIVITIES | PERIOD / DURATION | | | | | | | | |
| 14/09/2017 | 14/10/2017 | 03/11/2017 | 14/12/2017 | | | 24/01/2018 | 20/02/2018 | 18/03/2018 |
| Write proposal and defending |  |  |  |  | | |  |  |  |
| Review of related literature |  |  |  |  | | |  |  |  |
| Analyzing the alternative solution |  |  |  |  | | |  |  |  |
| Submission of selected solution to our supervisor |  |  |  |  | | |  |  |  |
| Write a report on chapter 1 and 2 |  |  |  |  | | |  |  |  |
| Design flowchart block diagram and schematic |  |  |  |  | | |  |  |  |
| Implement the system with software |  |  |  | |  |  | |  |  |
| Actual implementation and testing |  |  |  | |  |  | |  |  |
| Final report |  |  |  | |  |  | |  |  |
| Presentation and defend |  |  |  | |  |  | |  |  |

Taken into account the availability of Knust Wi-Fi and other resources in the library there will not be much cost but the purchase of electronic devices which will approximately cost GHc665.00. Other minor cost includes printing of report, photocopies and buying of data when Wi-Fi is less effective will approximately be GHc180.00. Hence a sum total of GHc845.00 will be the cost.

# CONCLUSION

Approximately 5000 litres of water goes waste at college of Engineering every academic year. This is as a result of malfunction of the control system in the polytanks that are situated at the top of the library block and “A” block.

The document has proposed a study of designing and implementing an automated system to pervert the problem.

The study will achieve the following specific objectives;

* Identify different alternative approaches to monitor and control level of water.
* Analyze the effectiveness and financial strength of each approach.
* Design and implementing the most effective solution to the problem.
* Implement the design system and examine the working principle.
* Formulate a mathematical model and use it to predict loss of water and energy to the college within a given time frame.