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Interconnected Real Time Weather Station

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# Abstract

In modern days, weather is forecasted by the use of satellites, super computers and other extremely expensive materials. Because of the amount of effort that is required of them, only a few meteorological center are in the business. But there is another solution to achieving this. We aim to create a network of interconnected weather stations that uses temperature, humidity, wind, and pressure sensors in order to give real time data about the weather in a particular area. By using the information from the various stations, we aim to create an accurate, cheap and localized means for finding out the weather condition.

# Statement of the Problem

Most of the weather report that come out of metrological centers is for large cities and generally on maps people can barely understand. Other than the way the information is provided to the people, the way that the information is gathered and analyzed is also a cause of problem. The metrological analysis is done by looking at cloud movement and wind from different places, and using a super computer to predict the weather. And for Ethiopia, the information they provide is not real time information. It’s instead based on the prediction of what will happen. This is due to the small number of weather station present in Ethiopia.

# Objective

The main goal of this project is to create a weather station that is cheap, easily deployable, easily scalable, and easily maintainable and one that doesn’t attract thieves. Through the course of this project, we aim to have two weather towers that will be networked together in order to give real time weather status for a small local area. To accompany the weather station, we will create a weather reporting site that provides the data to anyone. What makes this different from other weather information providers is the fact that our location is more specific so it’s more useful.

# Motivation

There have been many days that I have gone out my house after seeing a weather report that it will rain and have come back home without seeing a single drop of rain, the reverse has also happened enough times to cause frustration. So in our final project, we chose to create a method through which people can find out the weather that is happening in another area in real time. So our main aim is to provide real time, cheap, and easily accessible source of data about weather.

With enough weather station, one can cover a whole city and provide real time weather report for everywhere in the city. The data collected can also be used by the Ethiopian Metrological Agency so they can improve their prediction.

# Introduction

Man has always been fascinated with knowing the weather. Humans have developed different ways of knowing what mother earth has in store for us, and as our knowledge increased, we went from looking at the clouds to see the weather to using super computer and satellite imagery to predict the weather. This has led to the science of weather prediction.

Weather forecasting is the application of science and technology to predict the state of the atmosphere for a given location. The predications are based mainly upon changes in barometric pressure, current weather conditions, and sky condition, weather forecasting now relies on computer-based models that take many atmospheric factors into account. Human input is still required to pick the best possible forecast model to base the forecast upon, which involves pattern recognition skills, teleconnections, knowledge of model performance, and knowledge of model biases. The chaotic nature of the atmosphere, the massive computational power required to solve the equations that describe the atmosphere, error involved in measuring the initial conditions, and an incomplete understanding of atmospheric processes mean that forecasts become less accurate as the difference in current time and the time for which the forecast is being made (the range of the forecast) increases.

The Ethiopian Metrological Agency gets its prediction from other metrological stations because of the large effort involved in prediction. They also have only a few number of station in such a large country.

What we aim to do is create a cheap weather station that they can deploy in most areas to find out the weather there. The main reason that we will use this station is to give specific weather report about a specific location.

This makes it very unique and provides a much needed service to the Ethiopian public, since most company don’t have a base of operation and don’t give high priority to Ethiopia.

# Methodology

This project mainly consists of two parts:

1. The Weather Station
2. The Central Processing Center

# Cost Breakdown

This is the estimation of the cost of the implementation of the project.

|  |  |  |
| --- | --- | --- |
| **Component** | **Quantity** | **Total price($)** |
| Arduino Mega | 1 | 30.00 |
| [DHT22](http://www.sparkfun.com/products/10167) Humidity sensor | 1 | 10.00 |
| Temperature Sensor | 1 | 3.00 |
| A LiPo battery of [1000mAH](http://www.seeedstudio.com/depot/lithium-ion-polymer-battery-1a-p-593.html?cPath=178_183) or [2000mAh](http://www.seeedstudio.com/depot/lithium-ion-polymer-battery-2a-p-603.html?cPath=178_183) | 1 | 9.00 |
| [BMP085](http://www.sparkfun.com/products/9694)Barometric pressure sensor | 1 | 20.00 |
| Xbee [series 2](http://www.sparkfun.com/products/10414) modules | 1 | 26.00 |
| SD card shield | 1 | 14.00 |
| Resister and Jumping Wires | NK | NK |
| Total | | 120.00 |

Note: This is an approximate estimate of the cost of implementing this project. So it may vary as we progress

# Resources Required

The resources we require for the design, development, test and implementation of the software are listed below (more or less).

|  |  |
| --- | --- |
| Resources Required | Type |
| Computer (Either Desktop or Laptop) |  |
| Arduino IDE, Arduino Processing | Design tool(software) |
| Ms. Visual Studio (.Net Frame Work) | Development Environment |
| NetBean, Eclipse, and other IDE’s | IDE |
| Programming Books related to C#, Arduino Playground | Books |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.NO** | **TASKS TO BE PERFORMED** | ***DURATION: December up to May*** | | | | | | | | | |
| **November** | | | | **December** | | | | **January** | |
| ***Week1*** | ***Week2*** | ***Week3*** | ***Week4*** | ***Week1*** | ***Week2*** | ***Week3*** | ***Week4*** | ***Week1*** | ***Week2*** |
| 1 | Proposal writing |  | **X** |  |  |  |  |  |  |  |  |
| 2 | Ordering Materials & Resources |  |  | **X** |  |  |  |  |  |  |  |
| 3 | High level Planning of Entire System |  |  |  | **X** |  |  |  |  |  |  |
| 4 | Interfacing various sensors & Coding |  |  |  |  | **X** | **X** | **X** |  |  |  |
| 5 | Practical Testing |  |  |  |  |  |  |  | **X** | **X** |  |
| 6 | Presentation of the project |  |  |  |  |  |  |  |  |  | **X** |

# Time Schedule

This project is meant to span for the full academic year. We have divided this project into two parts. For this semester, we have chosen to create the weather station with all the sensory capabilities. And for the second semester, we have chosen to do the communication, the database and the interfacing (web page).

# Conclusion

Through the course of this project, we aim to create a cheap, reliable, and easily deployable weather station whose status can be viewed from a webpage will be real time and the information will be about a small area, so this system will be able to analyze the weather of a city to a higher degree.