

## **Pace University Weather Station Website**

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### **Introduction**

This technical paper first describes various weather station websites to provide a comparison of the existing systems. We discuss all the features and functionalities provided by these websites and discuss the importance of these features. We describe the technologies used to build a successful website and evaluate some existing websites based on their technical features. We make a heuristic evaluation and cognitive walk-through of one of the best weather station websites. We then make a buy/build decision concerning the work required on the Pace University weather station.

The purpose of the project is to provide the capability to view the data that is available and visible at the Pace University base weather station in Pleasantville via a web interface in an easy-to-use manner. The resulting weather station website will display the following information:

- Temperature
- Humidity
- Wind speed
- Wind direction
- Barometric Pressure
- Rain collected

### System Context:

Weather information is presented in a website, which can be used by the University to hold the weather information and is posted also on the web. It is portrayed as an easy-to-use tool people with minimal web browser experience can use to its fullest capacity.

Any student from any school or faculty member can take advantage of this website, to view information about a parameter.

### Potential Users:

Potential users include faculty, students, university officials such as Dean, chairs, etc and general users.

### Major Constraints:

Since weather station website is to be used on the web; there will be no system restraints on the users. Anyone with an Internet connection and a browser will be able to use the website to the fullest of its capabilities.

### Cost Estimation:

All the resources required for the successful completion of this project are provided for by Pace University and Dr. Charles Tappert.

### Project completion date:

This estimated completion date for this project is May 12<sup>th</sup> 2004.

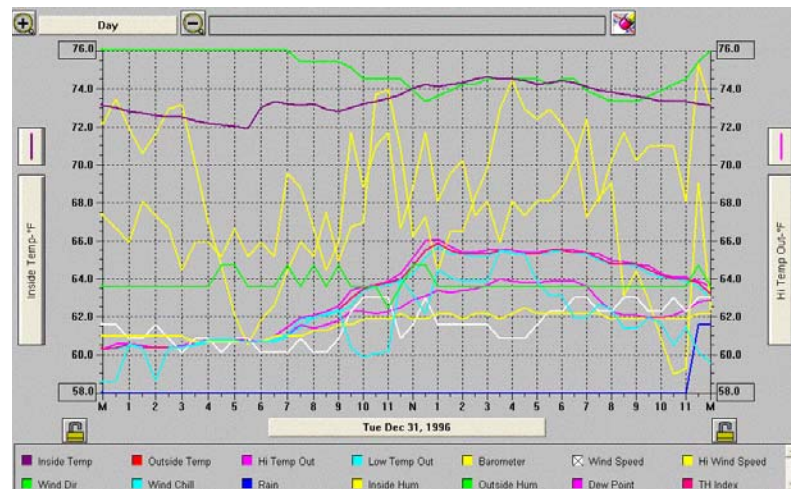
### Project Risk:

Certain amount of project risk is anticipated. As stated earlier, all the necessary resources are available and there is no monetary requirement for the project. Several requirement details are not finalized at this point. This could pose as a risk at some points. We intend using .NET for the front-end implementation. As we are new to the .NET technology, we might run into some technical hitches. The project team faces the risk of not being able to finish the project on time. Therefore technical risks are possible during the various stages of the project.

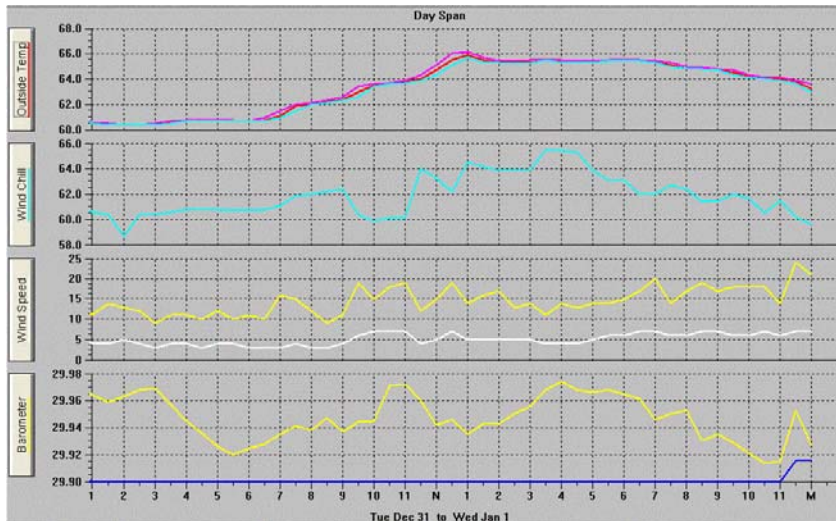
### About the Pace weather station:

The Graduate Program in Environmental Science has purchased and installed a Davis Vantage Pro Wireless Weather Station. It is housed at the Pace Environmental Center (the farmhouse). Information from the data collectors (rain gauge, anemometer, wind vane, barometer, temperature, solar incidence) is received at the base station and some calculations are performed on the data collected. In addition, they have purchased the Davis WeatherLink software and interface that connects the base station to a computer. It displays the weather information in a variety of ways. Historical tracks of weather features are displayed, if queried. There is also a weather prediction feature and a statement of what it's like outside.

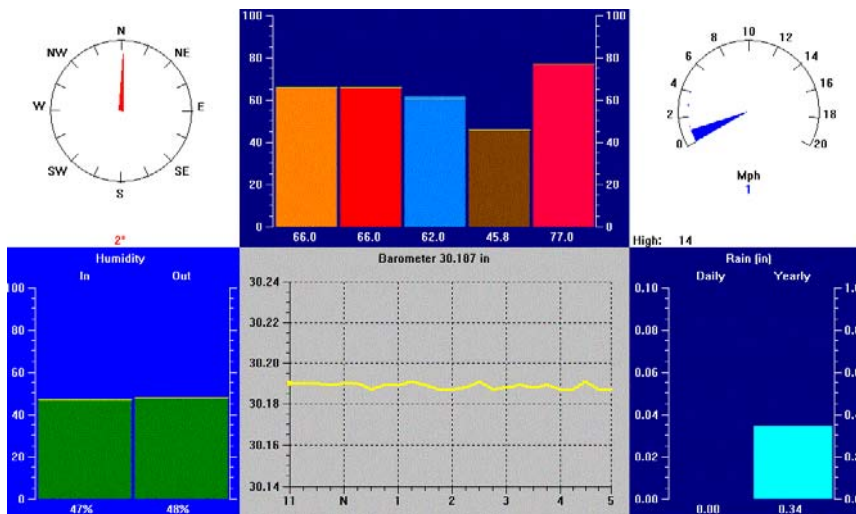
### Screen Dumps of the weather link software



Graphical Plot



Strip chart



Weather Bulletin

The above screen dumps represent information as displayed on the local machine.

## Relevance

In this section, we compare and contrast 3 prominent weather station websites. We will evaluate these websites based on the following criteria:

- **User Interface (ease of use)**
- **Flexibility and functional independence**
- **Cost**
- **Historical data management and presentation**
- **Degree of Customization possible**

The 3 weather station websites narrowed down for the evaluation, based on various criteria including popularity, ease of use and data manipulation being among them are:

1. [www.weather.com](http://www.weather.com)
2. [www.wunderground.com](http://www.wunderground.com)
3. [www.weatherbug.com](http://www.weatherbug.com)

### [www.weather.com](http://www.weather.com)

Weather.com is the biggest provider of weather-related information to Internet based websites. Their plug-ins are most popular for any weather related information. Can this be used as a plug-in? The answer to this is yes, hence making this our first choice to evaluate for possible use. Upon a detailed evaluation, the following factors were prominent in preventing us from using the weather.com plug-in:

#### **a. User Interface (ease of use)**

Too much information on the home page – distracting and annoying to the average user; too many ads, flashing images, pop-ups and banners that distract the attention, thereby hiding and undermining the core purpose of the website. Also, there are too many peripheral areas offered – golf, driving, health, home, recreation etc. This is not research-suitable data. The very purpose for providing Pace with a weather web portal is for students, faculty, staff and scientists to use information in a scientific and research oriented fashion.

#### **b. Flexibility and functional independence**

Very little flexibility since only information is provided, not data. This information can only be viewed, not used as data for any reason. For instance, the site tells you the current temperature in a region, but it does not allow you to store this data in a historical database, or to generate graphs or use it in any manner other than viewing it. Even a simple module of the website such as providing weather forecast for a particular region is not achieved as they have their own locales to choose from. The same weather forecast is shown for Pleasantville and Sleepy Hollow, 2 neighboring cities that are treated as one region. For an educational institution where intense research takes place, accuracy of data is of utmost importance. Therefore, a weather.com plug-in does not effectively serve the purpose.

#### **c. Cost**

The basic plug-in, with ads and popups and which just displays very basic weather forecasts is free, while the ad-free version needs to be bought for \$30.00 a year.

#### **d. Historical data management and presentation**

Weather.com does not allow subscribers of either the basic, or premium versions, to store data in any manner. All data is encrypted and in a read-only information format. Since it cannot be stored, it cannot be processed and presented for later use.

#### **e. Degree of Customization possible**

Very little customization possible, does not gather data from your sensors, only provides information from weather.com. Since it's not your information, it is not customized in any way. The only customization allowed is in the user interface design, which is not of great consequence or importance for an educational institution.

[www.wunderground.com](http://www.wunderground.com)

This is an interesting evaluation as Pace university already utilizes the free plug-in feature. Since we already know that our client is not satisfied with this website, we will only discuss the shortcomings of [www.wunderground.com](http://www.wunderground.com).

#### **a. User Interface (ease of use)**

This website provides a basic layout of limited information in an orderly and neatly presented manner. It provides daily, weekly and monthly statistics and graphical display of this data. The negative factor is that the difficulty in navigating through the website to reach the member's (Pace in this case) area.

#### **b. Flexibility and functional independence**

Some flexibility is provided as members are allowed to upload their own data. This is limited since this site operates on low budgets, due to low membership fees, and hence has a direct effect on amount of facilities and flexibility provided.

#### **c. Cost**

They provide only one plug-in which needs to be bought for \$5.00 a year.

#### **d. Historical data management and presentation**

Wunderground.com allows displaying data from member's own sensors (personal weather station). But the glitch lies in the fact that they display limited amount of data. Since it's quite an inexpensive service to subscribe for, they cannot provide for a huge database of weather data. They provide data in a comma-delimited file that can be utilized for research purposes.

#### **e. Degree of Customization possible**

Very little customization possible; not suitable for customized display in data. This site forces users to choose from existing interfaces and display patterns.

[www.weatherbug.com](http://www.weatherbug.com)

This is an interesting evaluation as Pace university already utilizes the free plug-in feature. Since we already know that our client is not satisfied with this website, we will only discuss the shortcomings of [www.wunderground.com](http://www.wunderground.com).

#### **a. User Interface (ease of use)**

Simple, elegant and effective user interface on the home page– a definite plus. Extremely slow operation. Too many ads and banners on following pages.

#### **b. Flexibility and functional independence**

This information can only be viewed, not used as data for any reason. Very little flexibility since only information is provided, not data. A simple module of the website such as providing temperature for a particular region is not achieved as they have their own locales to choose from. For instance, the site tells you the current temperature in a region, but it does not allow you to store this data in a historical database, or to generate graphs or use it in any manner other than viewing it.

#### **c. Cost**

The basic plug-in, with ads and popups and which just displays very basic weather forecasts is free, while the ad-free version needs to be bought for \$20.00 a year.

#### **d. Historical data management and presentation**

Just like weather.com, weatherbug.com does not allow members, to store data in any manner. All data is encrypted and in a read-only information format. Since it cannot be stored, it cannot be processed and presented for later use.

#### **e. Degree of Customization possible**

Weatherbug.com allows very little customization, as it does not gather data from member's sensors. Since it's not your information, it is not customizable in any way.

### **Methodology**

The weather station website has three basic components.

1. User Interface: The front-end of the system has been designed using ASP and VBScript.
2. Database: The database used in this project is SQL Server. The DB holds all the weather related data.
3. Graphing component: This component is used to display dynamic graphs and charts based on data presented to it. This component is created in Flash. It is a completely independent animated graphing solution which does not over tax the server, is presentable and scalable and can be customized according to one's own

needs. This component reads data from XML files, which are generated dynamically at runtime.

**Sample screen:**



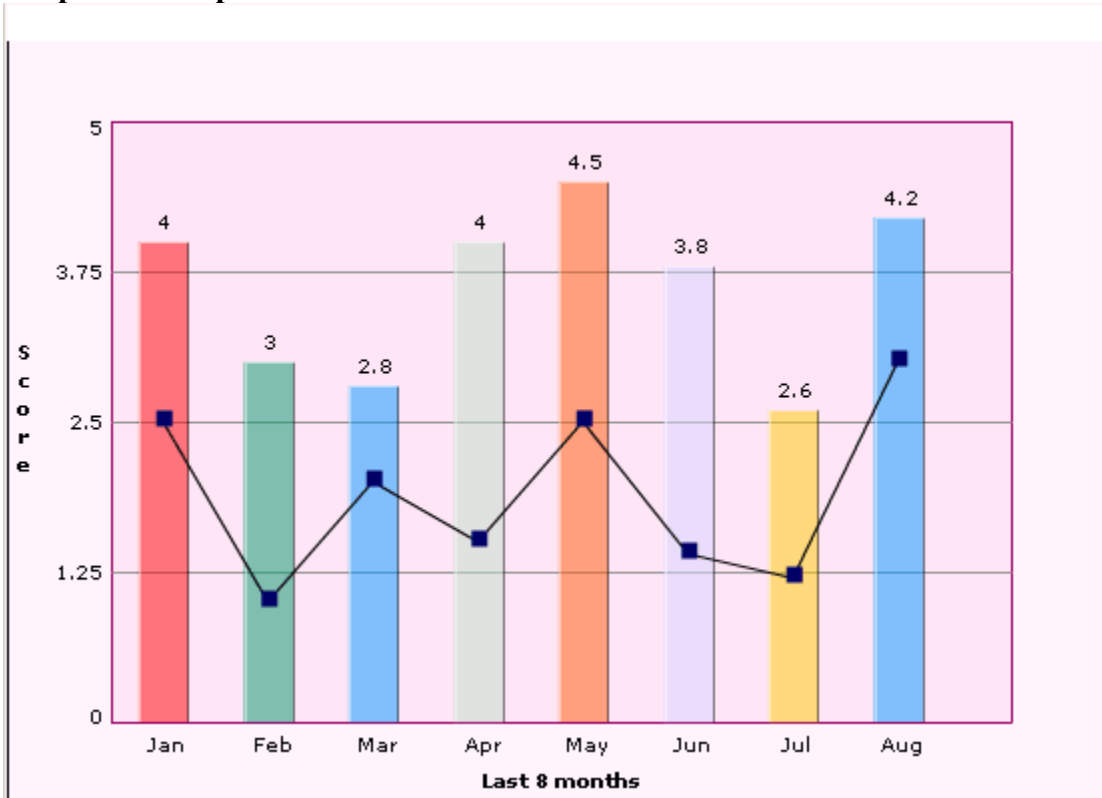
Pleasantville, NY  
 Lat: N 41 ° 7 ' 43 " ( 41.129 ° )  
 Lon: W 73 ° 48 ' 25 " ( -73.807 ° )  
 Elevation: 323 ft



- [Daily Statistics](#)
- [Monthly Statistics](#)
- [Tabular Data](#)
- [Graphs And Charts](#)
- [Sunlight Data](#)

	Current	High	Low	Average
Temperature	58.6	60.7	58.6	60
Dew Point	48.1	48.3	47	47.5818181818
Humidity	68	68	61	63.5454545454
Wind Speed	1	2	1	1.36363636363
Wind Gust	6	12	3	7.27272727272
Wind	South	-	-	South
Pressure	30.21	30.22	30.21	30.2181818181
Precipitation	0	0	0	0

**Graphical Component**



## Results

Based on the evaluations above, Pace University has decided that it is a more feasible solution to build a system rather than use any of the available products, including those listed above. Therefore the buy/build decision has been made.

The previous team that was responsible for this project faced adversities in understanding client requirements, and making an evaluation of existing systems versus building one itself. Our first goal was to clearly understand client requirements. The next challenge was to implement the required system. Team 8 has achieved success in presenting historical as well as current data in graphical, numeric and tabular formats.

## Conclusion

Better to build than buy because

- Can be customized to suit client requirements.
- No cost of development, operation and maintenance since all resources are provided by Pace University and guidance is provided by Dr. Charles Tappert.
- Since database is also designed and developed by Team 8, this allows for vast storage, handling, presentation and manipulation of data in the desired fashion.
- Since its being developed in-house, any amount of flexibility can be built into it.

## Recommendations

This semester, Team 8 has succeeded in storing data in a robust database and displaying data in graphical, numeric and tabular form. The team to work on this project the next semester will have to implement the FTP module. We highly recommend them to communicate with the client and if necessary, with us, Team 8, since we have done extensible research in this area.

## References

### Web resources:

1. <http://www.weather.com>
2. <http://www.wunderground.com>
3. <http://www.weatherbug.com>
4. [www.ambientweather.com](http://www.ambientweather.com)
5. [www.weathermatrix.net](http://www.weathermatrix.net)
6. <http://www.victoryseeds.com/weather/wmr968.html>
7. <http://www.weathergraphics.com/index.htm>

### Books and print material:

1. "The Rough Guide to Weather" by Robert Henson, 2002. Rough Guides Limited, Penguin Putman, Inc.
2. "The USA Today Weather Book; "An Easy-To-Understand Guide to the USA's Weather" by Jack Williams, 1997.
3. Roger Pressman, Software Engineering, 5th Ed., McGraw, 2001.