Title: Improving the Functionality of Personal Weather Stations Through Data Analytics

Kade Mahoney, Hailey DeNys, Evelyn Taylor
Dr. Berezovski, Prof. St John, David St. John, Tony McGee

Abstract
WeatherFlow, a personal meteorological station company, collaborated with an undergraduate team at Embry-Riddle Aeronautical University to create a new way of visualizing real-time meteorological data. Students used the meteorological data to create a real-time display of the weather in relation to a principal station. Temperature and rain were tracked in a grid structure with ten-mile intervals from ten to fifty miles along the eight cardinal directions, North, Northwest, West, Southwest, South, South East, East, and North East. This visualization tool will give users a new understanding of their local conditions allowing them to better plan their daily activities.

Objective
Create an improved method for user visualization of weather from other in-network stations around them.

Method
Temperature and rain were tracked in a grid structure with ten-mile intervals from ten to fifty miles along the eight cardinal directions, North, Northwest, West, Southwest, South, South East, East, and North East. The percent difference of a given weather attribute is plotted in a color according to Figure 3 in its appropriate grid space.

Results
By using the station marked in red in Figure 4, a plot of the relative temperature and rainfall can be seen in Figures 5 and 6 respectively. This process can easily be extended to any of the other weather attributes the WeatherFlow stations provide but for simplicity it was initially limited to temperature and rainfall as consumers find those attributes the most informative. In the live application these plots update with new information every minute to keep users up to date with the most recent weather patterns.

Figure 1: WeatherFlow’s Air Station. This station is capable of collecting the local pressure, temperature, relative humidity, lightning strike counts, and lightning strike distance.

Figure 2: WeatherFlow’s Sky Station. This station is capable of collecting the local illuminance, UV index, solar radiation, rainfall per minute, wind speed, and wind direction.

Figure 3: The color representation of a sector’s station’s percent difference in regards to the principal station.

Figure 4: A map of the principal and surrounding stations used in creating Figures 5 and 6. The principal is marked in red.

Figure 5: A map of the relative temperature in regards to the principal station. The color key is shown in Figure 3.

Figure 6: A map of the relative rainfall in regards to the principal station. The sectors that are absent in Figure 6 yet present in Figure 5 are sectors where there is a Sky unit but not an Air unit. The color key is shown in Figure 3.