



Undergraduate Research Conference at Missouri S&T

Apr 28th, 2021 - 10:45 AM

Small-Scale Wind Power Prediction

Nathan Skelton

Follow this and additional works at: <https://scholarsmine.mst.edu/ugrc>



Part of the [Computer Sciences Commons](#)

Skelton, Nathan, "Small-Scale Wind Power Prediction" (2021). *Undergraduate Research Conference at Missouri S&T*. 26.

<https://scholarsmine.mst.edu/ugrc/2021/full-schedule/26>

This Poster is brought to you for free and open access by Scholars' Mine. It has been accepted for inclusion in Undergraduate Research Conference at Missouri S&T by an authorized administrator of Scholars' Mine. This work is protected by U. S. Copyright Law. Unauthorized use including reproduction for redistribution requires the permission of the copyright holder. For more information, please contact scholarsmine@mst.edu.

Small-Scale Wind Turbine Prediction

Nathan Skelton and Dr. Sajal Das

Department of Computer Science



Introduction

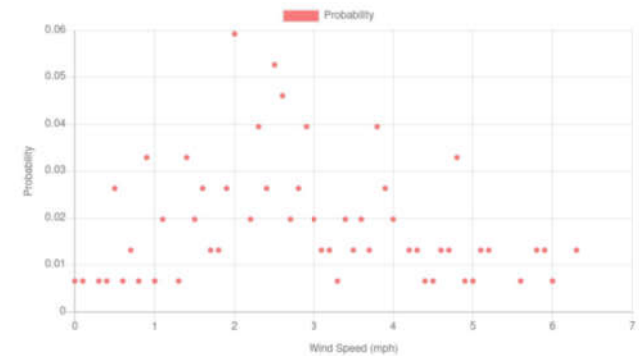
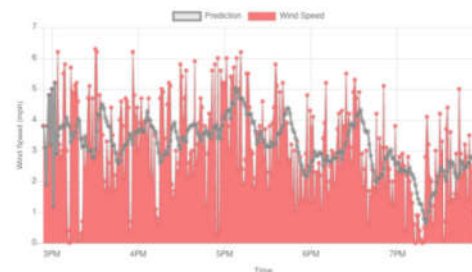
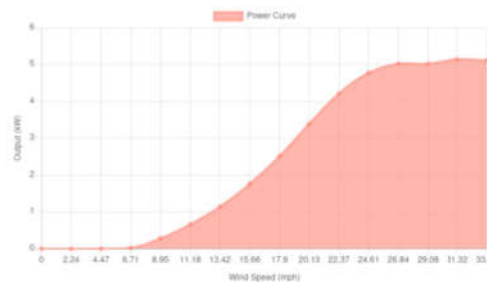
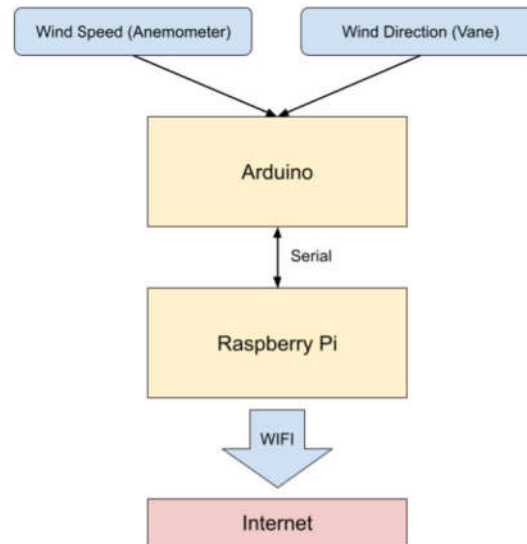
- Inconsistent generation from wind turbines has become the primary hindrance to widespread adoption.
- Small wind turbines are a power solution for remote installations or personal power needs.
- Accurate prediction for these generation sources, particularly in non-ideal environments, would expand the use of wind turbines.

Goals

- Develop the foundations for small-scale wind power prediction in non-ideal environments.
- Identify an algorithm for generation prediction on the hourly and next day basis.

Approach & System

- Installation site should have a local weather station for prediction, including an anemometer and wind vane.
- Sparkfun Weather Station Kit provides an anemometer and wind vane to an Arduino microcontroller.
- A RPi connects to the Arduino to store data to database and provide website platform for analysis.
- A wind turbine with a known power curve was selected to compare weather results against.



Proposed Prediction Algorithm

- Approaches indicated in research on the second and hourly timescale, using linear prediction and 10-minute averages, could be combined with proportional weighting to predict generation for second, minute, and hourly timescales.
- Weibull probability distributions on the per-day basis could be used for predicting generation on the daily timescale, potentially in conjunction with the algorithm for smaller timescales.

Conclusions

- Of the two sites that data was collected from, on the day data was collected, neither had sustained wind speeds to generate consistent theoretical power.
- Further experimentation should include a physical wind turbine to verify algorithms against.
- The study did not look into the creation of power curves, and this has a large impact on prediction.