Problem Statement

Due to constant wind direction and velocity change, the operation of the windmill generators is often sub optimal.

Such problems as the lack of precision, slow reaction time, inability to work in broad temperature ranges, influence of the environment, complexity of the moving parts and fragility take place in the existing patterns of anemometers.

Purpose

Develop a low cost, combined, reliable and accurate wind force and direction sensor, that has more advantages compared to existing ones.

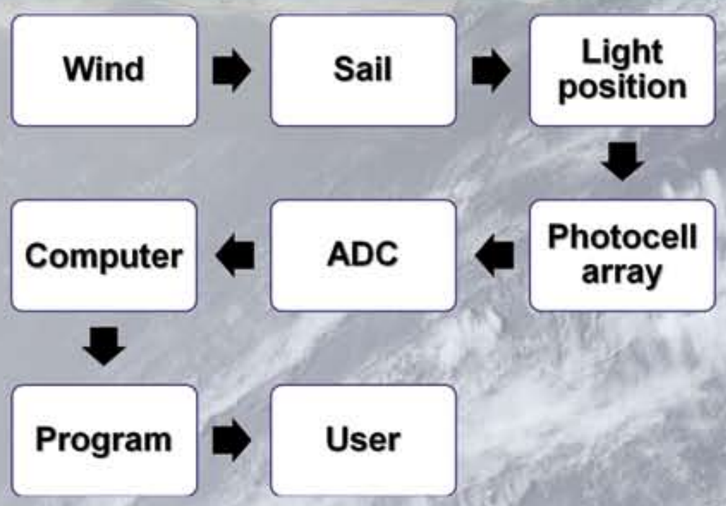
Hypothesis

Photocells can be used to measure wind velocity and direction. Precision and effectiveness can be provided by electronic data processing.

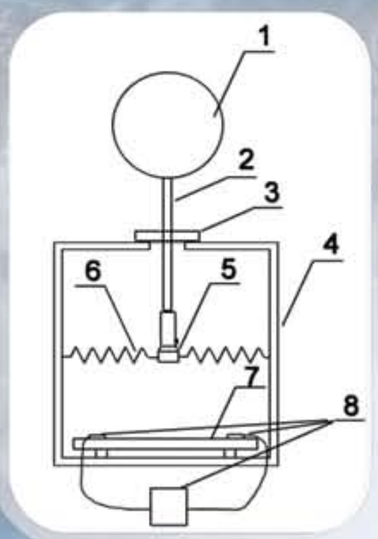
Research Procedure

- analyze the existing patterns of anemometers and find their disadvantages
- develop a new pattern that would have less disadvantages compared to the existing ones
- increase the efficiency and precision of the device
- build an experimental model
- check working capacity and efficiency experimentally
- find possible applications of the device

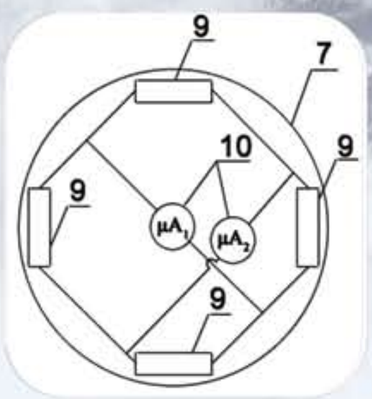
How it works



Structure



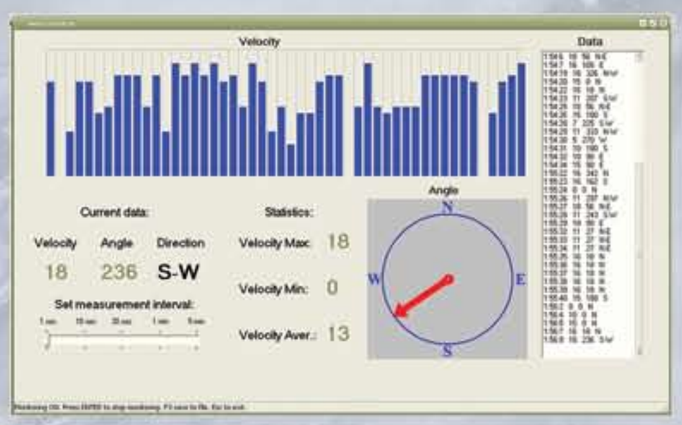
1. Sail
2. Spindle
3. Elastic Gasket ring
4. Shock-protected body
5. Directed light source
6. Springs
7. Recording unit support
8. Recording unit
9. Photocell array
10. Microammeters



Principle of operation

The working principle is based on the spring suspended light source and a photocell array below. Light source is connected with the aerodynamic sail via a spindle shaft assembly fixed to the sensor with a flexible elastic rubber gasket. Photocells detect the light position on the array from the source tilted by the wind and induce signal that is detected and digitized. Tilt angles are calibrated with known wind speeds and included in the software prior to operation.

Supporting Software



- Real-time measurements
- 2 modes of operation
- Check the flow info easily
- Calculate statistics
- Build the table
- Plot the graph
- Send the results to the Web
- Save the results

Application

- Wind-driven electric plants
- Weather stations
- Predicting natural disasters
- Cranes' security system
- Airports
- Safer navigation
- Narrow water-ways
- Anywhere, where it is necessary to measure velocity and direction of gas or liquid flow

Advantages

- 2-in-1: velocity + direction
- High precision and effectiveness
- Long lifetime
- Few moving parts
- No influence of external factors (temperature, air humidity and pressure, etc.)
- Low reaction to wind flaws
- Low price
- Small size & mass
- Damage protection
- Possible for any gas or liquid flow
- Plug & Play interface
- Easy-to-use program
- Ability to save and analyze the results
- USB output gives an opportunity to transfer results in different ways: