

Computer System for determining and Registration of Wind Direction

Ivan Valkov, Atanas Kostadinov, Alben Arnaudov, Ivanka Dekova, Todor Dimitrov,
Miroslav Pavlov

Abstract: *The paper considers a computer system for determining and registration of wind direction. The system enables possibilities for gathering and statistical processing of the received data. The purpose of the system is to estimate the possibility and expediency of building a wind turbine in a given place. There are a lot of scientific, technological and applied problems to be solved for further development of WEI, which are closely related to utilizing such systems.*

Key words: Computer System, Wind Turbine, Wind Direction Determining.

INTRODUCTION

The paper aims at demonstrating the capabilities of a computer system to define, register and save the incoming information about wind direction in a real time mode. On the basis of the received data the “rose” of the wind for a given place can be built.

Estimating the wind power potential for a place (or an area) is made as a result of systematic measurements and following a specific procedure [1].

Building the “rose” of the winds is one of the steps in the procedure, mentioned above.

It is known that work efficiency of a wind turbine of HAWT type (Horizontal Axis Wind Turbine) [1] depends on the constancy of wind direction at the point of locating the turbine [4]. The system is programme insured, which enables both statistical processing of the data, gathered for a predefined period of time, and their graphical representation.

COMPUTER SYSTEM FOR DETERMINING AND REGISTRATION OF WIND DIRECTION

The block-diagram of the realized computer system is shown in fig.1:

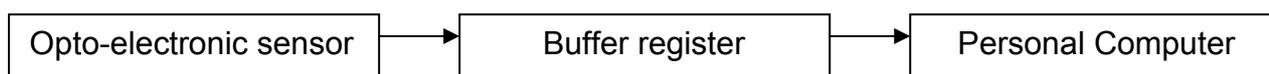


Fig.1 Block-diagram of the system

The opto-electronic sensor is a mechanical module, having an opto-electronic registration system, rigidly fixed to the body of the sensor. The module consists of a wind gauge, mounted on a vertical axis, which is rigidly connected with a disk, having a raster code formed on it in a proper way. The registration system contains opto-electronic pairs, fixed in a “П”-shaped carrier. An integral diagram 74LS75 is used as a buffer register.

The computer system operates in the following way:

When the wind gauge turns round, the raster disk starts rotating. As a result, a binary code is formed, which corresponds to a specific angle of rotation, read with respect to the North-South direction clockwise.

After passing through the buffer register, the received information is given to the parallel printer port (Centronics) of a PC.

The programme keeps track of the code, continuously coming into the sensor, registries and saves the time for which the wind direction has a definite orientation.

The information is recorded on a magnetic carrier and can be visually interpreted both in a table and as a graphic. The quantitative results from one of conducted laboratory experiments are shown in the table1, and, in accordance with them, the diagram, shown in fig.2, is drawn.

Table1
Experimental results

Direction	N	NE				E	SE				S	SW				W	NW			
Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
Degrees	0	22.5	45	67.5	90	12.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5				
Time	23	59	91	122	105	146	98	43	52	97	106	68	79	102	96	24				

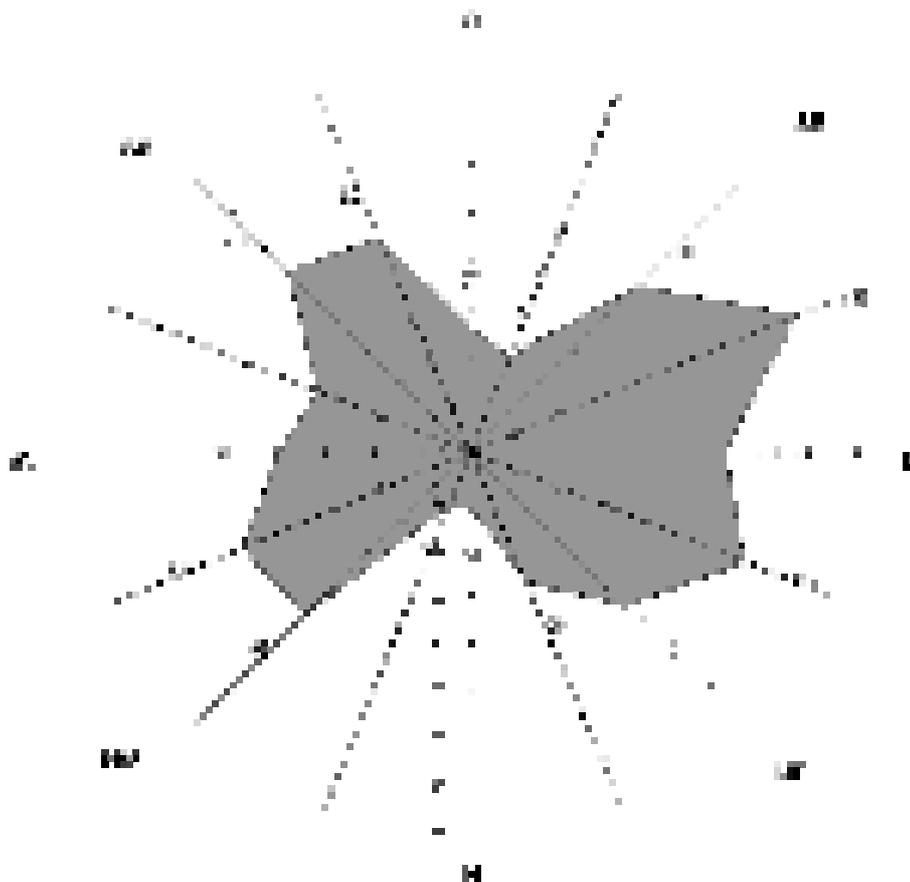


Fig.2 A “Rose” of the wind

CONCLUSIONS AND FUTURE WORK

A computer system for defining and registration of wind direction has been proposed. Experimental results have been obtained and represented as a diagram and in a table.

A system of the type, described above, would be useful not only in designing and realization of wind turbines installations, but also in the field of meteorology, agricultural aviation, lift-building, ecological control over manufacturing enterprises, urbanities, designing and building of air grids for energy transmitting [3].

Since the dependence of EC on the import of energy is nearly 50 % and the prognoses about this number incline to 70% [2], the significance of the Renewable Energy Sources(RES) is going to increase more and more.

On the other hand, this tendency is closely related to the problem of reducing the emissions of carbon dioxide. This is clearly expressed in the politics and strategy of the European countries, obeying Kyoto protocol for increasing the relative share of energy production from RES [1].

Specifically about Bulgaria, because of the non-steady prognoses about the fate of APS-Kozloduy and APS-Belene, in our opinion, the interest in exploitation of small power independent RES is expected to grow higher and higher, since the geographical conditions for realization of such installations are available [5].

Naturally, the problem for defining the horizontal component of wind velocity is inseparably related to the topic, developed in this report. However, the solution of this problem is going to be the subject of a further paper.

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ABOUT THE AUTHORS

PhD, assistant, physicist Ivan Valkov, Department of Computer Systems and technology, Technical College “John Atanassov”-Plovdiv, Phone: +359 32 608131

Assistant Atanas Kostadinov, Department of Computer Systems and technology, Technical College “John Atanassov”-Plovdiv, Phone: +359 32 608131

Assistant Alben Arnaudov, Department of Power Energy Technical College “John Atanassov”-Plovdiv, Phone: +359 32 608111

Assistant Ivanka Dekova, Department of Computer Systems and technology, Technical College “John Atanassov”-Plovdiv, Phone: +359 32 608131

Todor Dimitrov, Department of Electroenergetics, Technical College “John Atanassov”-Plovdiv, Phone: +359 32 608111

Miroslav Pavlov, Department of Computer Systems and technology, Technical College “John Atanassov”-Plovdiv, Phone: +359 32 608131