Project of monitoring the wind tunnel of the ETSEIAT's Aerospace Engineering laboratory (Software)

Techical requirements

Author
Oriol Villanueva Pujol

Director
David González Diez

Bachelor's Degree in Aerospace Technologies Engineering Thesis

Universitat Politècnica de Catalunya
Terrassa School of Industrial and Aeronautical Engineering

June 2015

Contents

1 Technical requirements

The ETSEIAT's wind tunnel monitoring project is the result of a Software and a Hardware project and has followed some technical orientations.

1.1 Project localization

The monitoring of the wind tunnel will be in ETSEIAT University, Colom street 11, 08222 Terrassa. In the aerospace engineering laboratory (TR6, 002).

1.2 Scope

In this project there will be developed the following aspects:

- Familiarize with ETSEIAT's aerospace engineering laboratory's wind tunnel and its actual working method.
- Create a connection interface between Arduino board and any computer for data sending and acquisition.
- Control of the Altivar 31 variable speed drive.
- Check and list the available hardware and develop the neccesary one.
- Produce or purchase the base support for all the circuits (for example a PCB)
- Integrate the NTC temperature sensor and the pressure sensors to the general system to modify air velocity from acquired data.
- Properly program the Arduino microcontroller board.
- Automatically measure and process all data from testing.
- Calibrate the sensors

1.3 Basic Requirements

There exist some basic requirements for the project:

Allow students and laboratory technicians to pre-program wind tunnel tests with different velocity ranges.
The total budget of the system must be affordable for ETSEIAT, which is a public university.
As much as it is possible the already existing hardware in aerospace engineering laboratory has to be used.

All results from sample's testing must be trustworthy and accurate.

The system must be robust and shouldn't induce any error during experimental tests.

The Arduino Board and its additional hardware must be a suitable substitute for the actual potentiometer, allowing total control in an easier and more defined way.

The specifically designed Hardware must be placed in a board (trying to use the smallest wiring amount as possible) that as much as is possible it shall be produced at the University.

1.4 Regulations

There is not an specific normative for this project, since the purpose and development required are only designed for the specific tunnel of ETSEIAT, and are not thought to be reproduced in other areas nor places, because the requirements of each wind tunnel can strongly differ. Moreover this laboratory isn't a certificatory one, and it doesn't need to be strict with the current normative as long as security is guaranteed.