Contribution ID: **41** Type: **Poster**

PIConNET Based Distributed System Dedicated to Magnetic Test of the CMS Muon Barrel Alignment

For the precise measurement of the positions of the barrel muon chambers in the CMS detector, a Position Monitoring System (PMS) has been developed at our institutes. The magnetic field, which has to be tolerated by the system, is 2 Tesla. The aim of this paper is to present and discuss the logical organisation, applied tools and methods of a subsystem of the PMS, which is dedicated to the forthcoming magnetic test.

Summary

Performance of the CMS detector of the Large Hadron Collider (LHC) is affected by the position and orientation of the individual detectors. Therefore, the CMS detector has an alignment system that consists of several subsystems. One of them is the barrel and end-cap internal alignment, which measures the positions of the muon detectors with respect to the linking points. This system will consist of LED light-sources with related electronics, video cameras equipped with video-sensors, temperature and tilt meters and a local network of 36 pcs PC-104 based computer for data acquisition and system control.

The optical, opto-electronic components and the computers have to work in a 2 Tesla strong magnetic environment. The possible damages induced by the strong magnetic field can alter electrical and optical characteristics of the components and thus the accuracy of the whole alignment system. In late 2004 the CMS Collaboration decided to put up a special experiment for the CMS Muon System with the Alignment components mounted, in order to enable the characterisation of the whole system under real conditions. For the experiment only the most crucial parts of the detector system (Sector 10/11 from each Wheel) will be installed, equipped and tested.

As it was reported in our earlier papers a computer network - based on dedicated so called mini-Crates - will be used for controlling of the opto-electronic components of the Alignment System. The delayed delivery of the mini-Crates prevents them to be used in the scheduled magnetic run. Their functionality can be replaced by the PIConNET micro-controller board, which is a versatile board equipped with an Ethernet communication interface.

For communication media we have chosen twisted pair Ethernet and for communication protocol we use a User Datagram Protocol (UDP) based proprietary protocol. The advantages of Ethernet and UDP/IP technologies are clear: they are mature and well tested, many applications are available for development and debugging, they are scalable and cost efficient.

The dynamic discovery of components (clients, masters and servers) is a key function of the design. For this purpose we designed and implemented a custom protocol, which is similar to the Dynamic Host Configuration Protocol (DHCP).

Our contribution will show the design of the dedicated PIConNET based distributed system for magnetic test of the CMS Muon Barrel Alignment. The investigation is focused on the components that are very sensitive for the magnetic field and on those methods that preferably have to be applied in case of trouble.

Author: Dr BENCZE, György L. (Institute of Particle and Nuclear Physics, Budapest, Hungary H-1525)

Co-authors: Dr NOVÁK, Dezső I. (Institute of Nuclear Research (ATOMKI), Debrecen, PO BOX 51. Hungary H-4001); Dr SZÉKELY, Géza (Institute of Nuclear Research (ATOMKI), Debrecen, PO BOX 51. Hungary H-4001); Dr

MOLNÁR, József (Institute of Nuclear Research (ATOMKI), Debrecen, PO BOX 51. Hungary H-4001); Dr SZILLÁSI, Zoltán (Institute of Experimental Physics, Debrecen University, Debrecen, Hungary H-4001); Mr SZABÓ, Zsolt (Institute of Experimental Physics, Debrecen University, Debrecen, Hungary H-4001)

Presenter: Dr SZÉKELY, Géza (Institute of Nuclear Research (ATOMKI), Debrecen, PO BOX 51. Hungary H-4001)