Executive Summary

DELPHI (Detector for Lepton, Photon and Hadron Identification) is one of the four experiments which are currently being constructed for the new LEP accelerator at CERN (European laboratory for high-energy physics). The (Norwegian) groups from the Universities of Bergen and Oslo are responsible for the sub-detector of DELPHI which is called the Small Angle Tagger (SAT). In total, DELPHI comprises 14 sub-detectors.

The data acquisition system for DELPHI can logically be split into two parts: the data collecting part and the control part. The data collection comprises the registration and digitisation of data from the nuclear reactions and transfer of this data through appropriate instrumentation to the data storage computer. The control part is responsible for setting and monitoring of parameters for the detector system, for instance, high voltage, gas flow, status of the instrumentation system, etc.

Furthermore, the DELPHI data acquisition system is distributed. Each sub-detector group is responsible for developing the hardware and software which is dedicated to their sub-detector, for instance, the SAT. The communication between the subsystems is by means of fast data links and common access to the readout instrumentation.

This thesis describes the development of the control system for the SAT detector. This consists of the identification of control and monitoring tasks, the implementation of the hardware system, and the design and implementation of the necessary software. This thesis is structured as follows:

- the environment in which the system is to function (chapt. 2)
- the requirements (what the system should do) defined by the environment and stipulated for the project, and design and implementation overview (how to do it), all under the heading of the scope and goals of the project (chapt. 3)
- the working tools: the microprocessor bus in which the system provided is based, the system itself, and the communication software facility across a network (RPC) for building a distributed application system (chaps. 4, 5, and 6 respectively)
- The work which is done and its conclusion (the remaining chapters).