ALICE plans major detector upgrades in LHC Run 3 from 2021. The forward muon arm will be newly equipped with a precise silicon pixel detector in front of the hadron absorber, along with a much enhanced data rate capability, to enable separation of prompt and non-prompt components of single- and di-muons and an improvement of di-muon invariance mass resolution, as well as minimum-bias readout of Pb-Pb collisions at up to 50 kHz. New and high precision measurements will be enabled for open charm and beauty hadrons, J/ψ, Λ(2S), and Y’s, and low-mass di-muons, opening unique physics programs at LHC.

ALICE Forward Upgrade in LHC Run 3

ALICE updates many of the architectures for its DCS (detector control system) in Run 3. It is a multi-layered system with the core of SCADA (supervisory control and data acquisition) based on Siemens WinCC-OA, topped with CERN JCOP (joint controls project) framework. On the lowest field layer, GBT-SCA (giga bit transfer slow control adapter) will replace ELMB (embedded local monitor board) being used for the existing detector subsystems. An additional data path exists, e.g. for status of pixel sensor chips, to be read out in the event data stream and stripped for the DCS at CRU (common readout unit).

Finite State Machines

ALICE DCS is based on FSM (finite state machine) in JCOP framework. The tree structure has been identified for entire MFT, along with the state diagram of each node and their dependency.

Implementation of Control Logics

Implementation of FSM into JCOP framework is in progress, based on the MFT logic design. Communication between nodes has been established. FSM will also be implemented onto the DCS test system.

Summary and Prospects

ALICE Muon Forward Tracker (MFT) is a new silicon pixel detector and a part of the upgrades toward LHC Run 3 starting in 2021. Its DCS is under design and implementation based on the new architecture choices at ALICE. A test system has been established at Hiroshima University, meant to become a small scale but representative prototype, with multi nodes on WinCC-OA distributed project. The worker node communicates with devices via OPC (OLE for process control) and DIM (distributed information management system). An example below shows how temperature sensors on the final prototype of the pixel sensor (pALPIDEv3) are read out and monitored, mimicking the data stripping at CRU for DCS. The logical tree structure of MFT is illustrated, where the FSM nodes are categorized into control units (green boxes), operations layer with FSM on JCOP, and finally the user interface layer.