In the present day to day life, Internet of things is everything, i.e., we need internet and telecommunication for almost every task of our life, and these require data centers. These data centers provide various facilities like data processing, storage, and transmission, and maintenance, operations etc., for performing these tasks, a huge amount of power is consumed, which in turn generates large amount of heat. As these data centers are to be made operational throughout the year, cooling of data centers is of utmost importance. The continued increase in heat flux at the chip level due to new and robust technology nodes following Moore’s law is starting to push the boundaries of existing cooling technologies especially for high end servers. Electronics cooling research is facing the challenges of high heat flux removal and increased pumping power. Not much attention has been focused on server and module level cooling. Present study focuses on two innovative methods in cooling:

- Dynamic cold plates at the server level
- Air flow path optimization at data center level

Dynamic cold plates can be very efficient means of heat reduction and uniform distribution for high power electronics like servers. When high-power electronics with non-uniform temperature distribution are cooled using tradition cooling methods, they give rise to localized regions of high temperature known as 'hot spots', the main failure regions of the devices. Novel techniques which bring uniform cooling are to be employed. One such solution known as dynamic cooling. It employs a self-regulated flow control device to regular the flow of the liquid coolant towards
different sections of the electronic device according to cooling requirements. This approach eliminates actuators, sensors, transducer and control module which make the system complex and reduced its reliability. The proposed Flow Control Device (FCD) uses a one-way nitinol spring coupled with stainless-steel spring that can sense the heat load and change the flow rate of coolant to each section of the electronic device.

One of the major issues of data centers is non uniform cooling of its server racks owing many reasons like the position of cooling air guiding shafts and their angles, fan power and pressure drop across the air flow path. Optimization of air flow path results in uniform cooling of server racks as well as significantly low power consumption of the cooling system. The present study focuses on a data center model, identifying the changes in flow of air from 6SigmaRoom simulation of it. Different design changes to bring uniformity in air flow across the racks have been proposed. Modifying and introducing different flow guiding features into the design such as the angle of the cooling air guide shaft and employing a porous plate have proven to bring uniformity in air flow.