Additive Manufacturing(AM) in 3D printing technology is gaining importance due to its advantages, such as layer-by-layer stacking, less material wastage, lower lead time, and compatibility with the production of complex parts. AM finds applications in aerospace, oil & gas, marine, biomedical and automobile industries.

The workflow in AM thus requires specialized controllers capable of converting the user input file to a set of instructions that can be understood by the printer. Several such controllers are available in the literature and as products in the market. Most of the controllers in the market are proprietary and are dedicated to the operation of only one process technology. The cost of the controllers is also on the higher side, and the companies tend to sell the product as a whole package- controller and printer system, which can prove to be highly costly. Also, the research and developments in the controller are not open-sourced, and there is little to no knowledge databases about it.

This thesis and product development aims at creating a real-time controller for AM. This product is designed to tackle the drawbacks of conventional products available in the literature and the market. The product will enable the control of various subsystems and workflow in 3D printing with the help of off-the-shelf microcontrollers. The product is intended to be low-cost, indigenous, simple hardware structure, and open-source. The working of a real-time controller is validated by controlling a test bench that emulates the 3D printing process. A 3D model of the product enclosure is also done with the help of Computer-Aided Design (CAD).