Team Member	Ankush Kumar Mishra
Project Type	Solid Modelling/Academia
Goal	• Real time framework to capture a 3D printing process using point cloud and filter out the surrounding noise by using depth mask or RGB mask • Cloud to cloud comparison by sampling the voxel model to generate its point cloud and comparing with the captured point cloud
Vision	• The framework will be able to capture the differences between the actual 3D printing and the simulated 3D printing. The simulated print will essentially act as a Digital twin of the object being printed.

Progress made till date – At present we are using an Intel Realsense D435 camera. The camera captures the depth information to give us a point cloud information of the object being printed. We are also capturing the point cloud once the print has been completed. Then we are using CloudCompare Software to segment out the target object from our point cloud. Simultaneously, we are generating a theoretical point cloud from the voxelized model of the target object. This will then be used for comparison between the two point clouds.

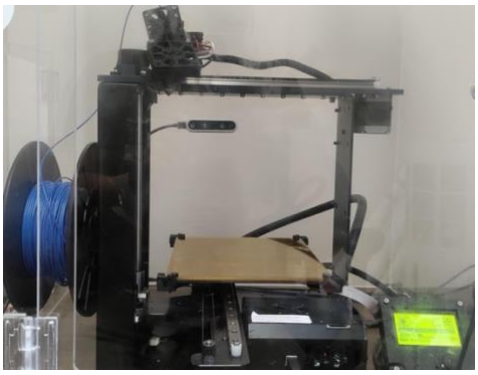

Fig 1: 3D printer setup with Intel Realsense D435 Camera

Issues/Concerns: - At present we are using a single camera. We have tried to capture the point cloud from multiple angles and register it to get the complete picture of the target object being printed. However, the registration is not so great as we need to manually pick points common between the two point clouds for registration.

Fig 2: Filtered Point Cloud of the target object captured from Intel Real Sense D435 Camera

Future Plans: - At present we are using Intel Realsense D435 camera for capturing the printing process. We will also incorporate FARO focus laser scanners to capture the target object and compare it with the theoretical point cloud. Also, we are working on a filtering mechanism for Intel Realsense point clouds. The framework could use distance mask or RGB mask to filter out the noise from the point cloud captured.

Project Plan: -

Nov 10: - Setup of point cloud depth camera for 3D Printer, Generation of G-Code from a voxelized model, generation of multiple point cloud data from Actual Printing

Nov 25: - Generation of point cloud for voxel model for different layers of printing, comparison of models for full model vs the case when only few layers are printed.

Dec 10: Point Cloud Comparison of every layer of printing for a voxel model and actual 3D printed model.

Extra Goal: - The aim will be to automize collection of point cloud data for every layer of printing being done, then automatically compare it with point cloud of voxel model and return the absolute distances between the models.