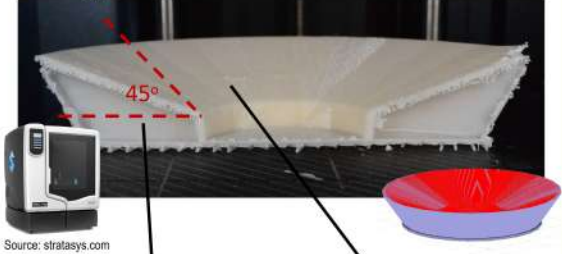


Support Structure in Conventional AM

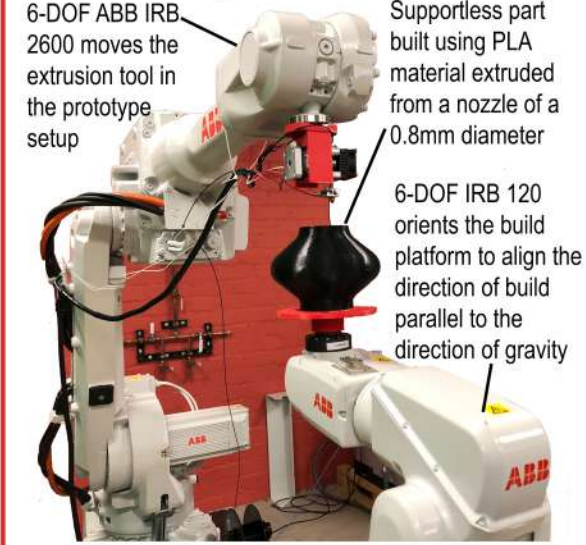


Support structure generated in a conventional Stratasys Uprint SE Plus 3D printer

Cross-Section of a built part at a steep angle of 20 degrees w.r.t. to the horizontal plane

- Disadvantages of support structures:
- 1) Increases the overall build time of the part
 - 2) Causes material wastage
 - 3) Requires post-processing
 - 4) Degrades the surface finish of the part

Multi-Robot Setup to Perform Supportless AM



6-DOF ABB IRB 2600 moves the extrusion tool in the prototype setup

Supportless part built using PLA material extruded from a nozzle of a 0.8mm diameter

6-DOF IRB 120 orients the build platform to align the direction of build parallel to the direction of gravity

Characterization of the Built Parts without Support Structure



● Supportless AM
● Conventional AM

build time (hh:mm)

- Part 1: 00:25 vs 02:49
- Part 2: 01:13 vs 11:42
- Part 3: 00:41 vs 02:53

Average Ra surface roughness of the built parts: 24.333 μ m measured using Mitutoyo Surftest SJ-410 surface profilometer

Average part accuracy: 0.193 mm measured using Hexagon Absolute Romer AM

Source: mitutoyo.com

Source: hexagon.com

Flow of Algorithm

