

# Developing Software for Variable Adaptive Infills for 3D Printing Applications

## PROJECT DESCRIPTION

"The additive design and manufacturing lab (ADaM Lab) is mainly concerned with the additive manufacturing processes from different aspects such as innovative 3D printer design, new functional materials development, 3D printing process optimization, Material Modeling, and topology optimization.

In order to optimize the 3D printed parts' internal infill structure to provide a lightweight and high strength properties, software should be developed to provide the ability to customize the shape of the infill structure and to adopt variable filling technique. Most of the available software provide fixed shape fixed filling percentage through the printed parts. Therefore, this project is currently being undertaken to develop an open source platform for design, slicing and incorporation of different infills for a given input geometry in form of an STL that can be used and optimized in various 3D printing applications

Required Skills/Background:

- Must be a third or fourth year student.
- Must be enrolled in a computer science or Computer engineering program.
- Must have a GPA of 3.3 or higher in last year.
- Programming languages C++, Python, Java, Visual Basic (API), and Matlab.
- Able to work with STL, IGES, binary, etc.
- Able to work with PNG images.
- Be passionate about 3D printing
- Should be a self starter as evidenced by earlier academic/co-curricular achievements

Expected Role:

Working closely with the supervisor, the student will:

- Develop software that is able to generate and manipulate 3D graphics.
- Import 3D graphical features from different 3D meshes files (Example \*.STL)
- Create cavities with in 3D graphics and fill it with variable scale imported or created objects.
- Ability to measure dimensions, areas, and volumes of 3D objects.
- Ability to slice 3D parts based on constant or variable slice thickness.

Contact: Brendan Cavanagh, Internship Coordinator (Inbound)  
University of Alberta International  
intern@ualberta.ca

- Export the modified geometries in form of sliced images in multicolor system and in different image resolution.
- Export this modified geometries in form of machine codes (G-code) and other formats.
- Integrate and modify an already developed reverse G-code in to graphics algorithm with the main software.

#### FACULTY-DEPARTMENT

Engineering - Mechanical

#### DESIRED FIELD OF (STUDENT) STUDY

Software Engineering, Computer Science, Electronics Engineering,

#### INTERNSHIP LOCATION

University of Alberta Main Campus - Edmonton

#### NUMBER OF INTERNSHIP POSITIONS

2

#### INTERNSHIP START DATE

July 4

#### INTERNSHIP END DATE

3 months after start date

#### ARE THE DATES FLEXIBLE?

Yes, I am flexible regarding the internship dates. Selected students can contact me to request a date change.