# Extruder

**Feature Name:** Extruder
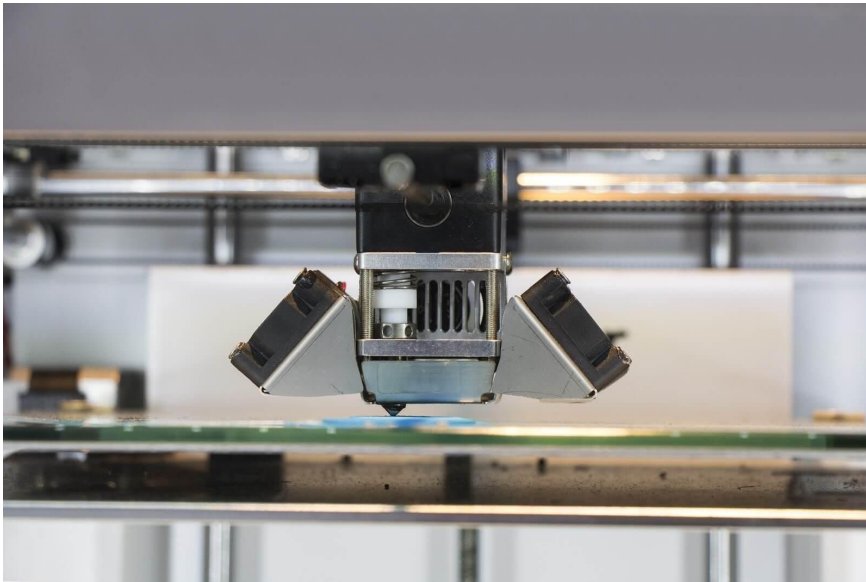
**Feature Name in Annotation:** Extruder

**Source of Information**
Domain knowledge, Code comment, Source Code

**Strategy Used:**
Through 3D printer construction, we learned that there are extruders that are controlled by motors to either push forward or retract the filaments. This was drawn on our first version of feature model. Then we started from the largest and most central logic file MarlinMain.cpp to check whether the comments, variables and method names contain keywords such as "extruder". However this keyword is far not enough for finding the entire feature since there are methods and variables that are named with keywords such as "volume" and "feedrate". This requires domain knowledge to know that these two words are also directly related to extruder mechanisms.

**Feature Description**: This feature is mandatory for Marlin. The 3D extruder is the part of the 3D printer that ejects material in liquid or semi-liquid form in order to deposit it in successive layers within the 3D printing volume.



3D extruder depositing plastic filament on a 3D printing platform

Source: https://www.sculpteo.com/en/glossary/extruder-definition/

There are three types of extruder can be used in marlin: Single Extruder, Mixing Extruder and Switching Extruder. Single extruder is a basic type of extruder which has a single nozzle, a Hotend (see the picture above). Mixing Extruder is a variant type of extruder which has one nozzle for all colors. Switching Extruder is also a variant type of extruder which can switch between different nozzles for different colors.

Feature model: Marlin -> Board -> Motor -> Extruder

➔ Extruder_Mixing
➔ Exreuder_Single
➔ Extruder_Switching

**Time spent:** This feature is one of 18 features that were located by manually going through all code files of Marlin using our source code method. It took one person 25 hours to identify all 18 features.

**Feature Characteristics:**

| Feature Name | LoFC | SD | TD | Completely Wrapped by ifdef |
|---|---|---|---|---|
| Extruder | 149 | 15 | 1 | No |

**Ratios of sources (%)**

| RL | PR | CM | Ifdef | DK | CC | SC | GD |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 40 | 10 | 50 | 0 |

**RL**: Release Log; **PR:** Pull Request; **CM**: Commit, **Ifdef**: Ifdef Expression; **DK**: Domain Knowledge; **CC**: Code Comment; **SC**: Source Code; **GD**: G-Code Documentation.