This thesis explores the feasibility of fabricating compliant mechanisms that flex vertically with multi-material fused deposition modeling (FDM) on consumer-grade 3D printers. Compliant mechanisms achieve motion through elastic deformation, avoiding traditional joints. By combining soft TPU (thermoplastic polyurethane) with rigid plastics such as PLA (Polylactic Acid) or PETG (Polyethylene Terephthalate Glycol), it is possible to address FDM's anisotropy, which makes vertically oriented flexures especially prone to interlayer failure. The work focused on designing and prototyping a vertical flexure hinge using a Prusa XL multi-material printer. Simple hinge models were developed in CAD, printed upright, and tested through iterative manual bending until failure or stable repeatable motion. The results showed that successful hinges can be realized when flexible TPU is bonded to rigid PLA or PETG, with interlocking geometry (IG) further improving interface strength. Although no formal fatigue testing was performed, the hinges endured repeated deflections by hand, suggesting limited cyclic usability. The main contributions are: (1) demonstrating that vertical flexures can be produced with consumer printers, (2) identifying material combinations and design features that improve bonding and performance, and (3) documenting failure modes and limitations. While durability under repeated cycling remains unresolved, this work shows that out-of-plane compliant mechanisms are achievable with current multi-material FDM, and it highlights directions for future research in material selection, interface design, and slicer improvements.