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From 3D Printing to 3D Sensing EMMANUEL RIVAS, GALEN HELMS, BORIS KIEFER, New Mexico State University — Advanced/additive manufacturing is predicted to be one of the fastest growing technological sectors for the foreseeable future. This technology allows for rapid prototyping of custom shapes, and the identification/elimination of potential manufacturing flaws early during the design stages. From a systems perspective, a 3D printer consists of an extruder and a motion system for positioning in 3D space. In the presentation we will describe how we retrofitted a fused deposition modeling (FDM) 3D printer to function as a sensor. In order to achieve this goal, we modified the firmware to combine sensor position and the corresponding sensor reading for post-processing, and changed the gearing of the stepper motors. Our reliability tests show that the positioning accuracy with these modifications is ˜10 micron. Here we discuss the results of two ongoing projects, using a Hall probe to measure the three components of the magnetic field of a disc magnet. The second application is a first step to establish if the reflectivity of the 3D printed filament is sufficiently high that the control of the volumetric flow rate can be used for in-situ print optimization and verification, which is one of the largest current challenges in additive manufacturing.

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