An Adaptable, Cost-Effective, Compact Approach to 3D Printer Self-Repair

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3D printing is a groundbreaking technology that has enabled innovation in various aspects of our modern world, but one key issue that continues to limit its use is that of maintenance. In this project, a solution to this issue is worked towards by focusing on a part prone to wear and tear: the cog within the timing pulley mechanism. This is achieved by first analysing the effect a deformed cog has on the relationship between the rotation of a cog and subsequent movement of the belt and then nullifying it through the application of a counteractive effect. In trying to minimise complexity and cost whilst maximising adaptability to different models of 3D printers, the counteractive effect is applied to the object file itself in the form of its Geometric Code rather than tampering with the printing mechanism. This allows the continuation of near-ideal printing, with the primary degree of remaining error stemming from the printer's own precision and the error from the devices measuring the cog-belt relation, and facilitates the printing of a new cog to replace the deformed one, achieving a degree of self-repair. This project can act as a blueprint for self-repair within different parts of the printing mechanism and for the broader field of robotic self-repair.

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