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Electro-magnetically actuated targeted drug delivery approach using Imaging technology, PID feedback control and MATLAB

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Conventional doses such as capsules which are used traditionally have severe side effects including raising of blood sugar level by dissolution of drug in blood, can be overcomed by replacing traditional drug delivery with specifically targeted drug delivery system. The main concept of using magnetic levitation for drug delivery is to deliver the drug to a specific point via. magnetic actuation and imaging technique, magnetic material encoated by drug can rupture the artery by getting strongly attracted towards externally applied magnetic field. By taking magnetically levitated drug to the targeted area, it will minimize the risk of rupturing of the artery. Dispersion of drug will be minimized as drug-coated core will be under influence of applied electromagnetic field, drug can be released by altering electromagnetic fields. In this study, one-dimensional (1D) force system is used. Two forces counter each other i.e. electromagnetic force and gravitational force. Addition of Ki to Kp and Kd speeds up the motion when reaching to the targeted set point, blob stays in levitated condition around the set point thus stability is increased by the addition of Ki but oscillations are still present that hinders the stability of the system. Exponential function is introduced to decrease the power of Kp, in result, it supplies the power when the error is large, power gets zero when error is reduced to zero. In this stable system, Kp and Kd gain are applied to minimize the oscillations and keep the blob levitated at targeted set point.

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