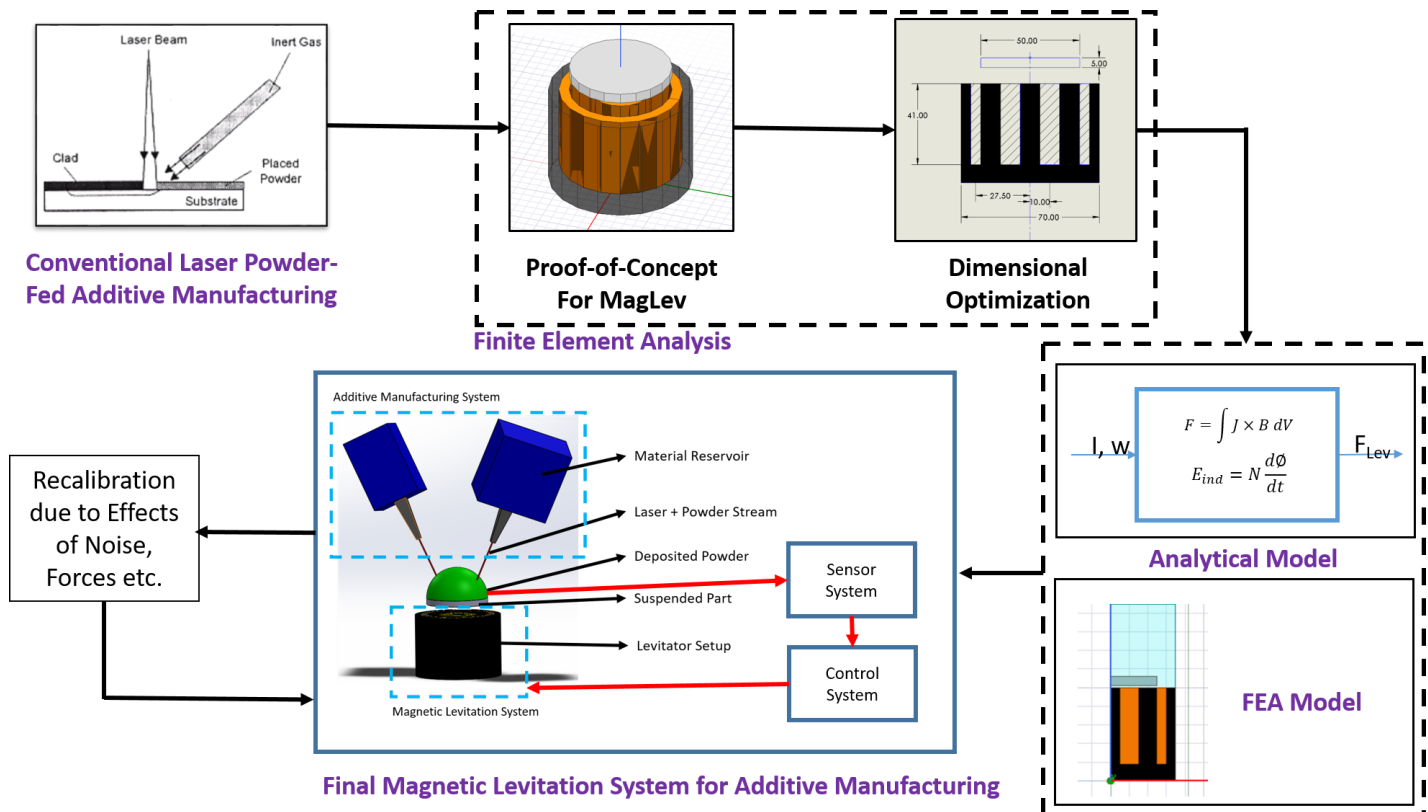


# Magnetic Levitation for Additive Manufacturing

Magnetic Levitation has found applications in a wide variety of fields. However, its application within the Additive Manufacturing (AM) environments is very limited.

The research presented here aims to bypass the need for a substrate, which is used in conventional AM operations and can be quite restrictive. By bypassing the need for this substrate, the system can have the ability to employ multiple material nozzles, thereby reducing fabrication times. Use of Magnetic Levitation technology can facilitate overcoming the need for this substrate and subsequently improve the functionality and versatility of the AM equipment. Two students, Parichit Kumar (PhD) and Saksham Malik(MASc), are currently working on this project in collaboration with the Multi-Scale Additive Manufacturing (MSAM) Lab <<https://msam.uwaterloo.ca/>> at the University of Waterloo.



## List of Publications

1. P. Kumar, M. B. Khamesee, "Development and analysis of a novel magnetic levitation system with a feedback controller for additive manufacturing applications," in Actuators, vol. 11, no. 12, Dec. 2022.
2. P. Kumar, S. Malik, E. Toyserkani and M. B. Khamesee, "Development of an electromagnetic micromanipulator levitation system for metal additive manufacturing applications," in Micromachines, vol. 13, no. 4, Apr. 2022.
3. P. Kumar, Y. Huang, E. Toyserkani and M. B. Khamesee, "Development of a magnetic levitation system for additive manufacturing: Simulation analyses," in IEEE Transactions on Magnetics, vol. 56, no. 8, pp. 1-7, Aug. 2020.

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The University of Waterloo acknowledges that much of our work takes place on the traditional territory of the Neutral, Anishinaabeg and Haudenosaunee peoples. Our main campus is situated on the Haldimand Tract, the land granted to the Six Nations that includes six miles on each side of the Grand River. Our active work toward reconciliation takes place across our campuses through research, learning, teaching, and community building, and is coordinated within our Office of Indigenous Relations <<https://uwaterloo.ca/indigenous>>.