# Abstract

The design of small-scale robots is a precise and complex process that requires optimizing a range of parameters. In recent years, AI, especially genetic algorithms, has been used as a promising tool in this field. We first explored optimizing tetherless mobile micro-surgical scissors by using a genetic algorithm to find the optimum placement and alignment of its driving magnets to produce the maximum force by using a physical equation as part of the evaluation function. While this approach was successful, the effectiveness of the genetic algorithms is often limited by the complexity of the evaluation function and modeling of the robot. To address this issue, we introduced a genetic algorithm that uses an MPM-based simulation as part of its evaluation function, eliminating the need for physical modeling of the robots and making it a suitable approach for evolving more sophisticated robots based on their complex behaviors that are hard to model. The robots are optimized to have a higher vertical speed as they are placed in a specific rotating magnetic field and observing their behavior. A diverse range of robots can be generated based on the external magnetic field that is applied to the robot during this process.