Electromagnetic Wall Climber

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The purpose of this research was to invent a working electromagnetic wall climber for the inspection of metallic structures and tanks that are too dangerous for humans or cost prohibitive. In some cases drones are used for inspections but can be limited spatially. Research only found one vehicle type electromagnetic device. Electromagnetic climbing devices used for inspections have not been reported. The climber design consists of 4 electromagnets for attaching to metallic structures and 16 servos acting as joints to create movements. The climber was remotely controlled using a programmable interface. The climber was designed, built, tested, and then each component redesigned as needed as part of the engineering process. The overall climber was designed from individually sourced components. The design included structural components, circuit boards, wiring layout, programming, test board, and 3D printed plastic components. The climber was tested physically and compared to theoretical analysis. Testing included electromagnetic heating, electromagnetic horizontal to vertical axis strength, and servo current draw. The climber was just shy of success as it attached and moved along the metallic test surface when at a lower angle but struggled to move up any large incline. Further improvements are planned so that the climber can climb vertically. Also planned are the addition of a camera, temperature sensor, and sample collection arms to be used as inspection tools. This research demonstrated the climber is a viable option for industrial inspections involving metallic structures.

Awards Won:
International Council on Systems Engineering - INCOSE: Certificate of Honorable Mention