A Novel, Self-balanced Robot with Leading Technology in Crossing All Angles of Transmission Lines

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High voltage transmission lines are conventionally inspected and maintained by humans, drones, or helicopters; all of which are expensive, dangerous, and ineffective. Thus recently, robots for line inspection were invented and commercialized. However, the application of these robots has limitations, primarily in their exclusivity to straight lines and dependency on two lines. This restricts their widespread application in electrical grids that feature many turns at different angles. To overcome these limitations, I constructed a safe, cost-effective, and remotely controlled robot prototype that is able to maneuver on one line, over obstacles, and switch to another transmission line at a different angle. The prototype hangs from the line with two motorized wheels, each connected to a separate deck via an arm. The two decks are connected with a rotatable ball bearing, separating them into an upper and a lower deck. The ball bearing lets the decks turn 360° laterally. Attached to each deck is a continuous track, which moves weights up and down the deck laterally. By shifting the weights, the center of gravity also shifts, enabling the robot to raise and lower the motorized wheels on and off the line. Resultantly, the lightweight robot can rotate to the desired angle and place the wheels on any section of line. The robot's structure mainly consists of VEX, with a few 3D-printed components and machined parts. The robot's controller is Arduino, powered by lithium batteries. In the future, live-line inspection capabilities will be extended once equipped with cameras, and operations such as de-icing and obstacle removal can be achieved through attachments.

Awards Won:
Second Award of $1,500
Patent and Trademark Office Society: Second Award of $500
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