CATCH System: Prototype of an Autonomous Vehicle for the Collection of Table Tennis Balls

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The research project addresses the problem identified at the CIDAR Sports Academy (Yaracuy, Venezuela), where wheelchair table tennis athletes waste about 25% of their training time collecting balls manually. As an engineering solution, “CATCH System” is proposed, an autonomous system that integrates artificial intelligence, proximity sensors and an Arduino UNO board to detect and collect balls automatically. The methodology combined direct observation, interviews, survey application and prototype development. Preliminary results show that the system reduces the collection time by 53% (from 17 to 8 minutes per session), with a capacity of 20 balls/minute and an effectiveness of 85% in controlled conditions, significantly optimizing the time dedicated to training. Although some limitations were identified in the initial version of the prototype, the project shows that low-cost technological solutions can transform inclusive sports practices. “CATCH System” is not just a robot with sensors and artificial intelligence; it is a means for inclusion, where every ball it picks up will be a small triumph against the physical limitations of these athletes, demonstrating that when creativity, technology and empathy are combined, solutions that change lives can be created.

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