Automated Darts Robot

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This Research Assignment describes the results of a challenge whether the darts-shooter which I have designed can win a game of darts when competing against a human player. The aim is to create a fully automated system which does not require human input.

The idea of building a darts robot came back in September 2021. I was playing darts with my family. I was frustrated because I was losing all the time, so I decided to convert my frustration into creativity. That was the starting point of my research: Can I build a robot that can play darts better than me, and win from my relatives?

To my knowledge, a dart-shooting robot at the scale of mine has never been made. This means I first have to know which materials and throwing system I should use.

For the materials, I decided to use LEGO for 2 main reasons. The first reason is economically. LEGO is in this case free because I recycle all my old legos from when I was a kid. The second argument is that LEGO is more suited for the trial and error methodology than other materials like 3d-printing. This is due to the fact that lego can easily be adjusted.

To determine the throwing system, I first discussed systems like e.g. a pressure cannon and an electromagnetic launcher. These are all good except they are not suited for LEGO. Next I made several prototypes of catapults. I came to the conclusion that a slingshot was the best system for me.

Prototype after prototype, learning opportunity after learning opportunity, the robot was finally looking good. After having automated all the charging and operating parts of the robot using sensors, I finally had to find out how to make sure the robot can aim automatically. There I ran into problems which forces me to manually aim the robot. But in the future, automating this part is definitely possible.

To know if my robot was finally better than my family or not, I made a statistical analysis that proves that yes, my robot is better.

This does not mean my robot is done. Eventually there will always be something to improve. In this research assignment, many science fields are discussed from electronics, to computer science and physics. Therefore I think my project has great educational potential, certainly for kids because LEGO and Arduino are originally toys made for them. You can always find more information about my project using following *link* or QR-code: