Eric Visser

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Pembroke High School

**Autonomous Nerf Gun**

One of the characteristics that makes BotBall so unique is its focus on Autonomous robotics. While many competitions rely on teams controlling their robots manually, or some even using only half autonomous control, the fact that BotBall requires entirely autonomous control drastically changes how one should think about game strategy as a whole. Although one could also score some points purely running motor code, the only way to truly be competitive is to use sensors and clever programming. Things that on the surface sound simple such as driving in a straight line can become challenging tasks, requiring the use of these sensors in order to score the most optimal and efficient points.

While BotBall has been the main source of my knowledge in autonomous programming, the team also worked towards building an automated Nerf sentry gun after the New England BotBall tournament was over last year. Although this certainly isn't the most unique project to talk about as many have done so before online, I felt as though it was interesting enough to share.

Though it would sound fairly complex to program at first, the actual coding behind it was relatively simple for me as plenty of open source sentry gun software is readily available on the internet. I personally used the software found at http://projectsentrygun.rudolphlabs.com/, and after hooking up one of our old botball webcams we were able to get the blaster to detect targets accordingly. One of the cool things about using software like this is that you can actually use facial recognition to make the Sentry not target certain people that walk in front of it.

From a building perspective, the Sentry Gun was also not too difficult to create because the team opted to make less modifications to the gun itself as opposed to many videos found on the internet in which people actually replaced the springs and battery inside the blaster in order to create a more

powerful and longer ranged shot. Out team used an old Nerf Vulcan Blaster as our base, and after making more simple modifications to the gun as far as the battery goes, we hooked the wiring up to an Arduino we had lying around from an old project. We used some spray painted wood for the base, and attached two servos to the gun to allow for both horizontal and vertical movement. We also used an old CD we attached to a part of the gun to allow the gun to have less friction when spinning side to side.

While our Nerf Sentry Gun may not look quite as nice as some of the others you can find on the internet, it certainly was an interesting dive into just what can be done with autonomous robotics. While the team could just as easily control the Nerf Gun turret with a Playstation 4 Controller, there is something extremely satisfying about having the turret autonomously target people or objects.