The Implementation of a Distance Triangulation Measurement Device

Devin Moser

Jefferson Community College, Watertown, NY

In 2017, the Clayton Chamber of Commerce asked the SUNY Jefferson team competing in the Clayton Pumpkin Chunkin to design a more efficient and automated system for use measuring distance in future competitions. As a class project, my partner and I accepted this challenge. A system was designed using two Arduino boards, each with a 9 degree-of-freedom (DOF) sensor to measure angle to within thousandth of a degree. These microprocessors were then planned to be enclosed in a 3D printed case of ABS plastic, mounted to a tripod with a sight, and placed at both edges of the firing line. Calibration of the system would require an initial lock to the other unit and powering on of the system, thus establishing the zero-angle reference point for the sensor. Upon any trebuchet firing a projectile, users would aim at the impact point. Using a 2.4 GHz wireless transmitter fitted to each Arduino board, the angle would then be transmitted to the wireless receiver at the score station computer. The system makes use of a Raspberry Pi™ microprocessor to record both angles, calculate the straight-line distance of the projectile using triangulation, and display distance to the score keeper's laptop.

In 2018, my partner and I were finally able to use and test our device. When performing our final checks, we realized that the devices were no longer communicating in the manner which they were supposed to and were forced to measure distance for the competition using only one device. Since it was our first year using the device at the competition the old method was also used to compare distances. A comparison between the two methods, other challenges we faced, and changes we plan to make in the future will be presented.