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EE 322

Homework #1 & #2

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The Digital Archery Target

Objective / Idea

The idea of designing a digital archery target was from the PE class I took last year. "It has always been a critical problem for those who archery. Archers could not see so clearly from where they stand. And sometimes there has being arguing for score is not so accurate due to the arrow is just precisely on the circle of two rings. When it happens, the judge should make their decision. And usually this will make a difference for a champion and a second-place in an important game." [My archery teacher's speech during the class] If a computer-controlled target is being used during a regular game, then this problem might not trouble the archers any more.

Requirements

The design should meet the requirements from the stakeholders listed below.

1. Manufactory

The system should be easy to be manufactured. It should be low cost. It should have a big market.

2. Client

The system should be easy to assemble and operate. The scouring system should be recorded precisely and correctly. The whole system's price should be acceptable. For an archer, the target should be no difference from a common target.

3. User

There should be nothing in front of the target so the archer's sight won't be sheltered. The archer could clearly see the target and the rings on it as the common target. The target should be durable. When an archer shoots, the arrow will stick on the target as the

common target will do. The score should be recorded precisely and correctly. The scouring system should be easy to operate and understood.

4. Designer

The system should be easy to figure out. It should meet all requirements above.

Design

Original Design

To meet the above requirements, a design of constructing a camera in front of the target is not OK. The camera will influence the archer's sight, and it might be physically damaged by a missed arrow. The picture the camera took will not be so accurate and cause visual error because of the angle from the camera.

Alternating Design

Instead of the camera design, an alternating design of a sensor board is put forward.

In this design, the digital target consists of three parts. First is the target surface. Second is the sensor board behind the target surface. Third is the computer, or the scoring system connected to the sensor board.

The target surface should be the same as the common target. This target surface should be thick enough that the arrow would not go through it to damage the sensor board behind it. But it should be thin enough for the sensors to detect the arrow's point. This part should be tested.

The sensor board is basically consists of multiple pressure sensors. When the arrow hits the target and stick inside the surface, the sensors will absorb the impact force and output the data to the computer.

Then the computer, or the scoring system, will record the data from the sensor board, analysis the data to find out where the arrow's tip should be on the target surface, and collect the results together for final score.

Market

This digital target could be applied to any archery club, especially when somewhere is holding a big archery competition game like Olympic Games. By using this target, the judge of the game will be more accurate and precise.