

Title: Indoor Hammer and Discus Measurement

Background

Hammer and Discus are track and field events where an athlete (the thrower) throws an implement inside of a cage using specific technique to try and maximize distance. The standard weight for the hammer is 7.62kg for the men and 4kg for the women. For the discus it is 2kg for the men and 1kg for the women. Good throwers can throw a hammer upwards of 200 ft and throw the discus a similar distance. This results in the implements having fairly high release velocity, approaching highway speeds. An important part of practicing throwing is being able to see how far each throw is, since that is the only effective method that can reliably and quickly allow the thrower to judge how good their throw was. Being able to measure distance helps throwers control their speed and can help bring attention to underlying technical problems that would otherwise go unnoticed.

Significance

However, it isn't always possible to throw outdoors, whether it be inclement weather or restricted access to a field due to it being shared with other sports. In a situation like this, the thrower can still practice hammer or discus on an indoor ring. However, due to the height that hammers and discs usually travel, the thrower must throw into a net. The nature of this setup means there is no way to judge distance, so the throwers lose the feedback that the distance would've given. So, it would be beneficial to have a way to estimate how far a throw would've gone based on the release velocity to give the thrower quick and effective feedback. This system could also be used in an outdoor setting as well. Sometimes, a thrower fouls a throw by releasing too early or late and ends up throwing the implement into the cage. Being able to know the ball velocity on a throw like that would provide valuable feedback on whether the rest of the throw was executed well. Along with that, the additional information about release velocity and release angle could help coaches make better informed training regiments.

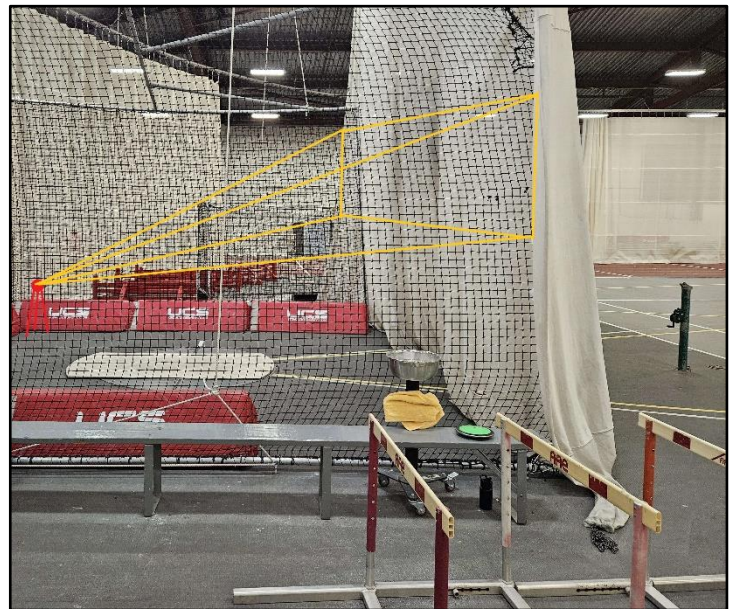
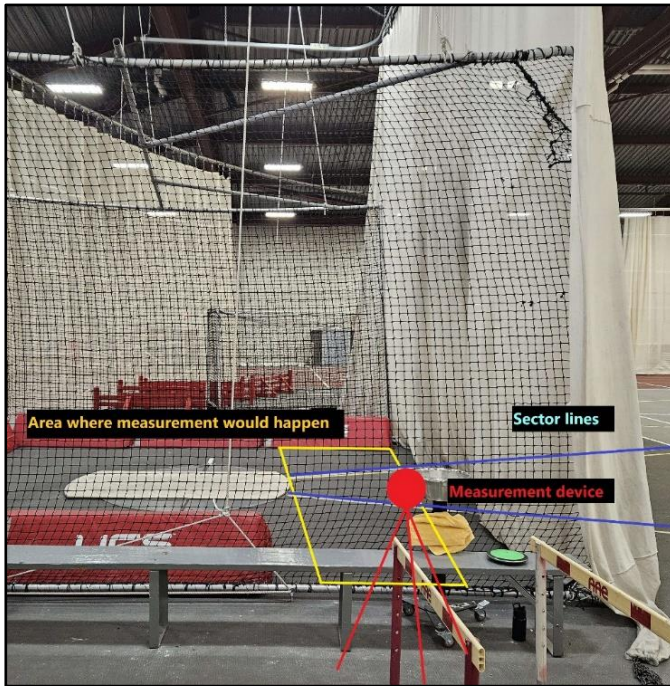
Requirements

- Requires minimal to no modification to any existing ring.
- Be easy to set up and remove.
- Be able to accurately and quickly calculate implement velocity and angle despite the high speeds of said implements.

- Be able to display distance, velocity, and release angle in a manner that is easy to see.
- Be able to deal with the variety of implement shapes and colors while (potentially) looking through the netting of a cage.

Concept Pictures:

Two possible arrangements.



Pictures of the release: (4 frames of a 30fps video)

