HCI

REU07

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TWiki Tip of the Day
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August 3, 2007

Yeah! Everything worked fantastically!! WOOOOOO!!!

Well, at least for the most part. Unfortunately, everything went really slowly because everyone want to stab the target themselves and so we had to convert and rename all the pictures each time. Definitely a hassle. Still, it was scoring correctly pretty much every time. Although, that likely had more to do with people not using the outside of the target. In fact, pretty much everyone went for the very middle. We could have had it display five every time and few people would have noticed the difference.

The "dons" loved the whole thing. They started talking about getting together some money to fund a grad student to work on this for the next year. They want to continue the project with the idea that we had and go ahead and try to use computer vision for this.
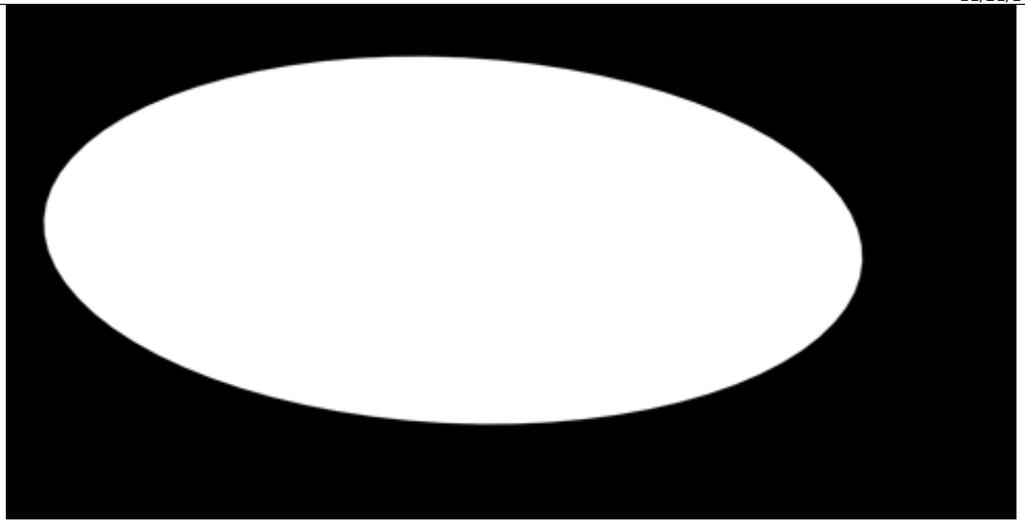
Code for the project is at:
https://subversion.vrac.iastate.edu/Subversion/LaserTarget/svn/LaserTarget/

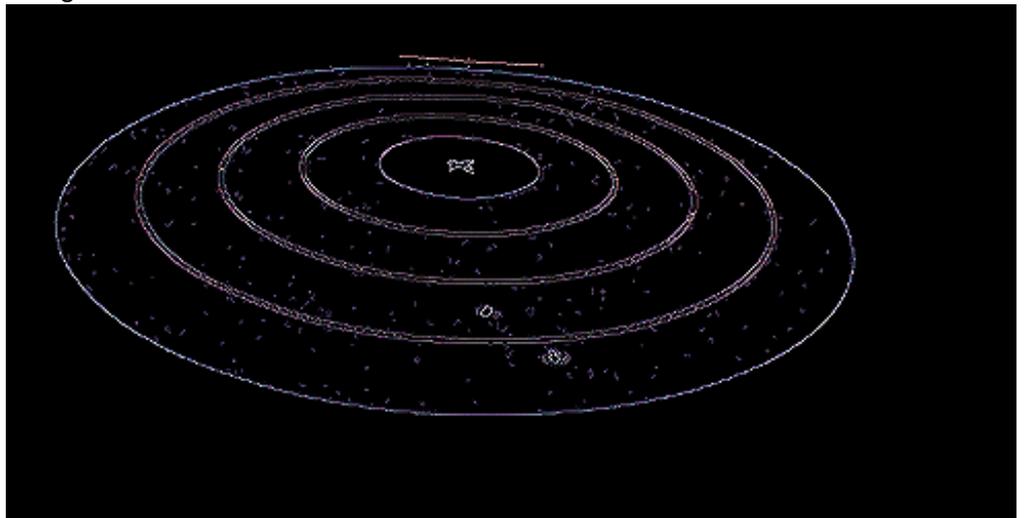The research paper is: REU07_OnTarget_Research_Paper.pdf

Screen shots:

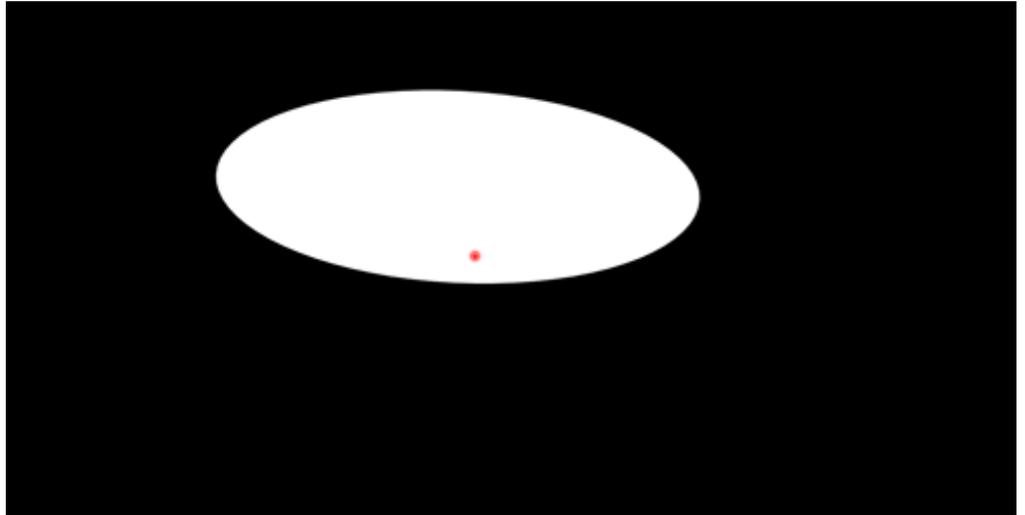* Picture of the Target:

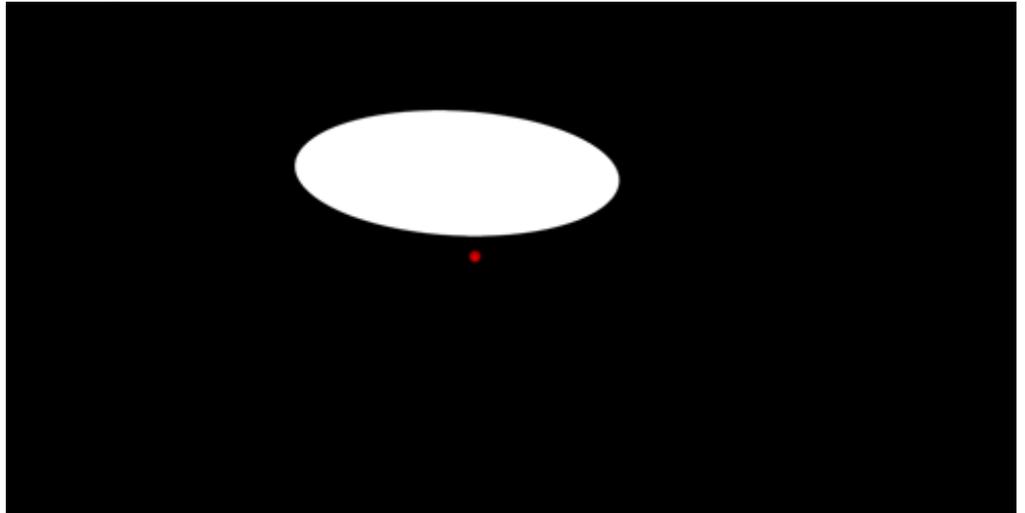* Mask:

* Edge Detection:

* Image Differential:

* Extracting the Arrow:

* Scoring the Arrow:

* Scoring the Arrow:

August 1, 2007

Whew, it's August already. We've come a long way in the last week. Andreea's code is scoring the arrows with a fair degree of accuracy, we have a tricked out (i.e. painted) target mount, and my GUI is done, at least so far as the layout goes. We ran into some problems late last week when we discovered that while Bryan had gotten Andreea's and my code to compile, they still couldn't communicate. We ended up making her project into a .lib file and having the GUI call her OpenCV functions indirectly

through some facade functions. That only took a couple of days. A little expensive considering the time we have left, but we got it to work, which is fantastic. Right now, we're working on testing for bugs and making the code a bit more robust.

Unfortunately, we won't be able to do a real live demo at the forum on Friday. This is because the resolution we need for the pictures (1280 x 960) is exactly twice as big as the resolution we get in the pictures taken with OpenCV. The software that came with the cameras can take pictures at the larger resolution, but OpenCV simply grabs frames from the video feed, which can't get any larger than 640 x 480. Rather unfortunate, but we can at least do half of a live demo: take pictures with the camera software beforehand and then feed those images into our program at the forum.

That's it for now. Hopefully we'll be able to make some more progress before we have to stop. Good luck to everyone on your projects.

-- [MattPoulter](#) - 01 Aug 2007

July 25th, 2007

The project has come aways since the last blog post. Again sorry, blogs are really easy to forget especially if you are not fond of them. Anyhow, the project is coming along, we now have a full mockup for the camera mounts and the target, took a few revisions but should be done now. Matt now has a window with some buttons and scrollers on his GUI which is really nice and simple looking. Andreea has now detected the edges and masked the images so that the noise is mostly filtered out of the images. She has also gotten closer to detecting the arrow on the target and will be working on that for the next week and a half. I(by this I mean mostly chad) got both the fltk and opencv to compile in the same solution file without them trying to kill each other. The poster has been finished and can be seen on the poster page of the wiki. It looks like we will come down to the wire on the programming but it should get done and allow us to have a pretty spiffy demo a week from friday.

-Bryan

July 10th, 2007

Our spec and date docs:

[Important_Dates.doc](#)

[Specifications.doc](#)

July 5th, 2007

So yea we kind of forgot about our group blog. Therefore we will give you a two week update this week. During the week with all of Vijay's projects and assignments we did not spend much time working on our project, which means we probably would not have had much to report anyhow. But now that we have almost all our time for project we have start to make progress. Andreea has started working in openCV with some pictures of the targets have took with the two cameras and is beginning to work on edge

detection. Matt has been pseudo coding(aka adobe photoshop) his gui. And I have begun work on the housing and mounting of the cameras on the target. If you havnt seen it already i have modeled the cameras and posted them in my blog and now i have begun to model some mockup housing so that I can get an idea of what type of materials we will need to buy in order to make some of this stuff seeing as not many stores just sell housing to protect cameras. Also it will be a nice addition to our poster at the end. I cant really comment on all the details of Andreea and Matt's stuff as most of it seems like a foreign language to me but i can tell you progress is being made once we got all the software up and running. Another final thing is that the girl's research paper is provig to be one of the more difficult parts of the project as it demands a much smaller time frame than our research does and I believe that stems from the two REU groups being on different schedules which stinks but is life.

-Bryan

June 14th, 2007

Saw this article and thought it'd be fun to get this kid out to test your prototype if things got that far. He's about 2 or 3 hours away, though. http://www.extension.iastate.edu/news/2007/jun/091401.htm

-Stephen

June 14th,2007

We decided to go ahead and purchase two cameras on Wed. from the bookstore. We made a shopping list of items that we decided we needed in the near future including; arrows, arrow heads, targets, etc. We have also been working on getting more software for the project. This includes more software, mainly imaging, and solidworks to help model out the final mount and prototypes. Division of labor still hasn't been fine tuned as of yet, because we do not want to push a ton of code off on Andreea and Matt and me are not coding experts. The plan for next week will be to get the cameras at least up and running and starting to play around with capturing and filtering images.

-Bryan

June 11th, 2007

We discussed our 3 ideas more this week, and decided to go with the camera option because it's cheap, easy to set up, and Jesse and I both have experience with image processing. For Wednesday, we decided to come up with a list of items we'll need to get started, and some good milestones for the project. Also, we're going to look into who will be doing what more closely. We are still keeping pressure, sound, and image tracking in mind to detect when an arrow hits to fire off the cameras to take pictures. But I think we're first going to start with just detecting an arrow in an image.

-Andreea

June 8th, 2007

More on how we plan to develop the prototype. Two semesters ago I had the privilege of having JO(Jim Oliver for those that don't know) for a professor. The class I had with him is ME 270. The class was structured as taking a problem that was presented to us and developing a working prototype. The early structure was class based and involved learning some of the methods that would be helpful in the work force; FMEAs, brainstorming, team work, CAD drawings, proof of concept. We have decided to set up the project in this sort of fashion. We all sat down and brainstormed and had around 9 initial ideas. At that point we started to rip apart those 9 ideas to get down to 3 or 4 really good and plausible ones. At that point we decided upon sound, ultrasound, and cameras. At this point we will do more research on all three and hopefully begin to narrow it down to one promising idea. At that point you begin to heavily look at the possibility of how to implement that idea for the current problem and hopefully by the end of the summer we will have a decent working prototype for tracking arrows on a target.

-Bryan

June 6th, 2007

We have been given the ok to talk more openly about the project, seeing as ISU will e the budget for this. This means that we will give you more explicit updates at the summer goes one. However, in the last week we spent some time brainstorming and came up with three main ideas to detect an arrow in a target. Ironically none of them involve lasers. The three principles we are discussing now are ultrasound, sound, and using cameras (or still images). We have also discussed the idea of adding either infrared or pressure sensors to those three ideas but will probably not use these two as a standalone. Right now we have the hardware to mess with some cameras and ultrasound sensors and plan on playing with them a little bit next monday to get a better idea of what it possible and which path we want to head down in the future.

-Bryan

May 31, 2007

The unfortunate thing about working on a project that a company would like to eventually patent is that they generally frown about talking about it. This, of course, makes blogging about that project rather difficult. Regardless, I can tell you a little about our research meetings yesterday. We met with the guys from the company (We don't know which one) yesterday morning. After, they came to lunch with us which was a small bit awkward. Both guys were past their 50's and the generation gap kept us from relating.

A lot of their expectations/wants seem, at least to the three of us, a little ridiculous. We have no way of even approaching the kind of system that they want. There are essentially three different environments that they would like the system to work in while accommodating any size of target. In ten weeks, I'll be surprised if we can come up with a functioning prototype for one of those environments that can only be used for one size.

-Matt

SG: Hey folks, if you add the code below to any wiki page, it will make it viewable by only the people listed (your team and the REU staff). Just copy this code onto all your laser target pages, and then you can use the blog more openly. Also, you might sign your blog posts. (- :

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