Hidden Object Detection

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CSCI 460

Spring 2024

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Project Setup:

Project Setup...for any project that uses the eye tracker...

- 1. Open Microsoft Visual Studio 2022
- 2. Create a Windows Form App (.NET framework)
- 3. Right Click on the Project
 - a. Select Properties



- 4. Under the Build Tab...
 - a. Change the *Platform target* to x64
 - b. Make sure that "Prefer 32-bit" is not checked

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If you do not have the NuGet installed...(If you already do, skip to step 13)

- 5. Open the *Solution Explorer*
- 6. Right click on *References*
- 7. Select Manage NuGet Packages

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8. Make sure that the *Package Source* is *nuget.org*

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9. Search for *Tobii.Research*

10. Select and Install the Tobii.Research.x64

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- 11. If necessary, click Accept for dependent packages to be installed
- 12. Once the installation is completed, open up the *Installed* section to verify that the installation completed successfully.

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Now that the package is installed, we can add the correct .dlls to the project...

13. Right click on *References* and select *Add Reference*...

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15. Locate the *Tobii.Research.dll* and add it to the project.

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16. Select the .dll from the list and click *Ok*

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17. To verify that the installation was done correctly, check that *Tobii.Research* appears in the *References* list

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18. Right click on the project and select $Add \rightarrow Existing Item...$

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- 20. Add the two files to the project
- 21. You will see the two files in the Solution Explorer

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22. Select each file individually and change the property *Copy to Output Directory* from *Do not copy* to *Copy always*.

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Tobii Pro Spark Reference Page: <u>.NET - Getting started - Tobii Pro SDK documentation</u>

How to Connect to the Eye Tracker (.NET):

```
using System;
using System.Collections.Generic;
using System.Ling;
using System.Text;
using System. Threading. Tasks;
using Tobii.Research;
namespace Tobii.Research.CodeExamples
ł
  class GFG
  ł
    // Main Method
    static public void Main(String[] args)
       // specific eye tracker address so the program can connect to it
       //https://developer.tobiipro.com/NET/dotnet-getting-started.html
       // create the address with our specific eye tracker
       Uri address = new Uri("tobii-prp://tpe01-100203100135/");
       // assign the eye tracker to IEyeTracker x so it can be used
       IEveTracker x = EveTrackingOperations GetEveTracker Uri.GetEveTracker(address);
       // get eve tracker data from the eve tracker
       IEveTracker GazeDataReceived.Execute(x);
       Console.ReadLine();
    }
  }
  internal static class EyeTrackingOperations GetEyeTracker Uri
  {
    internal static void Execute(Uri address)
     ł
       EyeTrackingOperations GetEyeTracker Uri.GetEyeTracker(address);
    internal static IEyeTracker GetEyeTracker(Uri address)
       Console.WriteLine("\nGet eye tracker from Uri: {0}.", address);
       var eyeTracker = EyeTrackingOperations.GetEyeTracker(address);
       Console.WriteLine("Got eye tracker");
       Console.WriteLine("Address: {0}", eyeTracker.Address);
       Console.WriteLine("Device name: {0}", eyeTracker.DeviceName);
       Console.WriteLine("Model: {0}", eyeTracker.Model);
       Console.WriteLine("Serial number: {0}", eyeTracker.SerialNumber);
       Console.WriteLine("Firmware version: {0}", eyeTracker.FirmwareVersion);
       Console.WriteLine("Runtime version: {0}", eyeTracker.RuntimeVersion);
       return eyeTracker;
```

```
}
}
class IEyeTracker GazeDataReceived
{
   public static void Execute(IEyeTracker eyeTracker)
   {
     if (eyeTracker != null)
     {
        GazeData(eyeTracker);
     }
   private static void GazeData(IEyeTracker eyeTracker)
     // Start listening to gaze data.
     eyeTracker.GazeDataReceived += EyeTracker GazeDataReceived;
   }
   private static void EyeTracker GazeDataReceived(object sender, GazeDataEventArgs e)
     Console.WriteLine(
     "Got gaze data with \{0\} left eye at point (\{1\}, \{2\}) in the user coordinate system.",
     e.LeftEye.GazePoint.Validity,
     e.LeftEye.GazePoint.PositionOnDisplayArea.X,
     e.LeftEye.GazePoint.PositionOnDisplayArea.Y);
     Console.WriteLine(
     "Got gaze data with \{0\} right eye at point (\{1\}, \{2\}) in the user coordinate system.",
     e.RightEye.GazePoint.Validity,
     e.RightEye.GazePoint.PositionOnDisplayArea.X,
     e.RightEye.GazePoint.PositionOnDisplayArea.Y);
   }
}
```

}

My Application:

To run my application...

- 1. Complete the following steps above to ensure all packages and .dlls are installed correctly
- 2. Add the following files to the project: GameForm.cs, GameForm.Designer.cs, gameOver.cs, gameOver.Designer.cs, mainScreen.cs, mainScreen.Designer.cs, Program.cs, ReplaySearchPath.cs
- 3. Make sure all images and txt files that you are using are in the project folder
- 4. Correct the file paths in the following lines of the code...
 GameForm.cs 93, 97, 99, 164, 166, 168, 253, 272, 291, 373, 378, 383, 388
 gameOver.cs 42, 46, 49
 mainScreen.cs 30, 92, 153
 ReplaySearchPath.cs 42, 178, 182, 189, 204,
- 5. See below for background text file set up, file paths will need to be correct there as well.
- 6. Plug in the eye tracker!
- 7. Don't forget to calibrate it using the Tobii Pro Eye Tracker Manager
 - a. Select New Setup when you are using the eye tracker on a new device, and carefully follow the instructions in the app to correctly line up the eye tracker

	🂱 Tobii Pro Eye Tracker Manager 2.6	.1 🗸	_ O ×
Tobii Pro Spark SERIAL NUMBER TPE01-100203100135 ADDRESS tobii-prp://TPE01-100203100135 FIRMWARE VERSION b05c12f988	•		÷
OVERVIEW	DRIVERS & FIRMWARE	LOGS & DIAGNOSTIC	
POSITION GUIDE	DISPLAY SETUP Taylor's Laptop FREQUENCY EYE TRACKING MC 60 Default CALIBRATION GAZE VISUALIZATI CALIBRATE	 Hew ▲ Edit A Export A Import 	

Tobii Pro Eye Tracker Manager Installation: <u>Tobii Pro Eye Tracker Manager introduction - Tobii</u> <u>Pro SDK documentation</u>

How to Run your Own Experiment:

When starting a new experiment...

1. Clear out the following files and make sure they are in the project folder (names must be exact)...

easyReferenceImageCount.txt easyRefObjCoords.txt easyTargetImageCoords.txt easyTargetImageCount.txt easyTimerCoords.txt easyTimerCount.txt easyTimes.txt mediumReferenceImageCount.txt mediumRefObjCoords.txt mediumTargetImageCoords.txt mediumTargetImageCount.txt mediumTimerCoords.txt mediumTimerCount.txt mediumTimes.txt hardReferenceImageCount.txt hardRefObjCoords.txt hardTargetImageCoords.txt hardTargetImageCount.txt hardTimerCoords.txt hardTimerCount.txt hardTimes.txt

- 2. Set trialCount.txt to 0
- 3. Application will create two new files each run...
 - a. TrialNumReplaySearchPathXCoords.txt
 - b. TrialNumReplaySearchPathYCoords.txt
- 4. Application will rewrite...
 - a. currentGameInfo.txt
- 5. Application will add to...
 - a. gazePointData.txt
- 6. Include the following three files in the project, make sure that they follow the formatting below...
 - a. easyBackground.txt
 - b. mediumBackground.txt
 - c. hardBackground.txt

Background Text File Set Up:

- 1. First line is the total number of lines in the text file
- 2. Second line is the background image file path
- 3. Third line is the number of target images the program can pick from for this background image
- 4. The following lines will be set up as follows...
 - a. Reference image file path
 - b. Left edge of the reference image (x value)
 - c. Right edge of the reference image (x value)
 - d. Top edge of the reference image (y value)
 - e. Bottom edge of the reference image (y value)
- 5. Include as many of those as you would like
- 6. Make sure that the full file paths are included and correct

Data Flow Diagram:

St	nucture Diag	Iran
	selected Level	
	ie)-easy	
mainScreen cs	- medium - hard	gameForm.cs
	a[]-holds game	e
	information for	·reads in old Trial Num
mainmenu ,	selected level	from txt file overwrites
bintton clicked	from text file)	wi waated TrialNum
		·resets all count vours :
		timer
aameOver.cs	when correct	· Writes background image.
Jun 1	image is clicked o	on reference image and
		level to file
·reads in current		writes all x and y coords
game into from file		from eye mocker to a file
· writes final time to	replay search	cn . Wiltes all relevant data
correct level file and	pafn bu	atton for research questions to
appends to array	Clicked	d correct corresponding
of all times		files
· gets most recent fine		
from array to displa	4	replay search Path CS replay path Disearch Path CS replay button clicke
	back to main	
	menu button	true an current game into trom
	clicked	TXT FILE TO GET LOTTEGT PULLEGROWING
		and is current trie later Gan to
		GIP
		road in V and it condition for G-
		run in a una y corainates to
		within the them want the