

Laser Tag

Spencer Boyer's VBA Project

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Executive Summary

Project Purpose

In the future, I would like to build a laser tag system that I could use when I build my own laser tag equipment. I would also like to run my own laser tag arena one day. To do this I wanted to find out what it would take to develop a scoring system in Excel. I believe that programming a system in Excel will help me be able to understand what variables are required and be able to write a better program in other programming languages.

Game Context

Laser tag is a game that usually has a dark environment. Players are usually inside, but outdoor courses also exist. Once the game begins, players move through the arena trying to find other players, not on their team, so that they can shoot at targets on other players trying to avoid having their own targets being hit. After a certain amount of time the game ends and the points are totaled. The scoring system keeps track of statistics like which player shot you and how many times you shot them, your accuracy, and which team won the game.

Solution

The system I built replicates a game of laser tag, and the scoring system. It keeps track of which players hit your pointer and how many times you clicked the player buttons. It simulates accuracy and also shows who won the game by showing a percentage of the total points available in the game. Charts are included which display shots given and taken with each player as well as a percentage of total points possible to further augment the scoring data; most laser tag arenas have some kind of report at the end. This project is the basis for a future scoring system that will be based off of the lessons learned. The future scoring system will use new ideas and better coding to provide a perfect laser tag experience.

Implementation Documentation

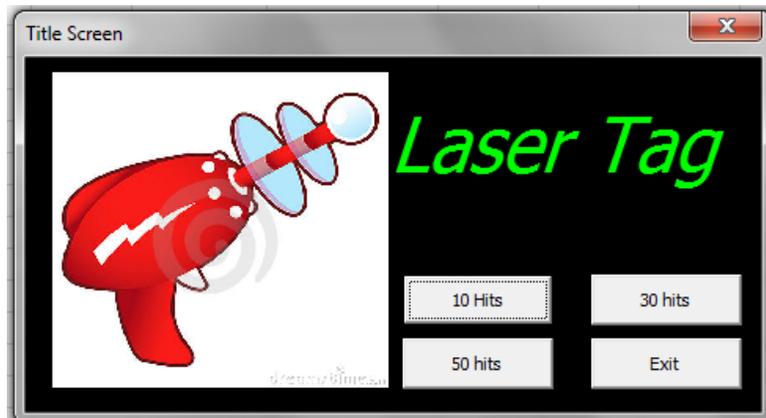
My project comes in two steps, the game itself and the scoring system. The scope of the project was to use user forms, functions, and charts to be able to simulate a game of laser tag.

The Game

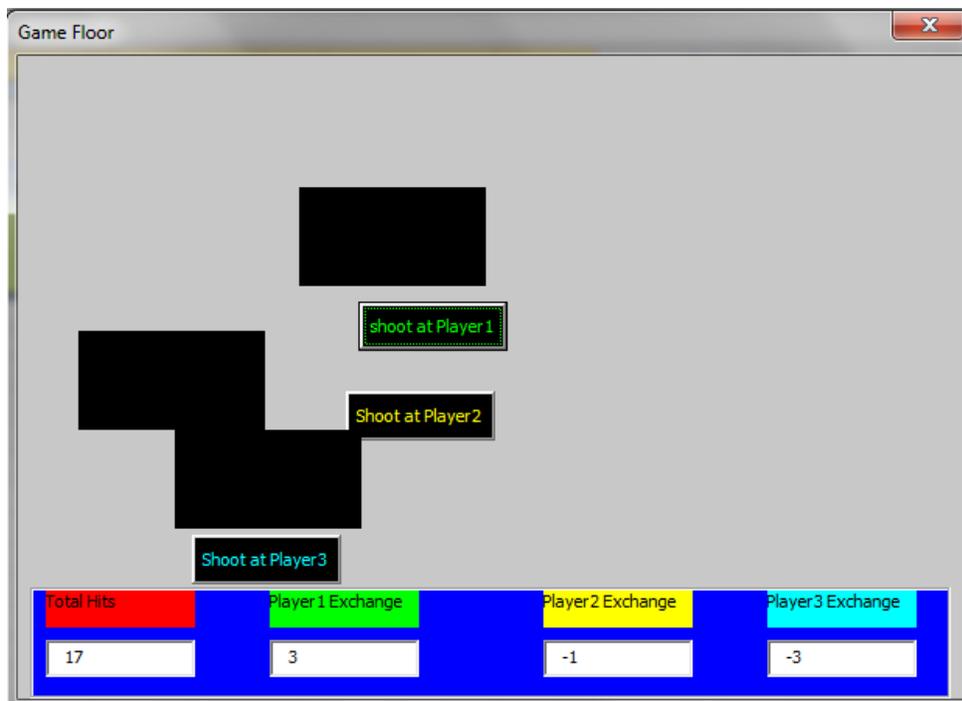
The game uses two user forms to simulate a laser tag arena. The first user form is used to set up the point limit.

The buttons on the user form will set the point cap at 10 hits, 30 hits, or 50 hits.

The exit button will exit the user form and will show the last game's score.



The second user form is more complicated than the first. This user form is used to simulate a laser tag arena. To see all of the elements the back ground was changed, usually it is black.



The buttons labeled shoot at Player # are how you score points in the game. By clicking on these buttons you take a shot at the other player.

To simulate accuracy every time you click on the button does not mean that you will get a point, meaning that you missed the target. I coded this by referencing a function that returned a Boolean. The function would check to see if a Rnd (random generated number) was greater than 40%. If so the Boolean would return a true. If the Boolean was false it would skip all of the code

that awarded points to the computer or the player. If the Boolean was true, points would be awarded and a sub would be referenced to see if the game was over. If the game was not over than the buttons would move elsewhere on the form.

The black labels represent the field of vision that the other players have. If your mouse moves close to these labels the computer has a change of hitting you, but the same accuracy system applies to the computer as well.

For demonstration purposes the labels and buttons do not move until a point is scored, meaning that the other player does not notice they are being shot at until they get hit once, you also do not know if you are being shot at.

The text fields down at the bottom of the user form keep track of the points that have been scored. Total points lets you know how close you are to the point cap.

The text fields under the Player # Exchange labels keep track of the difference between how many times you hit that player and how many times that they have hit you. This is for the player to develop a strategy on which button to go after next.

At the end of the game a message box appears to let you know the game is over and takes you to the score excel chart.

The Scoring System

Total Hits					10			
Point Breakdown	Player 1	Player 2	Player 3	Total	Winner	Accuracy		
Your Shots	5	3	0	8	Your Shots	80.00%	57.14%	
Enemy Shots	1	0	1	2	Enemy Shots	20.00%	50.00%	
Exchange	4	3	-1	6				

This is where all of the data from the last game played is stored. After the game is finished, all of the data stored in the variables used in the user form is placed into this chart and organized.

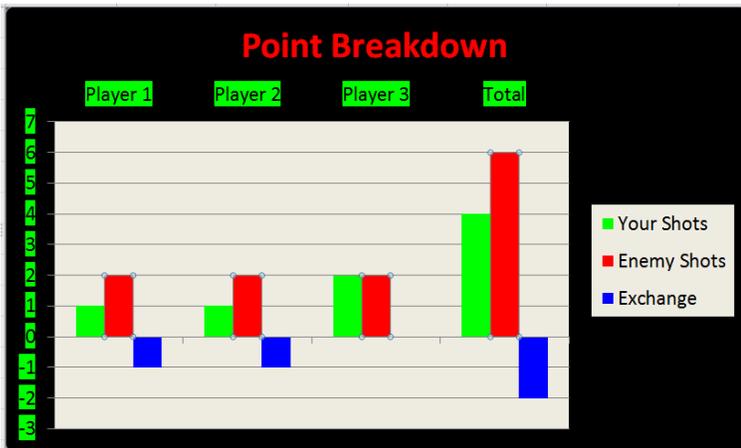
The Point Breakdown matrix shows how many times you hit each individual player, how many times they hit you, and the total exchange you had with that player. The total column totals all exchanges with the three players. This matrix is the basis of the score chart as all other calculated fields and charts get their data from these cells.

The Winner and Accuracy columns show how well you did in the game. The winner column shows the percentage of total points that you or the computer earned based off of the total column in the point breakdown matrix; this time, the computer won. This is shown by the higher percentage of enemy shots. The winner chart is based off of these percentages.

The accuracy column shows how many times you scored a point divided by how many shots you took in the game. Usually in real laser tag games this is a lot lower, but for demonstration purposes I increased the chance of hitting all players.

The total hits field shows how many points were available for the last game. This field helps the system know when the game is finished as well as calculate the winner percentages.

The buttons in the xribbon opens up the user forms or creates charts to provide a visual representation of how the last game went.



The Point Breakdown button brings up this chart. It shows in the green columns how many times you hit each player. In the red, how many times the other players hit you, and in blue the exchange between you and the other players. If the blue column is greater than zero you hit the other players more than they hit you. If it is below then the others hit you more than you hit them. If there is no blue column the shots given and taken are the same amount.

The Winner button brings up a chart like this. Very simply, it shows that the computer scored more shots than the player meaning the the computer won this game.

When one of the buttons in the xribbon is clicked the current chart is deleted to avoid having to many charts on the score screen. This is done to save memory and improve performance.

The formatting for both of these charts are done by the macro, it uses a lot of with statements to reduce the length of the lines of codes because charts have so many objects and properties that get used repeatedly.



Discussion and Learning

This project helped me learn how to use user forms and to better understand the ability to change the properties of the buttons and labels when running the program. I better understand how to reference the properties in the VBA code to be able to manipulate where the buttons show up on the user form, and how to keep the buttons in a certain area of the user form.

Another thing that I understand better is how to reference other subs and functions to be able to clean up the code that I have. I was able to use subs to check and see if the point total was reached after each point and to have a chance at missing the target to decrease accuracy with a function. By referencing these subs and functions I was able to save myself a lot of time by avoiding copying and pasting the same code six different times.

The best learning experience I had was working with the charts. I did not know much about how to set up the charts when I first started the project, but using the macro recorder I was able to learn a lot of code to be able to set the two charts up. I learned what macro recorder code was not important to my program by stepping through the code and seeing what changes were made. I also learned the benefits of setting variables equal to objects in excel, this helped me be able to reference the charts whenever I needed to as well as reduce the amount of code on each line. This also enabled me to be able to delete each chart no matter how many charts were made.

One thing that I thought of including but did not have time for, since I thought of this on Wednesday, would be to include a database to keep track of all the games that have been played, and pulling the data back in to show total stats on how well the players accuracy is, how many games where won, the point differences, and other statistics. I am not sure what kind of problems I would have run into but it gave me an idea about how to make my future laser tag system different from current arenas in the Utah Valley.

Assistance

I did not get any help with this project. I was able to figure out everything for the through the macro recorder and trial and error. I wish that I had more time to try the database inclusion, but that was not part of the original scope of my project so I did not think about including it till I did not have enough time to finish it.