Interactive Software And Hardware – Assignment 1

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Game Design

The basic premise of the game is to defend our base from waves of incoming enemies but because of the extreme cold, most of the sensors to detect the enemy are not responding. We only have a distance sensor that lights up when an enemy enters its proximity range. Our task is to kill the enemies as soon as possible so that they don't reach our base.

We have to use our limited stash of ammunition to defend our base so we must be careful.

We have enough energy to power up our heating systems for a few seconds before it overloads the supply and turns off while it recharges. While the heat is on, we have more of our sensory equipment online so we can get more information on the number and location of the incoming enemies.

We also have a powerful cryogenic freeze ray that can slow down the enemies but we must be careful as we have no way of recharging the ray.

We have to use all the equipment we have to defend our base for as long as we can against the incoming invasion.

Interface Elements

Inputs

- Ministick

This is the basic control of the shooting system of the game, once it is aimed towards a lane, a shot is fired in that lane and the first enemy within it range is killed.

- Temperature Sensor

This is what we use to simulate the heating of the sensory equipment. Once the temperature crosses 39 degrees, we are able to see more information about the location and the number of enemies.

- Rotation Sensor

This is the control dial of the freeze ray. Turning this will slow the enemies down but because of the limited charge, we must be careful about using it as the enemies get faster and more numerous as the waves progress.

We must also remember to charge the ray before we go to the front lines to defend the base as there is no way to charge once we are at the front lines.

Outputs

- LEDs

These are the proximity sensors. We have three, one for each lane, which turn on as soon as an enemy enters the sensor's range (which coincidentally coincides with the firing range of our turrets) .

- Servo Motor

This is a timer that shows how much time is left before the bombers come to kill of any enemies still alive from the current wave before they have to return and reload. Because this have no way of contacting us, they do this even when the enemies for the current wave are killed and thus the timer resets after every wave.

Interface and Game-play

The game can be entirely controlled with three input devices and two output devices with the screen serving little to no purpose. (apart from displaying some information when additional elements of the game are used)

The game is a defense simulator made in a way that it can be a standalone hand-held device with interface elements placed around the controller in a way that it makes the game easy to be played with one hand or both hands. The temperature sensor and the rotation sensor add a few features to the game that might aid the play if used correctly but could also be a distraction from monitoring the LEDs for the incoming enemies.

The interface is designed in a way that the user can intuitively understand the controls and play the game. The real challenge is trying to manage the different controls and outputs with the information provided on the screen. The user has to be careful about when to use what aspect of the game an has to time it properly to make the most use out of it.

This also makes the interaction with the game a lot less traditional and a lot more interactive. By not using buttons to perform any tasks, the actions can be performed by more relevant inputs that make more sense to be used to perform said action.

The LED being used to tell which lane has enemies in range also helps the user use their reflexes to make the kills instead of having to think about it, although as we progress in the waves, they enemies get faster and more numerous and eventually do overpower them. This is when the special power-ups come to our aid, the ability to use the rotation sensor to slow the enemies for a few seconds can help us

quickly clear the field or it can be used with the temperature sensor to plan a course of action which can be helpful when we are running low on ammunition.

The servo motor is our wave timer which not only tells us the amount of time left before the next wave, but also provides a consistent low pitch sound in the background that helps increase the level of anxiety.

The controller is meant to be assembled in a way that we have the ministick towards the front left part of the controller. The temperature sensor towards the right back part of the controller in a way that the user can activate it using their right index finger. The rotation sensor should be on the front right side (to be operated using the right thumb), with the servo motor above it. The phidget controller and the controller for the servo motor should be on the back of the controller aligned in a way that we can see the three LEDs above the controller lining with the ministick.
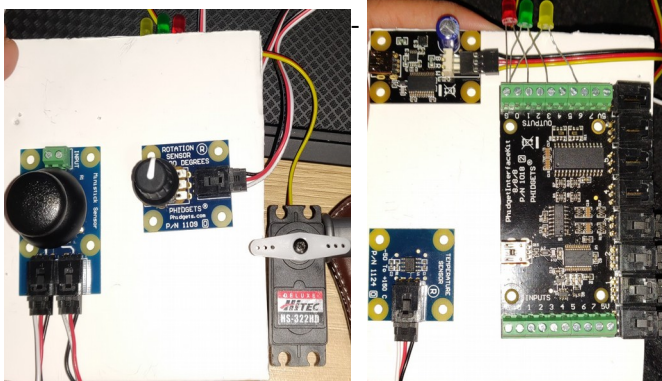
Assembly of the interface

Fig : The front side of the controller (Ministick, Rotation Sensor and servo motor) – And the back side of the controller (Servo controller, Temperature Sensor, Phidget Interface)

Inputs

The Ministick is supposed to be connected to the first(0) and second(1) voltage port of the phidget interface kit.

-The rotation sensor is connected to he third(2)

-The temperature sensor is connected to the fourth(3).

Note: Depending on how the ministick is connected, it orientation will kill enemies in the aligning waves.

We must make sure that when the ministick is moved towards the right end, a shot is fired in lane 3, lane 2 when

its moved front or back and lane 1 when its moved to the left.

Outputs

-The servo motor should be used with either of the non circular heads so that they can clearly show the passage of

time, and the initial orientation should align with either the horizontal or the vertical axis to clearly know when

180 degrees have been completed.

-The LEDs are supposed to be connected to the Digital outputs 1, 3 and 6 which are the second, fourth and the seventh

digital output ports respectively. These will tell us the enemies in range for the lanes 1, 2 and 3 respectively.

The Technology

Phidget provides an easy platform to create interactive interfaces. The large array of sensors and devices that can be connected to the phidget gives us a lot of freedom to design non conventional interfaces that give the user a much better experience if used correctly. The best part about using these interfaces is that they can feel more realistic and immersive than using buttons of combinations of them to perform specific actions. For example, it makes more sense logically to use the temperature sensor to simulate the increasing of temperature in the game instead of letting the user press a button for the same effect. This gives the game a sense of realism.

It also provides up with a platform to create interfaces on that helps the user have a more real and interactive experience when they interact with these systems. The devices we use mostly mostly rely on using buttons or touch to get input from the users. A lot of possibilities can be explored that help the users have a more realistic experience when interacting with said systems if we incorporate a wider variety of sensors like a pressure sensor to control the intensity of a task depending on the input pressure, or a light sensor to make the interface adjust to the background light conditions. The possibilities are only limited by our imagination (and certain hardware restraints) but there is certainly a lot that can still be done with various combinations of existing hardware and its software support.