

 **DRONE**  
**TEAM**

Drone It Yourself!

MAKING AND DESIGNING A TOY DRONE  
THROUGH MULTIDISCIPLINARY  
COLLABORATIVE WORK  
Project no. 2015-1-ES01-KA202-015925

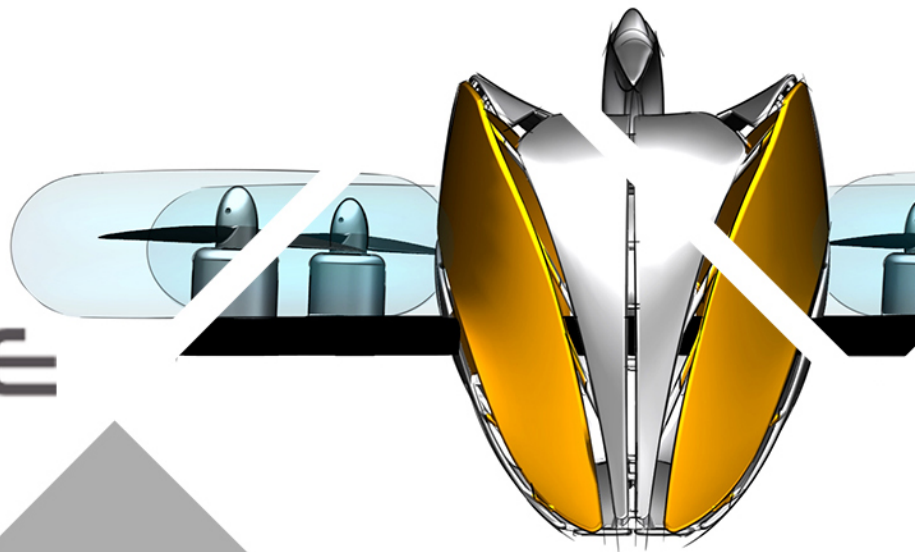


Co-funded by the  
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of the European Union



Drone It Yourself! consists of the following modules:

0. INTRODUCTION TO THE DRONETEAM PROJECT
1. BASIC TOY DRONE FRAME
2. MODULE OF FLIGHT CONTROL
3. MODULE OF COMMUNICATION CONTROL
4. MODULE OF ADVANCED FRAME
5. MODULE OF GPS-COMPASS CONTROL
6. MODULE OF PROBLEM MANAGEMENT
7. MODULE OF FLIGHT STABILIZATION SYSTEM
8. MODULE OF FIRST PERSON VIEW
9. DRONETEAM E-LEARNING PLATFORM
- 10. OTHER DEVELOPMENTS**
11. GLOSSARY



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## OTHER DEVELOPMENTS

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# 1. GAME OF DRONES. LEARN CODING BY MAKING GAMES

Additional developments related: How to design, develop and play a Roblox platform game.

## 1.1. INTRODUCTION

For students, the best way to learn programming is through the game. It's fun and exciting. Roblox platform helps students to learn game design and scripting.

1. Programming is a language and it is now one of the most widely used languages in the world.
  2. It builds problem solving skills.
  3. It encourages creativity.
  4. It helps improve focus and concentration.
  5. It's fun and it helps you to prepare for the jobs of tomorrow.
- Learn coding by making games!
  - Developing games may be fun. Most of the young people like games, so they would enjoy developing a game rather than writing a business app, which will be extremely boring for the most of them.

Game development is one of the most challenging developments.

You need to find ways to solve problems with code, and games work for many people.

### **METHODS AND TOOLS THAT CAN HELP YOU PLAN AND DESIGN YOUR GAME**

1. What kind of Game Should I Build?
2. Questions to answer about your game?
3. Documenting and Testing.
4. Plan Ahead?
5. Rapid Prototyping.
6. Keep Players Engaged.

### **I HAVE AN IDEA. HOW DO I KNOW IF IT IS A GOOD IDEA?**

#### **Questions to Answer About Your Game**

1. What is the core concept of your Game?
2. What is unique, cool and exciting about the concept?
3. Can you describe your game in 2 minutes or less?
4. Why would players care for your game?

First, make some simple game in one day. You will learn basic scripting and design!



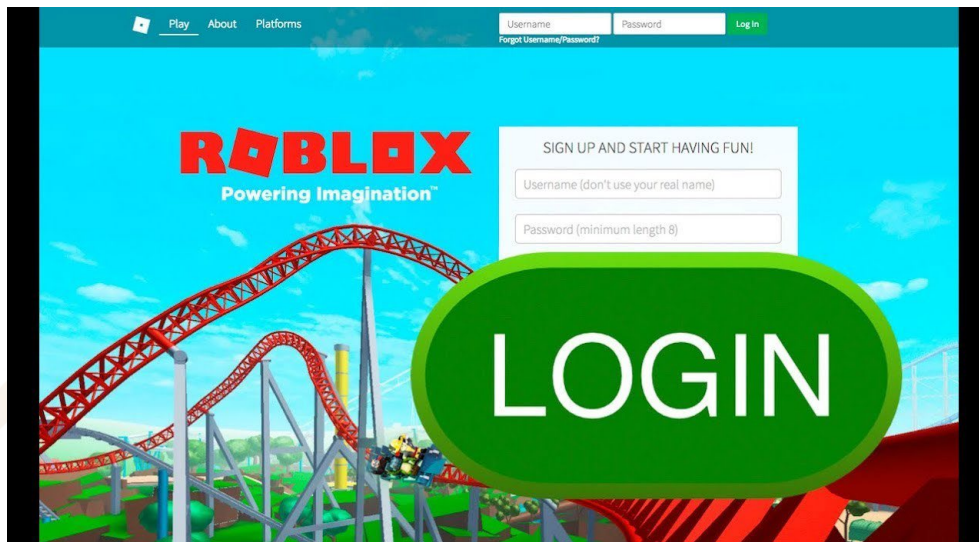
## 1.2. ROBLOX STUDIO

Drone Game is a simple example. You can make it in one day based on Roblox platform.

THE FIRST STEP IS TO CREATE A ROBLOX ACCOUNT AND DOWNLOAD ROBLOX STUDIO

If you're completely new to Roblox, click Sign up and follow these steps:

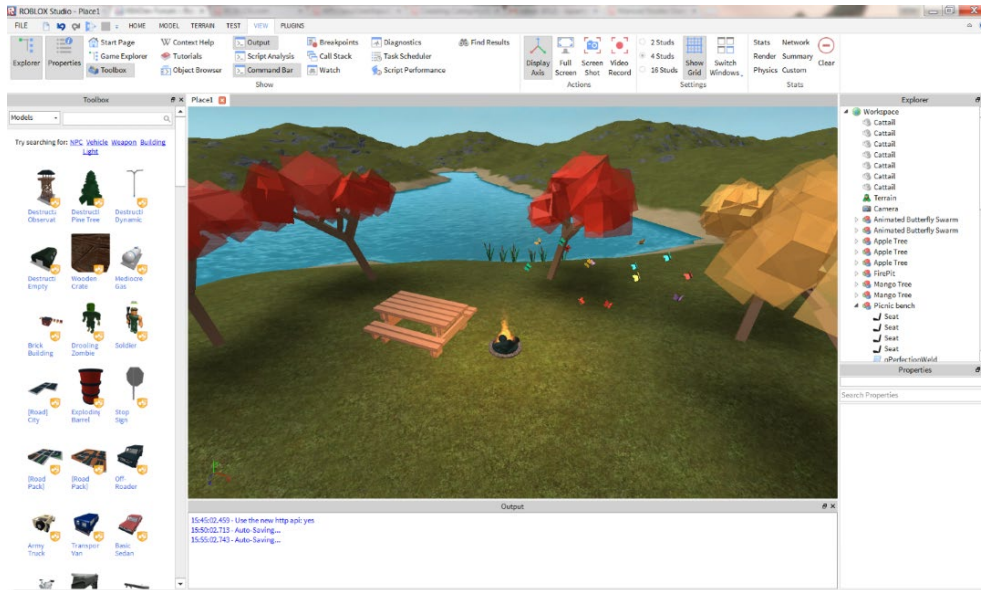
1. Enter your birthday.
2. Select a username. Red writing will appear if the name is already taken
3. Choose your password.
4. Select a gender.
5. Check the Terms of Use box
6. When finished, click Sign Up. Once confirmed, return to Roblox Studio, type the username and password you just created, and click Log In.



## 1.3. FIRST STEPS IN ROBLOX STUDIO

DOWNLOAD AND INSTALL ROBLOX STUDIO

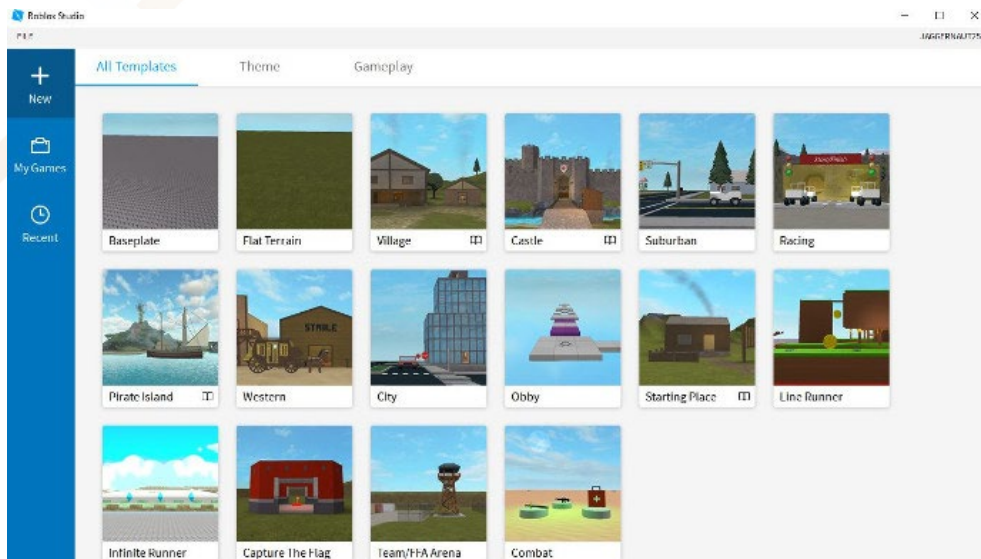




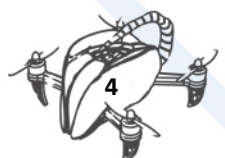
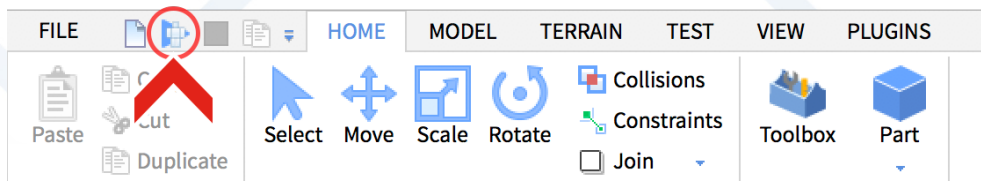
OPEN THE ROBLOX STUDIO AND START DEVELOPING YOUR GAME

FIRST OPEN A NEW PROJECT AND CHOOSE YOUR TEMPLATE

**Templates** are pre-built projects in Roblox that you can use as a start for your own games.



To test the obby template, simply press the **Play** button

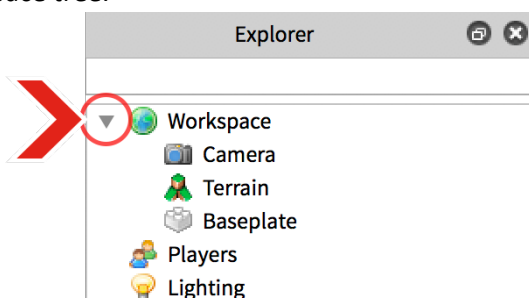


In game, use these controls:

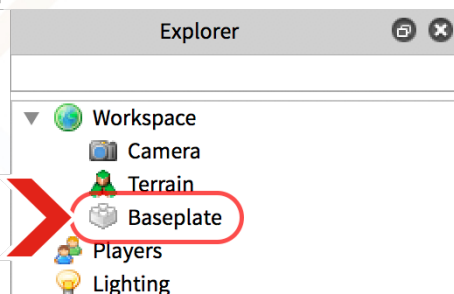
| Control                   | Action                     |
|---------------------------|----------------------------|
| W A S D or the arrow keys | Move your character around |
| Spacebar                  | Jump                       |
| Right Mouse Button        | Look around                |

We'll need a completely empty world to start building the game, so let's delete the baseplate.

1. Click the **small arrow** next to **Workspace** in the Explorer window. This will expand the Workspace tree.



2. Click on **Baseplate** to select it.



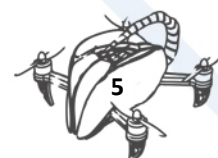
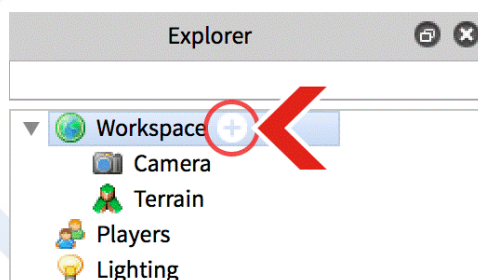
3. Press **Delete** on the keyboard.

## 1.4. CREATE A STARTING POSITION

In Roblox, where a player appears in the world at the start of the game or after restarting is called the **SpawnLocation**. Without a designated place for your player to start, they might spawn in the middle of nowhere and fall to their doom.

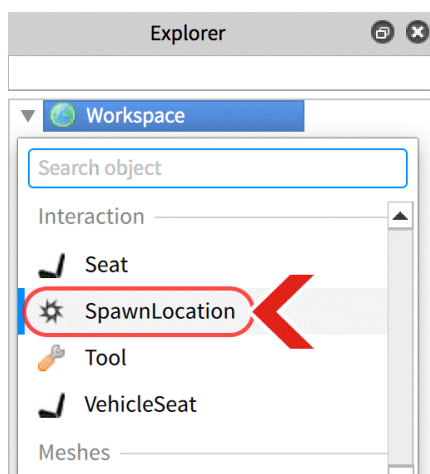
To create a new spawn location:

1. In the Explorer window, hover over **Workspace**.
2. Click on the circle (+) button.





3. Scroll through the drop-down list until you find **SpawnLocation** and click on it.



IN THE TOOLBOX OPEN THE MODEL AND SEARCH FOR DRON OBJECT

## 1.5. MOVING THE CAMERA

Now that you have an object in your game, move the camera around to get a better view.

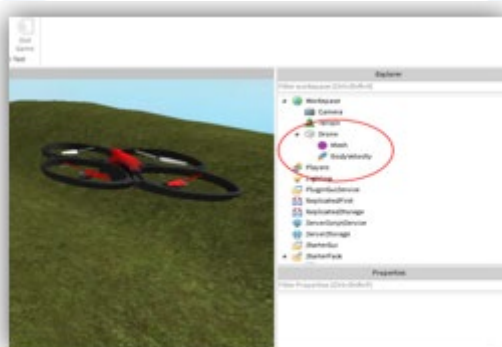
| Control            | Action                              |
|--------------------|-------------------------------------|
| W or Up Arrow      | Forward                             |
| S or Down Arrow    | Back                                |
| A or Left Arrow    | Left                                |
| D or Right Arrow   | Right                               |
| Q                  | Down                                |
| E                  | Up                                  |
| Shift              | Change camera speed                 |
| Right Mouse Button | Turn camera                         |
| Mouse Scroll Wheel | Zoom camera in or out               |
| F                  | Focus the camera on a selected part |

If the camera doesn't move, first click (focus) inside the game editor window.

## 1.6. SCRIPTING THE GAME

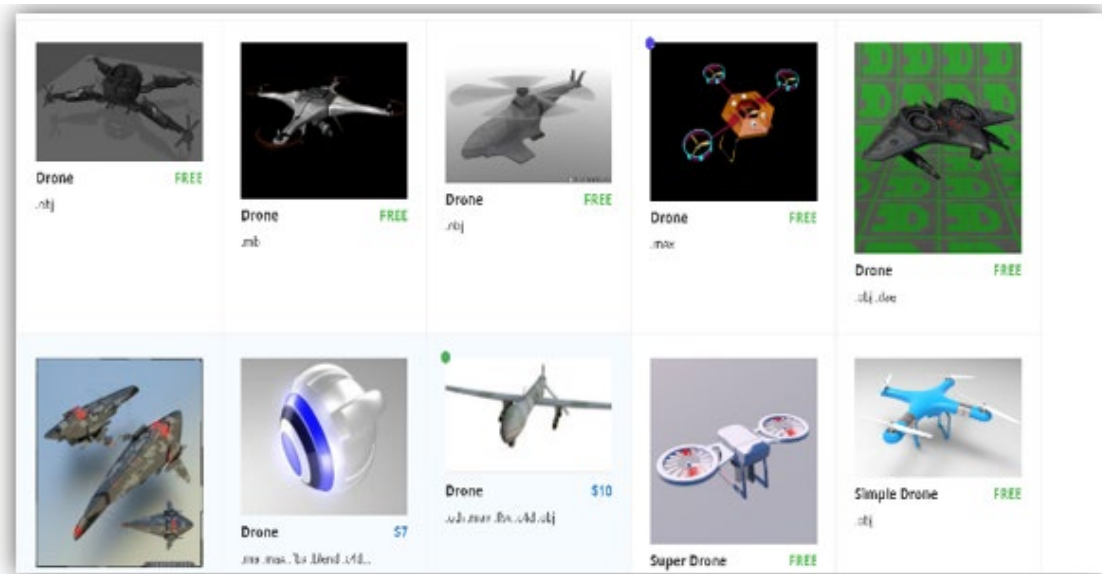
After implementing the object into the game, start writing code for controls.

Added a property "BodyVelocity". (Let's apply force)

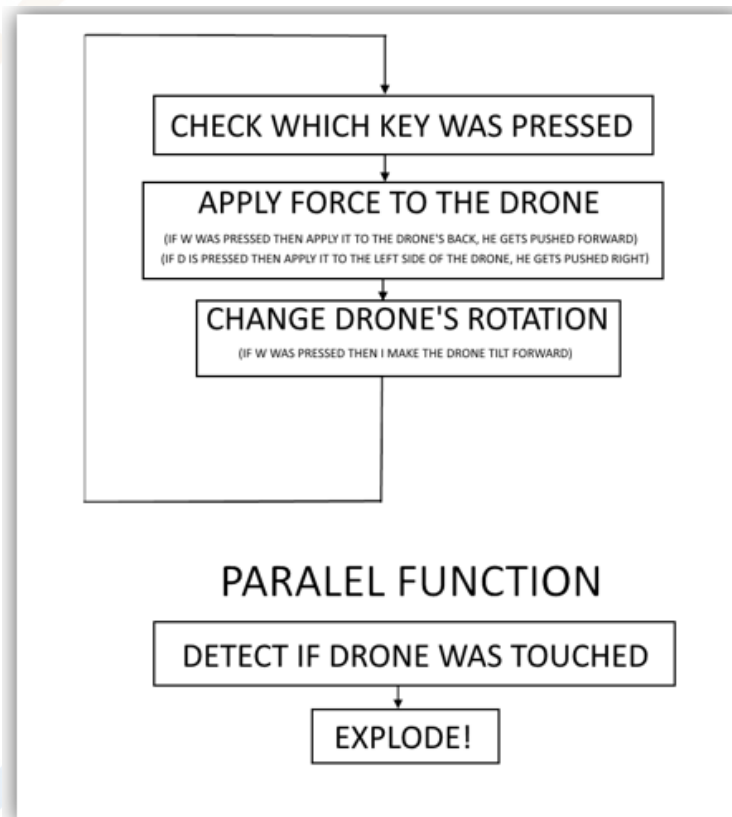


Find/select or create your own drone

(Blender / 3D Objects or Free Models)



## 1.7. DESIGN AND DEVELOPING PROCESS



## 1.8. CODE IN LUA PROGRAMMING LANGUAGE

```

local Player = game.Players.LocalPlayer--define player
local Camera = game.Workspace.CurrentCamera--define camera
local DroneModel = game.Workspace.WaitForChild("Drone")--drone model in workspace
local DRONE = false--to identify presence of the palyer in the drone, use e to move the drone
game:GetService("UserInputService").InputBegan:connect(function(inputObject,
gameProcessedEvent)
if inputObject.KeyCode == Enum.KeyCode.E and DRONE == false then
DRONE = true
DroneModel:SetNetworkOwner(Player)
Player.Character.Humanoid.WalkSpeed = 0
Camera.CameraSubject = DroneModel
Camera.CameraType = "Attach"
end
end)-- connecting with the server service and positioning the player on 0 not to move, and set
camera to follow the drone
local function turnForward()--forward
DroneModel.CFrame = DroneModel.CFrame*CFrame.Angles(-0.01,0,0)
end
local function turnBackward()--backward
DroneModel.CFrame = DroneModel.CFrame*CFrame.Angles(0.01,0,0)
end
local function turnLeft()--left
DroneModel.CFrame = DroneModel.CFrame*CFrame.Angles(0,0,0.01)
end
local function turnRight()--right
DroneModel.CFrame = DroneModel.CFrame*CFrame.Angles(0,0,-0.01)
end
game:GetService("UserInputService").InputBegan:connect(function(inputObject,
gameProcessedEvent)
if not DRONE then return false end
if inputObject.KeyCode == Enum.KeyCode.Space then
KeyHeldSpace = true
while KeyHeldSpace and DroneModel.BodyVelocity.Velocity.Y < 5 do
DroneModel.BodyVelocity.Velocity = DroneModel.BodyVelocity.Velocity +
Vector3.new(0,0.1,0)
wait()-- detection of buttons, space up, shift down, a left
end
elseif inputObject.KeyCode == Enum.KeyCode.LeftShift then
KeyHeldShift = true
while KeyHeldShift and DroneModel.BodyVelocity.Velocity.Y > -5 do
DroneModel.BodyVelocity.Velocity = DroneModel.BodyVelocity.Velocity + Vector3.new(0,-
0.1,0)
wait()
end
end

```



```

end
if inputObject.KeyCode == Enum.KeyCode.A then
  KeyHeldA = true
  while KeyHeldA and DroneModel.BodyVelocity.Velocity.X > -10 do
    turnLeft()
    DroneModel.BodyVelocity.Velocity = DroneModel.BodyVelocity.Velocity + Vector3.new(-
    0.5,0,0)
    wait()
  end
elseif inputObject.KeyCode == Enum.KeyCode.D then
  KeyHeldD = true
  while KeyHeldD and DroneModel.BodyVelocity.Velocity.X < 10 do
    turnRight()
    DroneModel.BodyVelocity.Velocity = DroneModel.BodyVelocity.Velocity +
    Vector3.new(0.5,0,0)
    wait()
  end
end
if inputObject.KeyCode == Enum.KeyCode.W then
  KeyHeldW = true
  while KeyHeldW and DroneModel.BodyVelocity.Velocity.Z > -10 do
    turnForward()
    DroneModel.BodyVelocity.Velocity = DroneModel.BodyVelocity.Velocity + Vector3.new(0,0,-
    0.5)
    wait()
  end
elseif inputObject.KeyCode == Enum.KeyCode.S then
  KeyHeldS = true
  while KeyHeldS and DroneModel.BodyVelocity.Velocity.Z < 10 do
    turnBackward()
    DroneModel.BodyVelocity.Velocity = DroneModel.BodyVelocity.Velocity +
    Vector3.new(0,0,0.5)
    wait()
  end
end
end)
game:GetService("UserInputService").InputEnded:connect(function(inputObject,
gameProcessedEvent)
if not DRONE then return false end
if inputObject.KeyCode == Enum.KeyCode.Space or inputObject.KeyCode ==
Enum.KeyCode.LeftShift then
  KeyHeldSpace = false
  KeyHeldShift = false
  DroneModel.BodyVelocity.Velocity =
  Vector3.new(DroneModel.BodyVelocity.Velocity.X,0,DroneModel.BodyVelocity.Velocity.Z)
end

```



```

if inputObject.KeyCode == Enum.KeyCode.A then
KeyHeldA = false
elseif inputObject.KeyCode == Enum.KeyCode.D then
KeyHeldD = false
end
if inputObject.KeyCode == Enum.KeyCode.W then
KeyHeldW = false
elseif inputObject.KeyCode == Enum.KeyCode.S then
KeyHeldS = false
end
end)-- when drone lifts up
local x = false
DroneModel.Touched:connect(function(hit)-- function is activated when the drone touches
something and explodes
if x == false then
x = true
local explosion = Instance.new("Explosion")
explosion.Position = DroneModel.CFrame.p
explosion.Parent = DroneModel
wait(0.5)
DroneModel:Destroy()
DRONE = false
Player.Character.Humanoid.WalkSpeed = 16
Camera.CameraType = "Custom"
Camera.CameraSubject = Player.Character
wait(1)
x = false
end
end)

```



## 2. VR SIMULATOR

### 2.1. GENERAL

Download files. Link: <http://www.droneteamproject.eu/results/download-area2/228-vr-droneteam-simulator>



Video demo: [https://youtu.be/VBy0F\\_8Y22s](https://youtu.be/VBy0F_8Y22s)

### 2.2. MINIMUM REQUIREMENTS FOR HTC VIVE

**Graphics:**

NVIDIA GeForce GTX 1060 or AMD Radeon™ RX 480, equivalent or better.

**Processor:**

Intel Core™ i5-4590 or AMD FX™ 8350, equivalent or better.

**Memory:**

4 GB RAM or more.

**Video out:**

HDMI 1.4, DisplayPort 1.2 or newer USB ports: 1x USB 2.0 or better port.

**Operating system:**

Windows 7 SP1, Windows 8.1 or later, Windows 10.



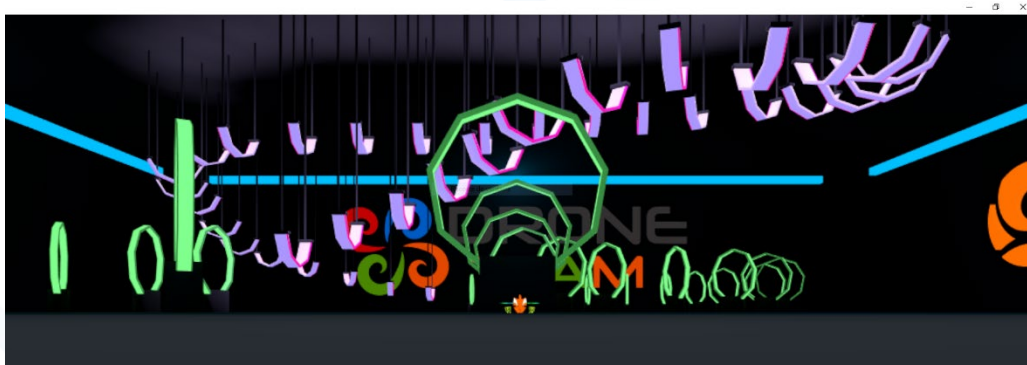
## 2.3. HOW TO SET UP HTC VIVE FOR THE RV DRONETEAM SIMULATOR

In this section we will learn how to test the DroneTeam Virtual Reality simulator with the HTC Vive glasses.

1. Download the program to configure the HTC Vive, which you have here.
2. Download the simulator itself (you can find it in the download section). We can also access from here.
3. Once we have the resources in hand, we have to configure the HTC Vive with the previously downloaded program, this program includes an assistant which will help us to configure our Virtual Reality glasses.
4. Then, with the glasses already configured, we have to unzip the file .zip that we had downloaded earlier, called DroneTeam Simulator.
5. This file will be decompressed in a folder, and within that folder we have everything necessary to use the DroneTeam Simulator. As we can see, the folder contains another folder, an extension .dll and an application called DroneVR.

|                 |                  |                        |           |
|-----------------|------------------|------------------------|-----------|
| DroneVR_Data    | 31/05/2018 10:41 | Carpeta de archivos    |           |
| DroneVR         | 12/12/2017 15:49 | Aplicación             | 636 KB    |
| UnityPlayer.dll | 12/12/2017 15:57 | Extensión de la apl... | 21.781 KB |

All we have to do is double click on the application DroneVR and the simulator will automatically open, which looks like this:



### 3. DRONETEAM AR APPLICATION

Augmented Reality app created for DroneTeam promotion. AR DroneTeam APP for Android devices. With Augmented Reality. You need to focus the DroneTeam Logo. Drone is flying and you can link to the project website or view a video about DroneTeam Project Consortium.

1. Download application from Google Play or from Download Area section.



<https://play.google.com/store/apps/details?id=com.AIJU.droneteam&hl=en>

Download Area. Link: <http://www.droneteamproject.eu/results/download-area2/229-ar-droneteam-app>

2. Once we have downloaded the application and are in it, centre the phone with the logo of DroneTeam.

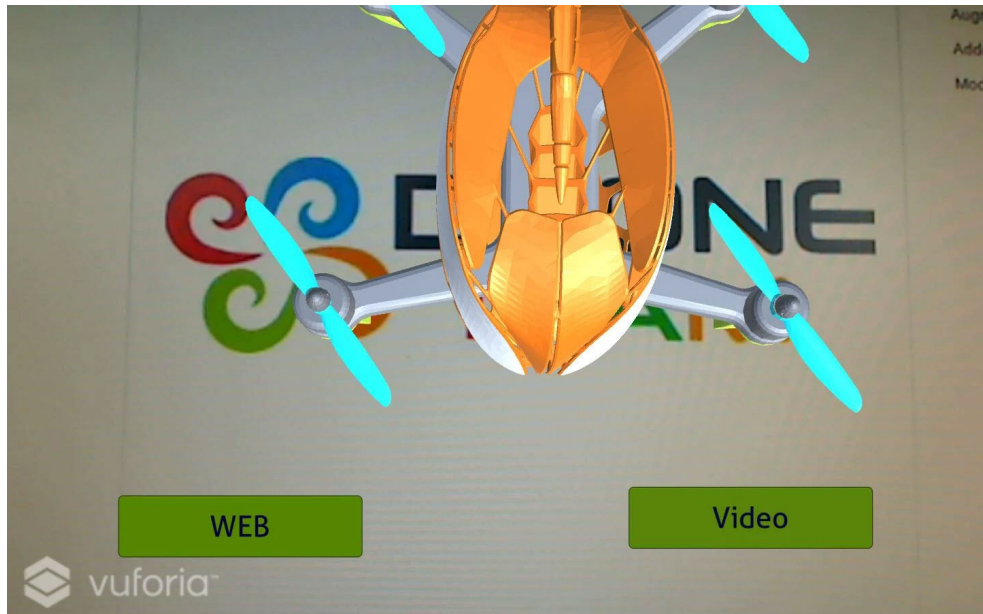


3. Now we can see the 3D model of DroneTeam drone.





4. It should be added that we have two buttons with which we can access the official website and an explanatory video.



## 4. DRONETEAM HOLOGRAM



Hologram created for promotion. Video Link: <https://youtu.be/8NI55qhJpWQ>