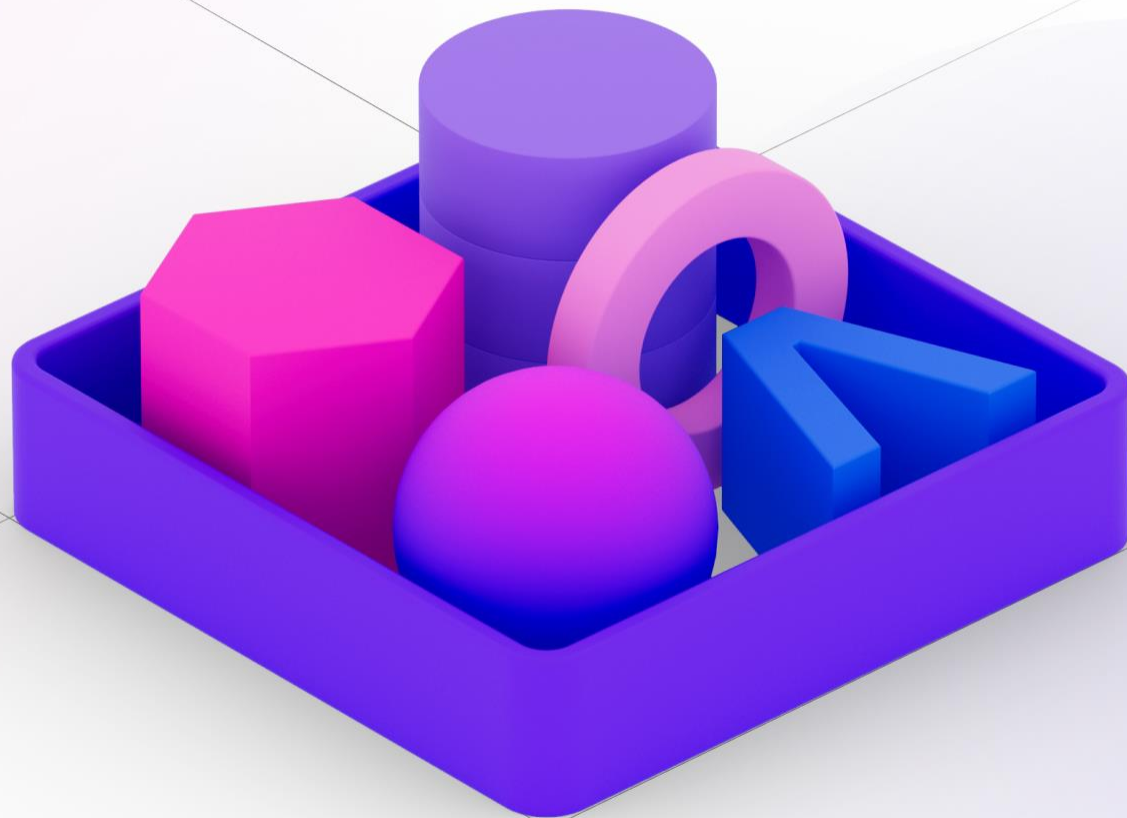


# .NET Conf

Focus on modern code



# Coding a Drone Using Unity/.NET and ChatGPT AI

Zaid Zaim  
Spatial Computing Expert at ignore gravity  
Microsoft MVP







ignore gravity







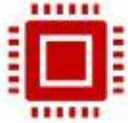
# DJI Tello Tech-specs



Flight Time: 13 minutes



Image Transmission  
Distance: 100 meters



Intel Processor,  
Professional processing  
yields high-quality  
footage.



Smart Switching: 2  
Antennas



HD Transmission: 720p



Auto Takeoff/Landing



Fail-safe Protection



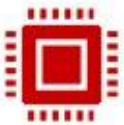
Lift off or land with a  
single tap.



Low Battery  
Protection



Alerts go off when  
your battery gets  
low.



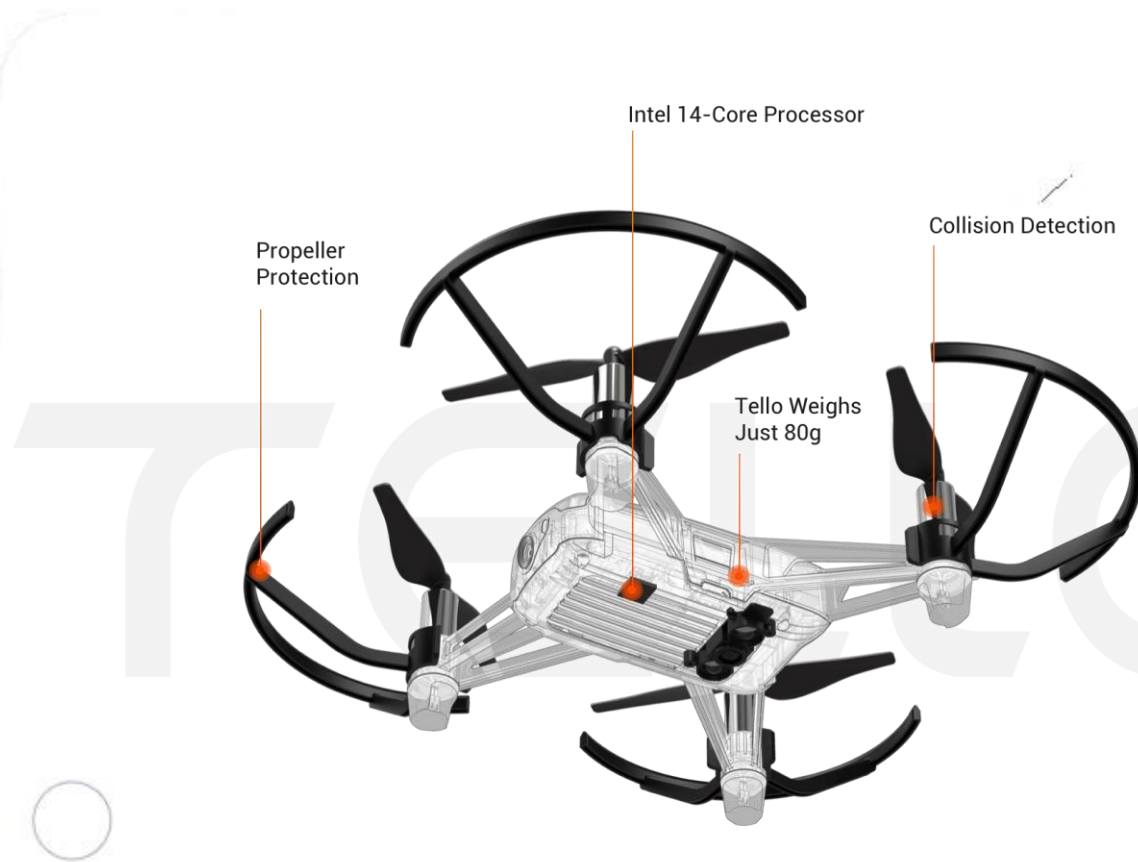
Smart technology  
that facilitates  
precise hovering.



Land safely, even if  
you lose connection.



Vision Positioning  
System



*Credits: Bruno Capuano*

# Playground for Today



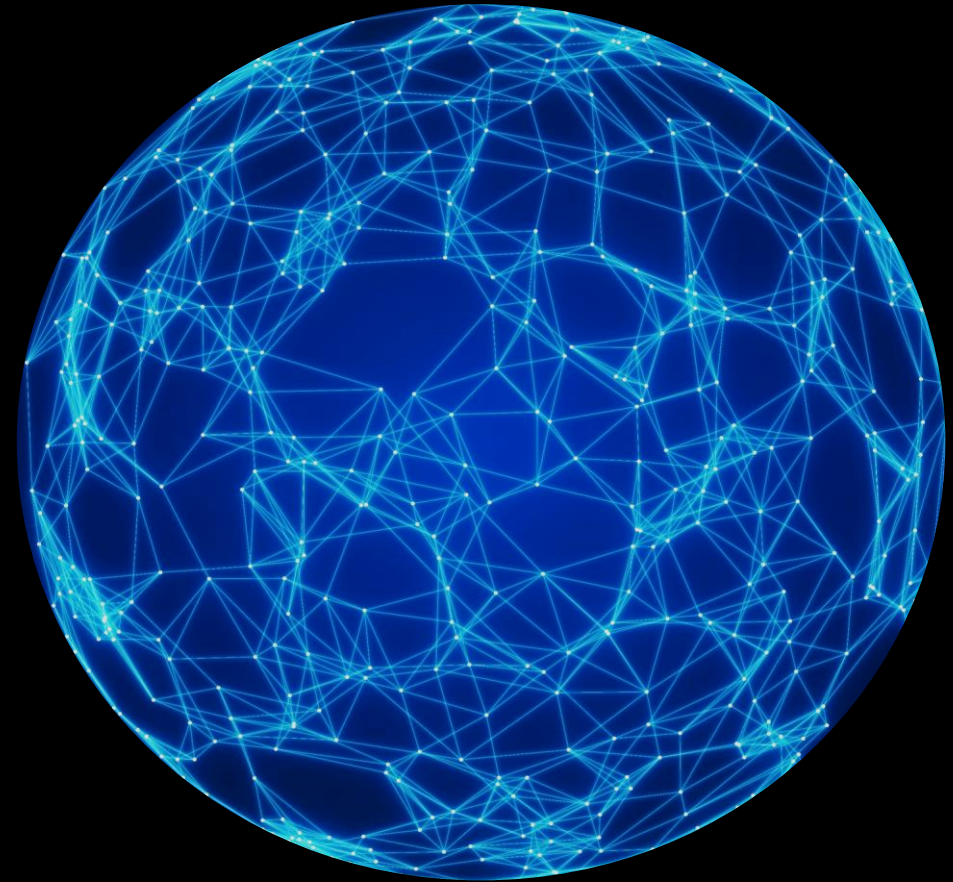


Physical



Mixed Reality

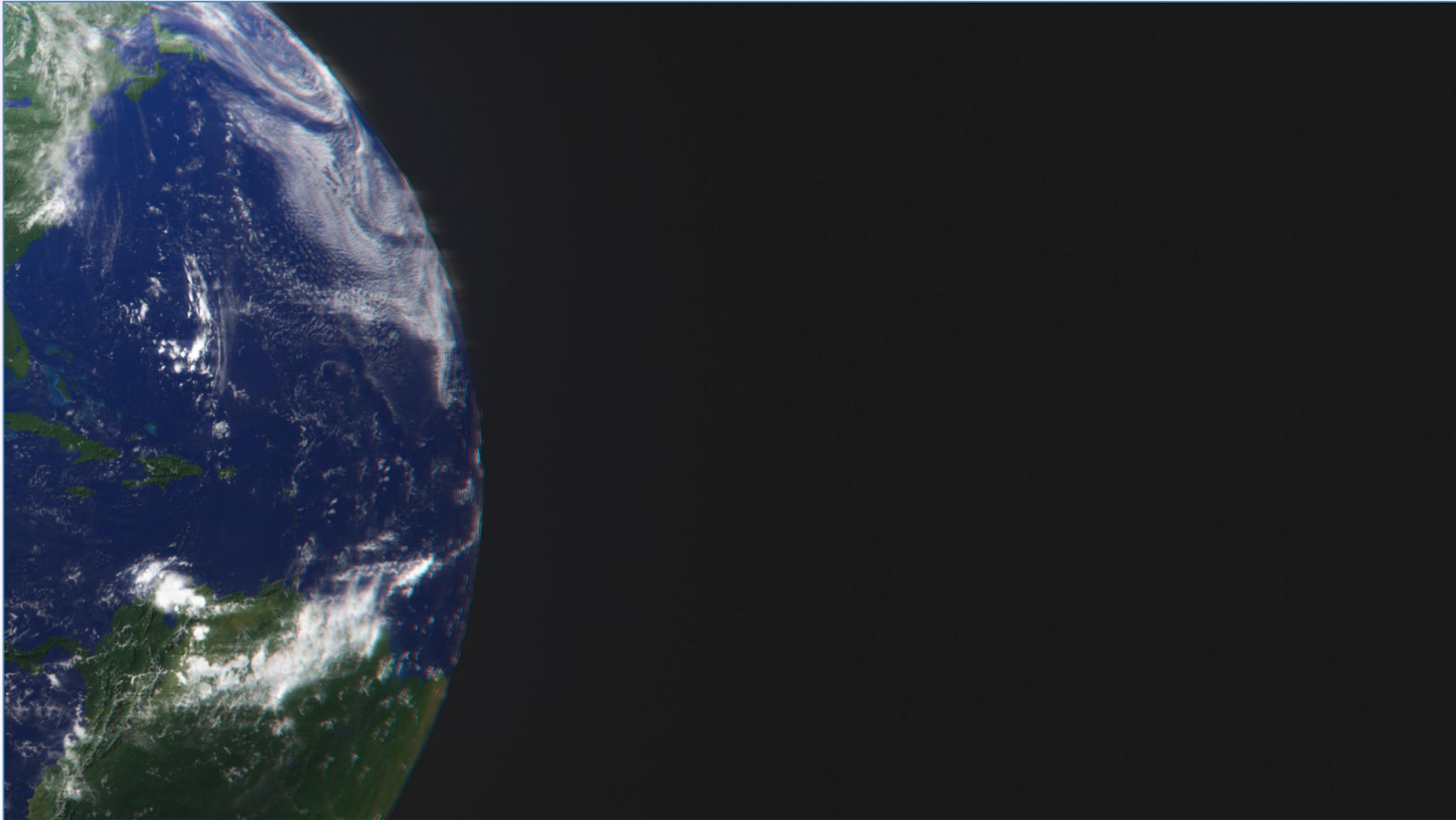
Virtual



Discover what's possible while staying grounded in the familiar



## KEY INNOVATIONS IMMERSION



Touch holograms – Fully articulated Hand Tracking



# Architecture

Use Wi-Fi to establish a connection between the Tello and PC, Mac, or mobile device.

## Send Command & Receive Response

Tello IP: 192.168.10.1 UDP PORT: 8889 <<- ->> PC/Mac/Mobile

Step 1: Set up a UDP client on the PC, Mac, or mobile device to send and receive messages from the Tello via the same port.

Step 2: Before sending any other commands, send "command" to the Tello via UDP PORT 8889 to initiate SDK mode.

## Receive Tello State

Tello IP: 192.168.10.1 ->> PC/Mac/Mobile UDP Server: 0.0.0.0 UDP PORT: 8890

Step 3: Set up a UDP server on the PC, Mac, or mobile device and check the message from IP 0.0.0.0 via UDP PORT 8890. Steps 1 and 2 must be completed before attempting step 3. For more details, refer to the Tello State section.

\* Refer to the Tello State section for details.

## Receive Tello Video Stream

Tello IP: 192.168.10.1 ->> PC/Mac/Mobile UDP Server: 0.0.0.0 UDP PORT: 11111

Step 4: Set up a UDP server on the PC, Mac, or mobile device and check the message from IP 0.0.0.0 via UDP PORT 11111.

Step 5: Send "streamon" to the Tello via UDP PORT 8889 to start streaming. Steps 1 and 2 must be completed before attempting step 5.

## Tello Command Types and Results

The Tello SDK includes three basic command types.

### Control Commands (xxx)

- Returns "ok" if the command was successful.
- Returns "error" or an informational result code if the command failed.

### Set Command (xxx a) to set new sub-parameter values

- Returns "ok" if the command was successful.
- Returns "error" or an informational result code if the command failed.

## Tello Commands

### Control Commands

Command	Description	Possible Response
Command	Enter SDK mode.	ok / error
takeoff	Auto takeoff.	
land	Auto landing.	
streamon	Enable video stream.	
streamoff	Disable video stream.	
emergency	Stop motors immediately.	
up x	Ascend to "x" cm. x = 20-500	
down x	down "x" Descend to "x" cm. x = 20-500	
left x	Fly left for "x" cm. "x" = 20-500	
right x	Fly right for "x" cm. "x" = 20-500	
forward x	Fly forward for "x" cm. "x" = 20-500	
back x	Fly backward for "x" cm. "x" = 20-500	
cw x	Rotate "x" degrees clockwise. "x" = 1-360	
ccw x	Rotate "x" degrees counterclockwise. "x" = 1-360	
flip x	Flip in "x" direction. "l" = left "r" = right "f" = forward "b" = back	
go x y z speed	Fly to "x" "y" "z" at "speed" (cm/s).  "x" = -500-500 "y" = -500-500 "z" = -500-500 "speed" = 10-100  Note: "x", "y", and "z" values can't be set between -20 – 20 simultaneously.	

Model: GPT-4



Write me a unity c# script that implements Tello's following architecture:



Architecture

Use Wi-Fi to establish a connection between the Tello and PC, Mac, or mobile device.

Send Command & Receive Response

Tello IP: 192.168.10.1 UDP PORT: 8889 <<- ->> PC/Mac/Mobile

Step 1: Set up a UDP client on the PC, Mac, or mobile device to send and receive messages from

the Tello via the same port.

Step 2: Before sending any other commands, send "command" to the Tello via UDP PORT 8889 to

initiate SDK mode.



Sure, here is a simple C# script using Unity's built-in `UdpClient` which will allow you to send and receive messages from a Tello drone. This script should be attached to a Unity GameObject in your scene. Please make sure to adjust the script according to your specific requirements:



csharp

Copy code

```
using System;
using System.Text;
using System.Net;
using System.Net.Sockets;
using System.Threading;
using UnityEngine;

public class TelloController : MonoBehaviour
{
    private UdpClient client;
    private IPEndPoint droneEndPoint;
    private Thread receiverThread;
    private bool isRunning;

    // Tello's IP and Port
    private string telloIP = "192.168.10.1";
    private int telloPort = 8889;

    void Start()
    {
        // Create a new UDP client with the Tello's IP and Port
        droneEndPoint = new IPEndPoint(IPAddress.Parse(telloIP), telloPort);
        client = new UdpClient();

        // Start the SDK mode
        SendCommand("command");

        // Start the receiver thread
        isRunning = true;
        receiverThread = new Thread(new ThreadStart(Receiver));
    }

    void Receiver()
    {
        while (isRunning)
        {
            try
            {
                IPEndPoint anyIP = new IPEndPoint(IPAddress.Any, 0);
                byte[] data = client.Receive(ref anyIP);

                string text = Encoding.UTF8.GetString(data);
                Debug.Log(">> " + text);
            }
            catch (Exception e)
            {
                Debug.Log(e.ToString());
            }
        }
    }

    void SendCommand(string command)
    {
        byte[] commandBytes = Encoding.ASCII.GetBytes(command);
        client.Send(commandBytes, commandBytes.Length, droneEndPoint);
    }

    void OnApplicationQuit()
    {
        // Close the UDP client and stop the receiver thread
        isRunning = false;
        client.Close();
    }
}
```

Regenerate response

```
// Start the SDK mode
SendCommand("command");
```

```
// Start the receiver thread
isRunning = true;
receiverThread = new Thread(new ThreadStart(Receiver));
receiverThread.IsBackground = true;
receiverThread.Start();
}
```

```
void OnApplicationQuit()
```

```
{
    // Close the UDP client and stop the receiver thread
    isRunning = false;
    client.Close();
}
```

```
// Function to send a command to the Tello
```

```
public void SendCommand(string command)
{
    byte[] commandBytes = Encoding.ASCII.GetBytes(command);
    client.Send(commandBytes, commandBytes.Length, droneEndPoint);
}
```

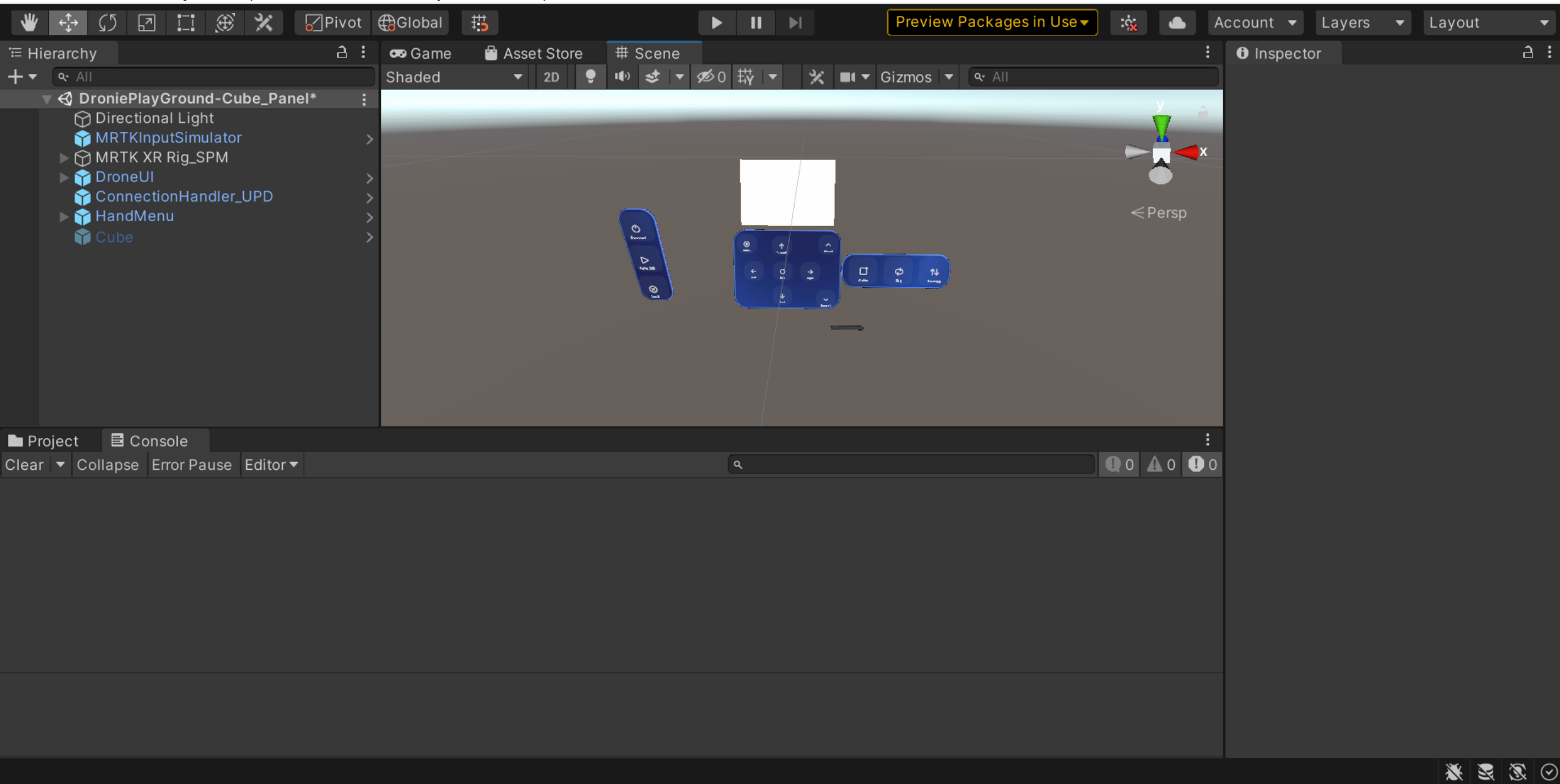
```
// Function to receive responses from the Tello
```

```
private void Receiver()
{
    while (isRunning)
    {
        try
        {
            IPEndPoint anyIP = new IPEndPoint(IPAddress.Any, 0);
            byte[] data = client.Receive(ref anyIP);

            string text = Encoding.UTF8.GetString(data);
            Debug.Log(">> " + text);
        }
        catch (Exception e)
        {
            Debug.Log(e.ToString());
        }
    }
}
```

Regenerate response





ignore gravity



hololux



*Thank you for joining us on this  
journey and for being an incredible  
RockStar*

<3

# Resources

- [Introduction to mixed reality - Training | Microsoft Learn](#)
- [The .NET Docs Show - Let's code a drone to follow faces with Bruno Capuano](#)
- [Overview of Learn modules for Mixed Reality - Mixed Reality | Microsoft Learn](#)
- [Unity Real-Time Development Platform | .NET \(microsoft.com\)](#)
- Project Repo: <https://github.com/hololux/MixedReality-Tello-drone> - Hololux GmbH Org.