

# Oculus Rift Development Kit 2



Sam Clow  
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# Executive Summary

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This document will introduce developers to the Oculus Rift Development Kit 2.

It is clear that virtual reality is the future of immersive gaming and Oculus VR is at the forefront. The Oculus Rift is the closer to a life like virtual reality gaming experience than ever seen before.

Oculus VR is a new company which has already seen immense support as customers eagerly await the release of a consumer ready Oculus Rift. Their Kickstarter campaign raised \$2.4 million.

The Rift is a gaming system, with a head-mounted display that immerses its user into a virtual reality. The Oculus Rift DK2 is a set of virtual reality goggles designed to immerse the user in a 3-D, lifelike world. The internal screen displays two images side by side, one for each eye. Attached to the headset are motion sensors which follow the user's movements. Overall the headset works to create the sensation of looking or walking around a 3-D world.

- The DK2 stands out because of its:
- Positional tracking
- Low persistence OLED display
- Built in latency tester
- Engine integrations
- Oculus SDK

Once the customer ready Rift is released there will be high demand for compatible games. The Development Kit 2 is the fastest and easiest way for developers to create such games. This kit includes all the necessary equipment and software to get developers started in the creation process.

## Glossary

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**Kickstarter** – A crowd sourced, funding website which acts to raise money for start-up companies or new inventions.

**Latency**- A time delay between the cause and the effect of an action in a computer generated environment.

**Virtual Reality**- A computer-simulated environment that can simulate physical presence in a digitally created scene.

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# Introduction

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The purpose of this document is to introduce developers to the Oculus Rift. No gaming system is successful if it does not support the latest, most incising games. The Development Kit 2 will allow you, as developers, to create such games.

There is no doubt that virtual reality is the future of gaming, and Oculus is on the forefront of its creation. The consumer ready Oculus Rift will be released in 2015 and will need games to accompany it.

This kit will allow developers to create the best and most compatible games for the Rift. This kit brings with it the closest to consumer ready virtual reality system ever seen. It will allow developers to see exactly how their games will be seen and played. It also comes with software that will give developers a head start in the game creation process.

This document will show why developers should be creating game for the Oculus Rift and why they should use the Development Kit 2 to do so. This will be show through the following:

- The future of gaming
- Oculus VR
- What is the Rift
- How the Development Kit 2 stands out
- Conclusion

## The future of gaming

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Gaming companies are constantly trying to make their games as realistic as possible. Graphics are continually improving and games are becoming increasingly interactive. While some systems have moved this trend forward with games that track the users movement, Oculus VR has taken it to an entirely new level. Virtual reality has never been tried in the gaming world until now. Oculus VR intends to take interactive gaming into an entirely new dimension.

Gamers are ready for the next level of interactive gaming, for their experience to become as realistic as possible, they have proven this through their support via Kickstarter.

## Oculus VR

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Palmer Luckey founded Oculus VR by raising money through Kickstarter. The ground breaking Oculus Rift raised more than \$2.4 million dollars. It garnered support from people around the world as well as top gaming companies Valve, Epic Games, and Unity. This publicly funded beginning ensures that a large base of people are already interested in the Oculus Rift and ready to spend money on it.

The company's goal is to "to revolutionize the way people experience interactive content." [1].

## What is the Rift

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The Oculus Rift Development Kit 2 (DK2) is a virtual reality gaming system, with a head-mounted display. This system comes closer to a consumer ready virtual reality than any other systems before it. [2]

### How it works

The Oculus Rift DK2 is a set of virtual reality goggles designed to immerse the user in a 3-D, lifelike world. The internal screen displays two images side by side, one for each eye. Lenses are set up in front of this screen in order to shape and focus the image and make it appear 3-D. Attached to the headset are motion sensors which follow the user's movements. These are accompanied by an external camera which also tracks the user's position and movements, ensuring that the image can be adjusted accordingly. Overall the headset works to create the sensation of looking or walking around a 3-D world. [2] [3]

### Design

Figure 1 depicts the headset itself, which weighs in at 14.7 ounces. It has a sleek rounded design which includes a single power button and light. Two wires run from the forehead panel down the back of the headset where they connect into a cloth covered cable. This cables reaches 6 feet and is used to power the headset as well as connect it to the computer. [2] [4]

Figure 2 shows the position tracking camera, which has a fairly simple design which resembles that of a table mounted web-cam. This is separate from the headset itself. [2] [4]



Figure 1: The headset while worn [3]



Figure 2: The position tracking camera [3]

### Growth

Many small improvements have been made since Development Kit 1. The DK2 includes the position tracking camera as mentioned earlier, which is able to ensure more accurate

movement tracking. This version also has the addition of low persistence display which ensures the image appears more stable. Less blurring and judder will significantly reduce motion sickness in the users. DK2 also boosts a built-in latency tester which the original did not have. This kit also includes engine integrations and Oculus source code which will allow developers to gain a head start in creating their products. The DK2 is slightly more expensive than its predecessor coming in at \$350 rather than the \$300 DK1 listed for. [2] [5]

## How the Development Kit 2 Stands Out

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This kit will enable developers to create compatible games by the expected 2015 launch of a consumer ready Oculus Rift. [2]

### Positional tracking

The Development Kit 2 comes with a position tracking camera, which is shown in Figure 2. This is a new feature that has shown itself to be instrumental in creating the most realistic virtual reality experience. This camera adds considerable accuracy for in game position tracking. This will track all of the user's real world movements and portray them in the game.

This camera means that even the slightest moves will be picked up and imitated in the game. This will add to the virtual reality experience, making it as life like as possible.

With this camera tracking every move a developer makes while testing, they will be able to see every angle of their game world. This means they can build their game accordingly, with as much detail as they see necessary. [5]

### Low persistence OLED display

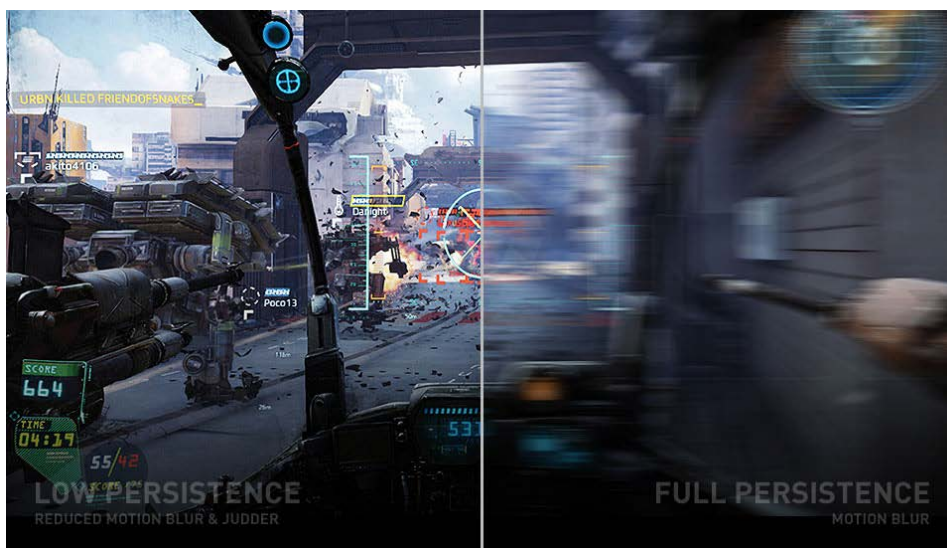


Figure 3:Low persistence vs Full persistence [5]

Low persistence OLED (organic light-emitting diode) display is what makes a scene look stable. This will eliminate motion blur and judder, meaning one less element that could take the user out of the game and back to reality.

As can be expected, a major drawback to such immersive virtual reality is motion sickness. This low persistence display will help to stop that. With a more stable scene, less blurring and shaking, the user will feel significantly more comfortable. The scene will remain as stable as any real situation.

For developers this means users will be able to take in the full detail of the game world. Scenes will not be blurred and missed due to any sudden movements. The full detail will be taken in. Motion sickness is of course something that could discourage people from buying certain games but with this low persistence display that will not be a problem. [5]

## Built-in latency tester



**Figure 4:** The built in latency tester [5]

This tester ensures real-time microsecond precision measurement of motion-to-photon latency. This ensures the least amount of lag, which lets you optimize the user's virtual reality experience.

What this means is that when the user makes any move in the game the reaction will be as close to instantaneous as possible. For instance if the user chooses to go from one destination to another there will be no delay the new destination will appear right away.

This creates the most life like environment possible as the real world sees no delays moving from one scene to another.

Without having to wait for such delays the user will get more game time. This gives the developer the opportunity to create more scenes, as users will be more likely to do more in the game if there is little delay involved.



## Engine integrations

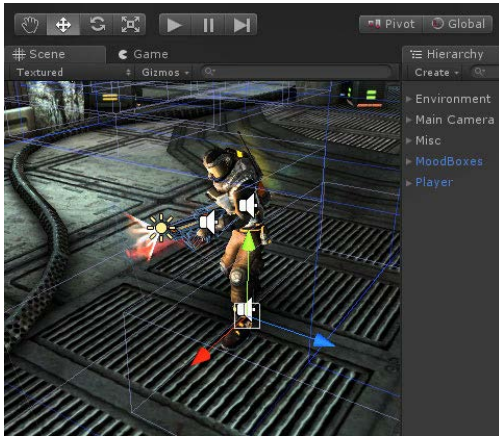


Figure 5: Example of the available software

This kit includes out-of-the-box engine integrations for the Unreal Development Kit, Unreal Engine 4, and Unity 4.

These are the major tools that any developer would use in the creation of their game. These integrations mean that any developer who does use these tools will have a head start. All the information needed to get started will already be available in these programs.

This means that getting started in the creation of a virtual reality game is now faster and easier than ever before.



Figure 6: Compatible developers' tools

## Oculus SDK

Oculus SDK (software development kit) includes source code and documentation which will give developers all the information they need to create games compatible with Oculus.

Both the Oculus Rift and the Oculus SDK are currently supported by Windows, Mac OS X, and Linux.

This means that using any of these systems a developer will be able to get started quickly and easily. They will have all the information they need readily available and will not have to learn as they go.

## Testimonials

“Oculus Rift is a new virtual reality (VR) headset designed specifically for video games that will change the way you think about gaming forever. With an incredibly wide field of view, high resolution display, and ultra-low latency head tracking, the Rift provides a truly immersive experience that allows you to step inside your favorite game and explore new worlds like never before.” [6]

“The next generation of Oculus Rift is here, and the improvements make an impressive device even more impressive.” [6]

“Based on my experience, developer interest, and consumer enthusiasm exhibited at PAX Prime, the Oculus Rift looks like it’s definitely ready to lead the way into virtual reality gaming.” [6]

## Conclusion

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It is clear that virtual reality is the future of immersive gaming and Oculus VR is at the forefront. The Oculus Rift is the closer to a life like virtual reality gaming experience than ever seen before.

Once the customer ready Rift is released there will be high demand for compatible games. The Development Kit 2 is the fastest and easiest way for developers to create such games. This kit includes all the necessary equipment and software to get developers started in the creation process.

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