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Developing Applications Using Multiple Kinects

Over the course of the last few chapters, you have gained enough knowledge in developing applications using Kinect for Windows SDK, and now the time is ripe to take the development process one step further by including multiple Kinects in our development domain. Applications can be developed for multiple Kinects using Kinect for Windows SDK. Kinect for Windows SDK supports as many as four Kinect sensors to plug into a single system. With the aid of multiple Kinects, we can make even more feature-rich and interactive applications, such as capturing data from a specific sensor, a failover application where one Kinect acts as a backup and starts automatically when the other one is down, building a security system that detects intrusion in different locations, 3D modeling of data and so on. This takes the app experience to a completely different level.

We need to keep a few things in mind before proceeding to developing applications using multiple Kinects. The area that we need to be careful about is the setting up of the environment for using multiple Kinects. This chapter deals with multiple Kinects, covering fundamentals of development with multiple Kinects, where you will learn how to configure an environment for multiple Kinects, identify and capture data from multiple devices, control individual sensors, and so on. The following areas will be primarily covered in this chapter:

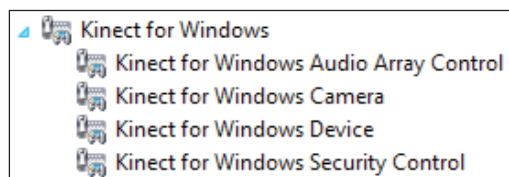
- Setting up the environment for multiple Kinects
- Multiple Kinects – how to reduce interference
- Detecting multiple Kinects
- Developing an application using multiple Kinects
- Controlling multiple sensor status change
- Handling a failover scenario using Kinects
- Challenges faced in developing applications using multiple Kinects
- Applications where multiple Kinects can be used

Setting up the environment for multiple Kinects

In *Chapter 2, Getting Started*, we have discussed details about the installation and verification of Kinect device drivers and setting up the development environment. There is not much difference with respect to the setup or the driver installation when we deal with more than one Kinect. The problem will start once you have plugged in multiple devices in a single system. Let's have a look at what will happen if you start plugging in the sensors one by one; we will consider having two Kinect sensors at this time.

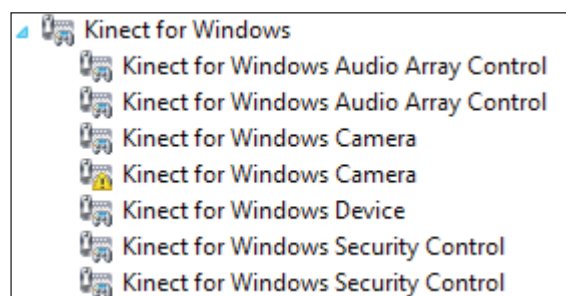
Plugging the first Kinect sensor

Once you have plugged in the first Kinect, navigate to **Control Panel | Device Manager**, look for the **Kinect for Windows** node and you will find the list of components detected as shown in the following screenshot:



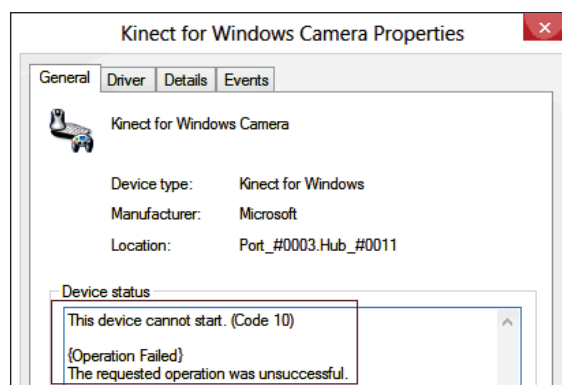
Plugging the second Kinect sensor

Now, plug in another sensor into the system and again navigate to **Control Panel | Device Manager**; look for the **Kinect for Windows** node (if you are already there, you will find the device manager refreshing automatically) and you will find the list of components as shown in the following screenshot:



From the detected component list, it looks like every component is detected twice as there are two Kinects plugged in. If you take a closer look into the list of detected components, you will find that one of the **Kinect for Windows Camera** devices shows the *exclamation mark*.

Double-click on the particular node that shows the warning and check for the device's status. If it shows **This device cannot start. (Code 10)**, it clearly indicates that one of the Kinect cameras could not be loaded due to some reason. This is shown in the following screenshot:



Most of the time, developers do not notice this warning and start with the development, which causes an exception during the initialization of that particular Kinect sensor.

We will encounter a similar problem with other sensors as well if you try to add more devices. Before going ahead with further development, you should know the reason behind it and how to troubleshoot the issue.

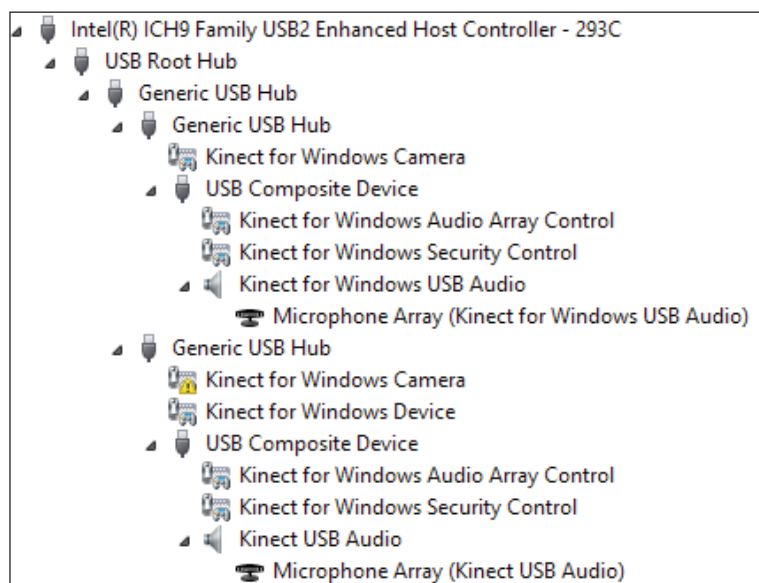
Kinect sensors require an individual USB Controller

Kinect sensors consume a good amount of bandwidth of the USB port; hence, more than one Kinect can't be operated by a single USB Controller. While you are working with multiple Kinects, the only thing you need to take care of is that each of the Kinects has to be connected to a different USB Controller.



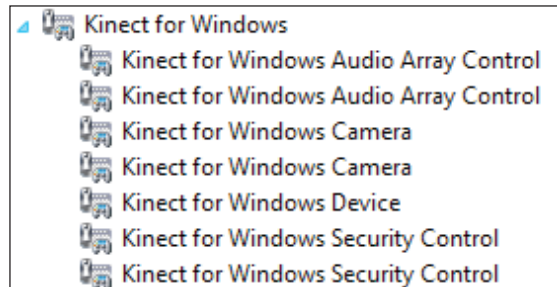
A USB Controller is different from a USB port, and multiple USB ports can be controlled by the same controller. The number of controllers your machine has can be seen in the device manager.

At this point, if you change the view of the device manager from **Device by type** to, **Device by connection**, you will find something similar to the following screenshot where you can see that both the Kinect sensors are plugged under a single USB Controller (293C):

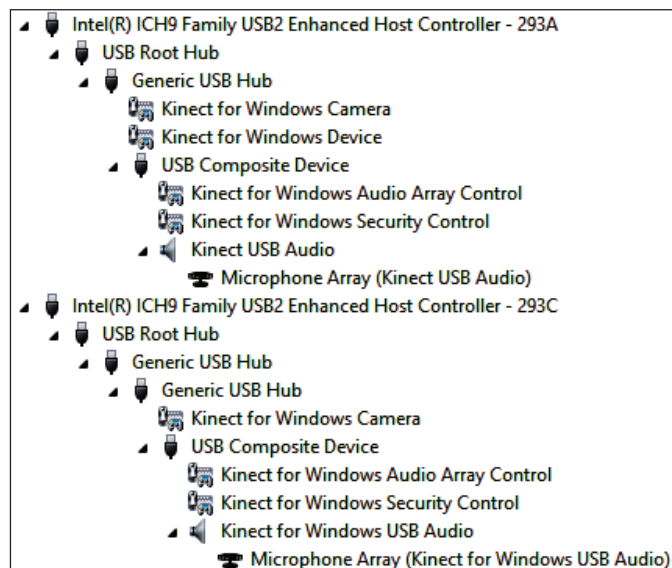


As the USB bandwidth is important, Kinect reserves the bandwidth for the camera for the first time when the drivers load. So, the first Kinect that is loaded will hold the bandwidth it needs. Then, any further connected Kinects will fail to load their camera drivers. Even if you aren't using the first loaded device, it will still hold the bandwidth for its own use. During unload, Kinect releases the bandwidth.

Once you have devices plugged into different USB Controllers, and external power has been supplied for both the devices, you will be able to locate both the devices with camera and audio control within the device manager section as shown in the following screenshot:



To be sure that your devices are plugged into multiple USB Controllers, again change the view to **Device by connection** and you will find that both the devices are connected to different USB Controllers (**293A** and **293C**) as shown in the following screenshot:



Typically, laptops come with a single USB Controller whereas PCs come with one USB Controller in the front and one at the back. Many of the laptops have the docking station, which has different USB Controllers, while with PCs generally you can change the USB port to try it out or check it from the device manager for the number of USB Controllers. There are a number of external USB Controllers available that you can use in such scenarios.