



IEEE Okanagan College  
Student Branch  
and  
IEEE Okanagan Subsection  
Presents

Valentin Koch, Principal Research Engineer, Autodesk, Inc.

## Rotations in 3D Graphics Programming and the Gimbal Lock

**Time & Date:** 6:30 pm on January 27, 2016

**Location:** Okanagan College Room E 310

**Talk Abstract:**

Rotations are fundamental in 3D computer programs, such as video games, 3D modelling, and embedded navigation systems. A frequent mistake in 3D graphics programming is to use the so-called Euler angles, or Euler matrices, to rotate objects around the traditional X, Y, and Z-axis. In this talk, Valentin will show why using Euler angles can lead to situations where an object loses one degree of freedom. The problem is referred to as the “Gimbal Lock”. With some mathematical examples, Valentin will show why Gimbal Lock occurs and will present different techniques to perform rotations in 3D that avoid the issue. This talk is for people who are interested in 3D graphics programming and have a basic understanding of Linear Algebra and matrix computations.

**Speaker Biography:**

Valentin Koch joined Autodesk, Inc., in 2010 to help create the new road and highway optimization service. He is the product owner of the InfraWorks 360 optimization services, and he is architect of the optimization algorithms. Valentin previously worked as a consultant in operations research and optimization. He holds an MSc in mathematics and a BSc in mathematics and computer science. Valentin has published several articles in peer-reviewed journals about subjects that are related to optimization and operations research, including applications in road design optimization and resource allocations for road construction.

**Refreshments** will be provided. For further information please contact:  
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