KUESA™ 3D Studio

The Complete Design-to-code Workflow Solution for 3D Assets in Real-time Applications

Building software that is dependent on real-time 3D models – be that an automotive dashboard, MRI machine, factory control system, or furniture design tool – requires not only 3D designers and 3D programmers, but the ability to bring these very different skillsets together into a smoothly operating workflow. A massive problem here is that the assets created by 3D artists can rarely be used by programmers directly, forcing the development team to hand-tweak models and hand-code animations to make things work. It also forces designers to move their designs to target hardware in order to see how they'll actually appear. This manual work extends product release timelines, and the artificial wall it creates between 3D artists and software engineers is a bottleneck that all but eliminates rapid iteration and the fine-tuning required to create high-quality products.

KDAB specifically created KUESA™ 3D Studio to eliminate this problem. KUESA 3D Studio makes for an easy, integrated workflow, bridging the gap between designers and developers. Designers can realize their vision using the tools they are experts in, developers can focus on their strengths without having to deal with design issues, and management can rely on getting better products to market faster.

KUESA 3D Studio versus other approaches

There are traditionally two main ways to integrate real-time 3D content into an application:

Workflow	Description	Drawbacks
Manual	Designers create videos of scenes and developers recreate them in code	• Creates unnecessary team overhead, communication, and work • Introduces translation errors and provides suboptimal results • Makes editing assets extremely difficult, which inhibits UX refinement and iteration
External tool	Designers and developers use a common-denominator tool, editing scenes for integration into an application	• Limits the creative process and application functionality to the constraints of a less-powerful tool • Designers and developers require retraining on unfamiliar software • Restricts knowledge, debugging, and adaptation through black box software that cannot be modified

What makes KUESA 3D Studio better?

For designers – KUESA 3D Studio has seamless plugins that allow designers to use familiar, professional 3D design tools such as Maya, Autodesk 3ds Max, and Blender (and other glTF compatible digital content creation tools) to create 3D scenes and animations. These professional-level tools also give designers additional capabilities like physically-based rendering (PBR), and objects with fully animatable and code-accessible properties for nearly every aspect of the object's appearance: geometries, cameras, materials, lights, and objects. Not only can designers build consistently photo-realistic 3D objects for their application, they can also fully specify how these objects behave and interact within a virtual environment.

For developers – The software team can use KUESA 3D Runtime to directly import designer-created and fully capable 3D objects into an application. Developers give the objects life by connecting behavioral logic to designer-specified animation triggers. Because all asset properties are accessible – from the attributes of displayed objects to the details of the rendering pipeline – developers can use the full power of the Qt 3D API to change and fine-tune the appearance of a 3D scene. With a wealth of tools within KUESA 3D Studio, designers and developers are able to inspect, preview, condition, sanity check, debug, profile, and optimize a project's 3D assets. Because no custom software, data tweaking, or hand-coded animations are required, KUESA 3D Studio makes it easy to deliver applications with highly optimized 3D models that can be simply integrated and updated as often as needed.

For managers – The workflow that KUESA 3D Studio uses from design to run-time makes it much faster to get beautiful 3D assets working in production products. Not only does this shorten the development time but, because rapid cycles become painless instead of painful, it is far easier to try out design tweaks and UX tests to ultimately create a more finely tuned product. KUESA 3D Studio uses the open standard glTF format for data exchange so it works well with current design tools, is future-proofed against new ones, and prevents vendor lock-in.

KUESA 3D Studio components

KUESA 3D Studio is comprised of three main components:

- **KUESA 3D Design Plugins** – plugins that augment a designer's preferred digital content creation tools, allowing designers to create and export fully accessible 3D scenes and to display content that visually matches the run-time environment
- **KUESA 3D Tools** – many additional utilities for fine tuning, conditioning, investigating, debugging, and optimizing 3D assets, usable by either designers or developers
- **KUESA 3D Runtime** – libraries built on top of Qt and Qt 3D that allow developers to integrate 3D scenes into applications. KUESA 3D Runtime is built on-top of the widely popular Qt 3D framework. As KDAB is the originator and maintainer of Qt 3D, we know how to wring every ounce of performance from it, providing great performance on both desktop systems and embedded boards

KUESA 3D Studio capabilities

- Support for Maya, Autodesk 3ds Max, and Blender, as well as any other glTF-compatible digital content creation tools
- Ability to build 3D scenes with PBR, non-PBR, and node-based materials
- Real-time performance on desktop and embedded systems
- Integration of both 3D and 2D assets
- Compressed textures, meshes, and images for faster load times, reduced application size, and optimal use of GPU resources
- Full programmatic access to scene items with APIs in C++ and QML
- Photo-realistic results consistent across design tools and applications
- Special effects like bloom and depth-of-field
- Up to date with Qt 3D performance improvements in Qt 5.15
- Ability to incorporate tools into a continuous integration system resulting in consistent 3D asset verification and conditioning
- Availability of AGPL 3 license for KUESA 3D Runtime

Physically Based Rendering (PBR)

PBR is able to approximate the appearance of real-world objects by considering the scientific properties of materials (such as albedo, conductivity, and microfacets) while still rendering objects in real time. KUESA 3D Studio developers can use PBR so that materials in the 3D design tool and engine are displayed identically with photo-realistic results.

Iro Material Library

Physically based rendering can generate amazing images, but not all embedded systems have enough processing power to handle it. Plus, without knowing the actual physics, PBR isn't easily tweakable to simulate materials such as a pre-defined bitmap that needs to appear glossy. For these cases, or any other where PBR may be overkill, KUESA 3D Studio supports the Iro Material Library. This KDAB library provides a catalog of materials that can simulate common surface properties (such as reflections, clear-coated paint, and transparency) and gives great looking results with less designer and GPU overhead.

KUESA 3D Studio: flexibility meets power

Some solutions take away from the abilities of designers by forcing them to relearn and use a limited proprietary tool, restrict what programmers can accomplish within their framework, and in many cases both. Having helped many companies solve these problems, we know the pain, inefficiency, and delays this architecture can cause. KUESA 3D Studio is our response: an open and extendable solution that won't lock you into someone else's product, and is architected to use already existing best-in-class tools to their full advantage.
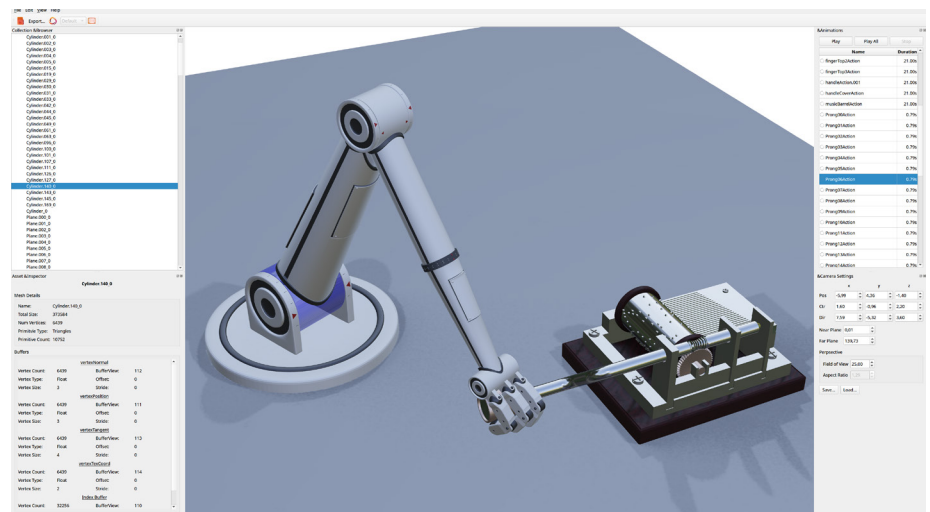
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About the KDAB Group

The KDAB Group is the world's leading software consultancy for architecture, development and design of Qt, C++ and OpenGL applications across desktop, embedded and mobile platforms and is one of the biggest independent contributors to Qt. Our experts build run-times, mix native and web technologies, and solve hardware stack performance issues and porting problems for hundreds of customers, many among the Fortune 500. KDAB's tools and extensive experience in creating, debugging, profiling and porting complex applications help developers worldwide to deliver successful projects. KDAB's trainers, all full-time developers, provide market leading, hands-on, training for Qt, OpenGL and modern C++ in multiple languages. Founded in 1999, KDAB has offices throughout North America and Europe.