

Kineo Collision Detector

Quickly analyze proximity and collisions in CAD/CAM/CAE and robotic applications

Benefits

- Enables high-performance collision detection and minimal distance computation
- Optimized for polyhedral geometry
- Can be extended to handle different data types
- Optimizes memory consumption
- Is multi-threaded and thread-safe
- Easy to learn, use and customize
- Used with leading CAD systems
- Performs collision checks and distance measurement on point clouds without constructing meshed polyhedrons

Summary

Using Kineo™ Collision Detector software from Siemens PLM Software helps you check spatial interferences, or collisions, between hierarchical assemblies of triangle mesh surfaces, or polyhedrons. Kineo Collision Detector enables you to utilize generic mechanisms for handling geometrical objects, collision tests and reports.

Kineo Collision Detector enables you to perform different kinds of interference analyses, including:

- Fast Boolean to determine if analyzed objects are colliding
- Exhaustive Boolean to determine if analyzed objects are colliding and, if so, reports every pair of colliding triangles
- Flat Boolean to determine if analyzed objects are colliding and, if so, reports lists of colliding triangles

- Exact distance to determine if analyzed objects are colliding and, if not, reports the shortest distance between them
- Exact distance with limited precision to determine if analyzed objects are colliding and, if not, reports a bounded overestimate of the shortest distance between them
- Estimated distance to determine if analyzed objects are colliding and, if not, reports an underestimate of the shortest distance between them
- Penetration to determine if objects are colliding and, if so, reports a translation vector that suppresses the collision

Every object can have its own tolerance value, which is the size of a clearance zone added around the object. Kineo Collision Detector is optimized for low response times, with a built-in multi-thread capability, enabling the best hardware performance.

Thanks to its stateless, thread-safe mode, Kineo Collision Detector enables you to run different tests over the same objects in simultaneous threads. This offers new possibilities to multithreaded applications aimed at performance and reactivity. Instead of waiting for tests to return, the process can spawn new tests in new threads and use all available computing power.

Kineo Collision Detector

Features

- Performs different types of analyses
 - Boolean collision test
 - Exhaustive collision test
 - Estimated distance computation
 - Exact distance computation
 - Estimated penetration distance computation
- Provides multiple outputs
 - Shortest distance between noncolliding objects
 - Underestimate of the shortest distance between noncolliding objects
 - Bounded overestimate of the shortest distance between noncolliding objects
 - Set of all colliding pairs of triangles, or set of all colliding triangles
- 3D geometry importers (JT, STL, STEP, VRML, etc.)
- Handles several primitives:
 - Polyhedrons
 - Point clouds
 - Rays
 - Capsules
 - User-defined
 - Assemblies of these

Kineo Collision Detector is optimized for low-memory footprint. Polyhedrons point to triangle mesh data located in user memory space, eliminating the need for duplicating data into Kineo Collision Detector objects. Further gains of memory are possible through the use of deferred initialization. You can use Kineo Collision Detector with any triangle mesh. Triangles are not oriented; their normal vectors can point to either side. Holes and disconnected triangles are not an issue.

Kineo Collision Detector offers you a fully modular collision detection and distance measurement framework. In order to implement collision detection for primitives not supported as standard by Kineo Collision Detector, you can plug a few new elementary computation bricks into Kineo Collision Detector to integrate seamlessly into the existing, open architecture.

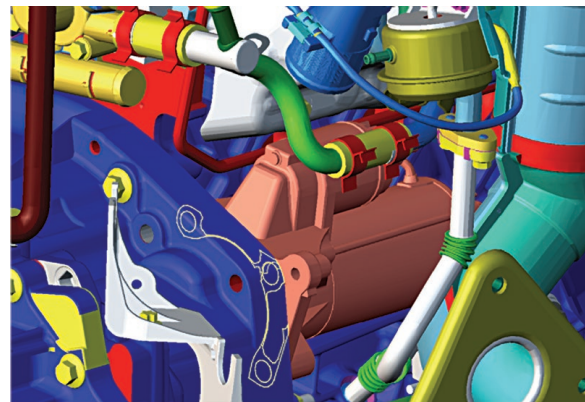
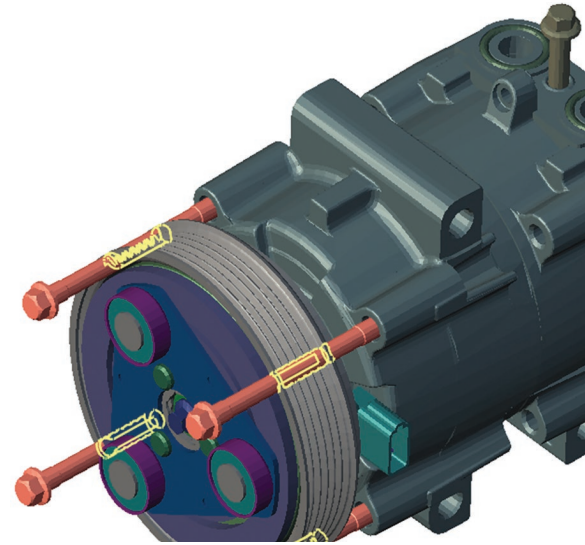
Point clouds

Kineo Collision Detector enables you to integrate collision detection for point cloud data, such as those obtained through laser scanning or optical vision sensors. There is no need to reconstruct the polyhedrons. The collision detector directly handles the heavy dataset from laser scans or vision systems.

Without the need for an initialization phase, you can use the Point Cloud component to query collision detection and proximities between two point clouds or between one point cloud and one polyhedron.

Application examples

- Clash analysis for design review
- Interactive mockup manipulation
- Robotic collision avoidance
- Graphical interference feedback



Ease of integration

Kineo Collision Detector is a software component that has been carefully designed with OEMs and system integrators in mind. Its portable architecture enables flexible integration with existing software systems. New software applications based on Kineo Collision Detector are easy to build using our complementary developer toolkit, KineoWorks™ Interact.

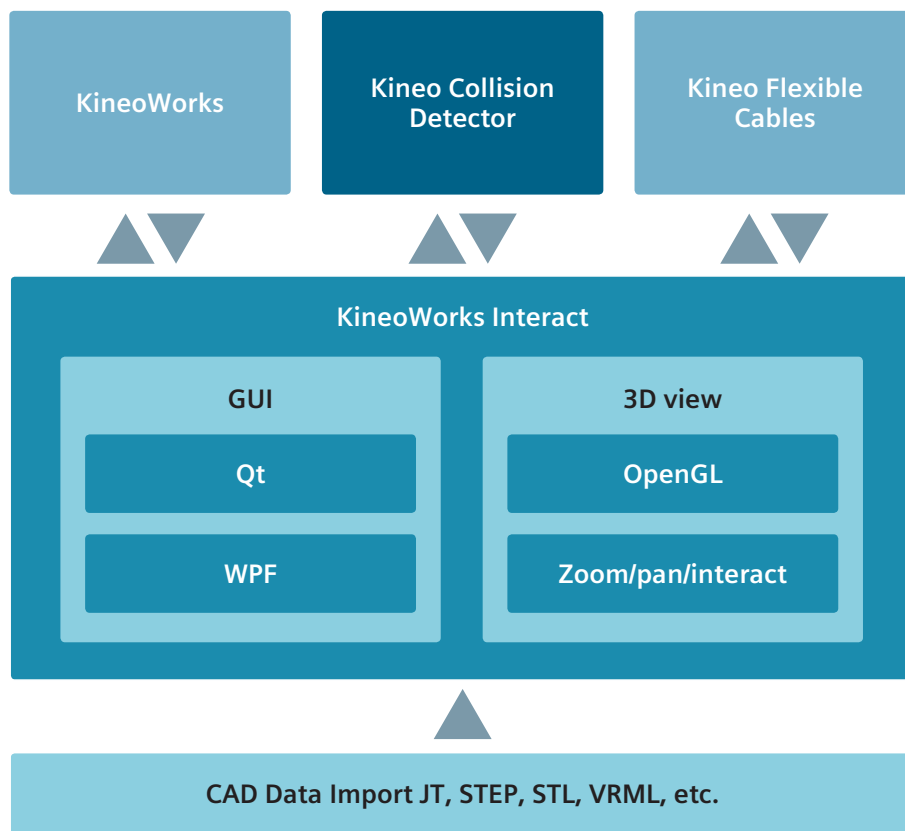
KineoWorks Interact

KineoWorks Interact is a rich CAD and robotics GUI toolkit that enables the rapid development of 3D software applications that are based on Kineo motion planning, collision detection and flexible cable simulation technologies. It is used in-house by OEMs and niche market software developers to maximize and expedite return-on-investment for their digital manufacturing solutions.

Users can easily develop and run customized and proprietary modules through standard C++/C# application programming interfaces (APIs).

Key features

- Graphical User Interface development (Qt, WPF interfaces)
- Rich 3D visualization
 - OpenGL rendering of the KineoWorks data model
 - Extensions available for rendering custom data types and for adding custom behaviors
- Mouse navigation and interaction with the model
- 3D geometry importers for JT, STL, VRML, STEP and IGES
- Support of copy/paste, undo/redo
- Support for unicode and localization
- Graphical editing of KineoWorks objects



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