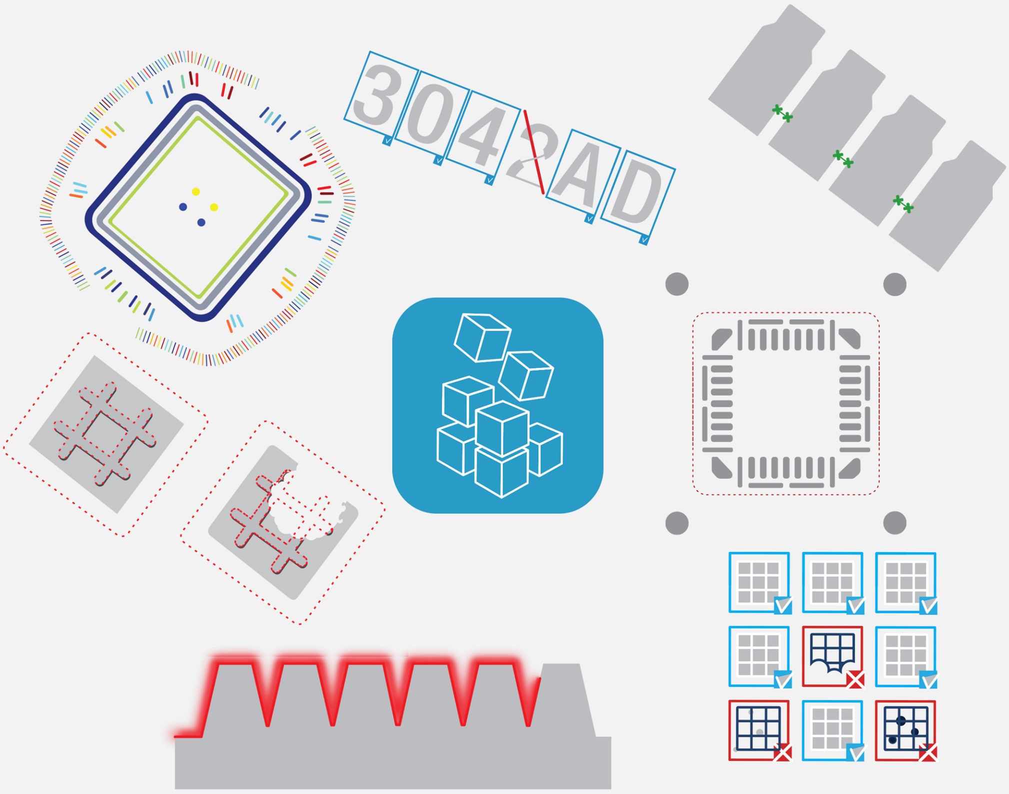
USER GUIDE

Open eVision

Easy3D Compatibility with Mech-Mind 3D Scanners



This documentation is provided with **Open eVision 2.17.1** (doc build **1160**).
www.euresys.com

Easy3D Compatibility with Mech-Mind 3D Scanners

Introduction

The **Mech-Mind** 3D sensors are structured-light cameras for industrial applications.

The specifications are available on the manufacturer website:
https://www.mech-mind.com/product/mech-eye-industrial-3d-camera.html

- This document explains how to use the 3D data coming from these sensors with **Open eVision** 3D libraries and tools.
- A sample application distributed with source code demonstrates that integration. This application is freely available in the `Easy3D Sensors Compatibility` additional resources package on **Euresys** website.

Resources

This document and the sample applications are based on the following resources:

- □ **Mech-Mind** Pro S Enhanced (it should also be compatible with all other **Mech-Mind** sensors).
- □ **Mech-Mind SDK**
- □ **Open eVision** 2.17
- □ Microsoft Visual Studio 2017

The **Mech-Mind SDK** is available at https://github.com/MechMindRobotics/mecheye_cpp_interface

Features

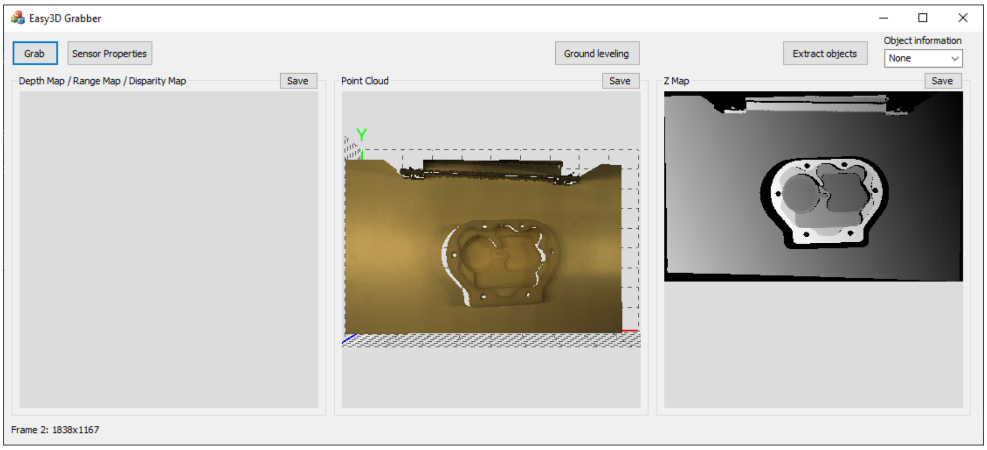
- The **Mech-Mind SDK** exposes point clouds from PCL:
  - □ `pcl::PointCloud<pcl::PointXYZRGB>`
  - □ A `pcl::PointXYZRGB` corresponds to 128 bits:
    - 3 × 32 bits for the XYZ
    - a 32-bit float for RGB (with 8 bits not used)

Easy3DGrab sample application

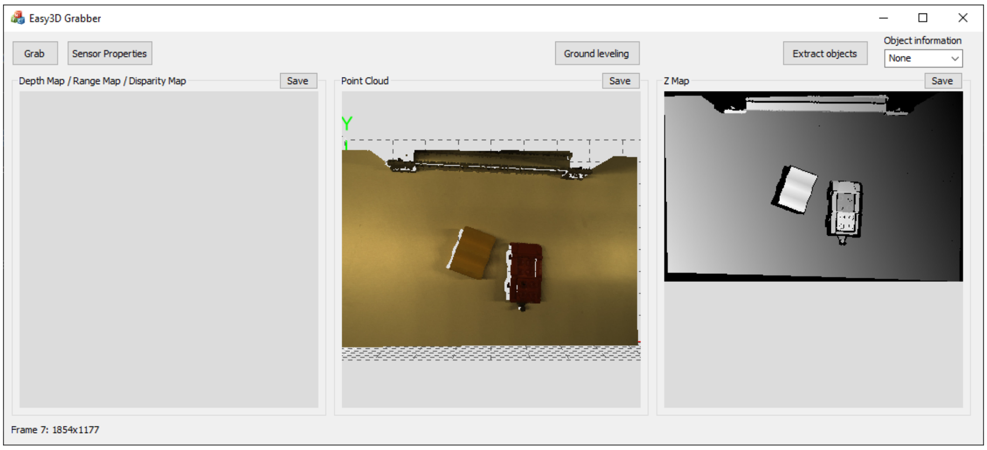
Easy3DGrab is distributed with C++ source code as an **Open eVision** additional resource.

- It features the import of the `pcl::PointCloud<pcl::PointXYZRGB>` formats and the conversion to **Open eVision** formats (`EPointCloud` to `EZMap`).

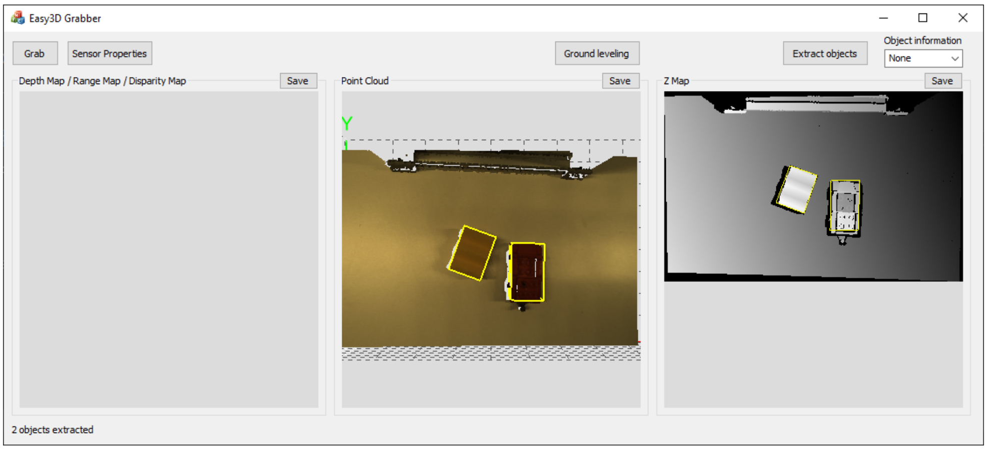
- You can save these representations.
- Click on the Grab button to acquire a new image.
- Open the Sensor Properties dialog to:
  - □ Modify the exposure mode.
  - □ Modify the exposure time.
- The Object extraction function is exposed but you can use it only with the **Easy3DObject** license.
- You can also perform a Ground leveling.



The Easy3DGrab application:
EDepthMap not available (left), EPointCloud (center), EZMap (right)



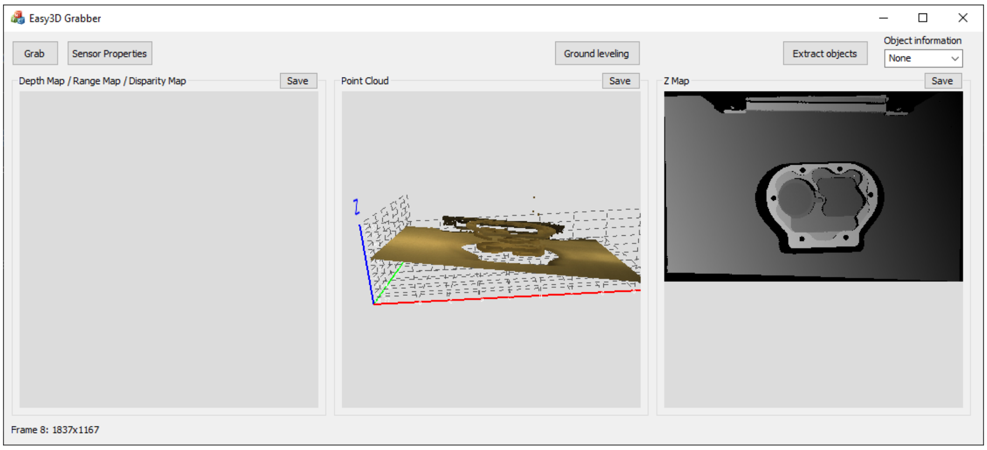
The Easy3DGrab application: an EPointCloud (center) retrieved with colors



Object information: None

2 objects extracted

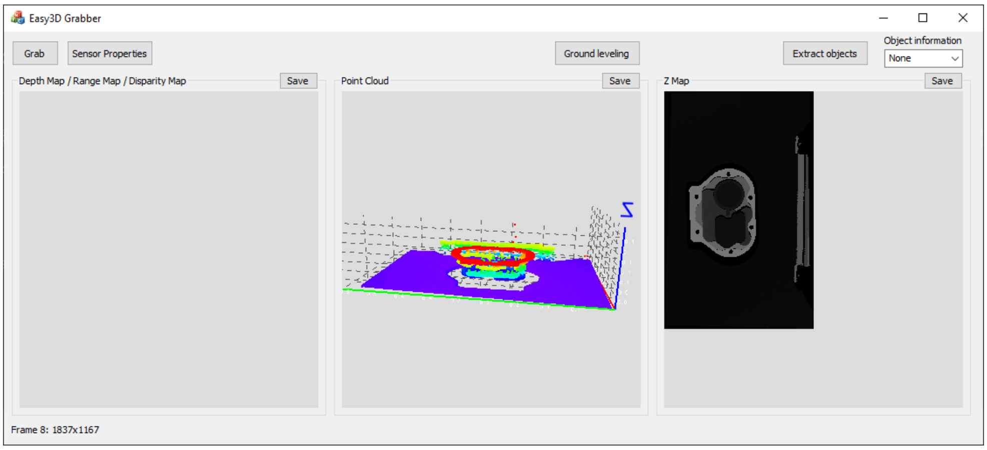
The Easy3DGrab application: extraction of objects



Object information: None

Frame 8: 1837x1167

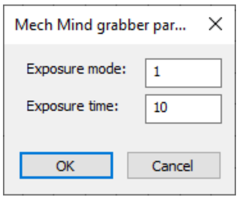
The Easy3DGrab application: before ground leveling



Object information: None

Frame 8: 1837x1167

The Easy3DGrab application: after ground leveling



Mech Mind grabber par...

Exposure mode: 1

Exposure time: 10

Setting the 3D sensor parameters

C++ code sample to convert **Mech-Mind** formats to **Easy3D** objects

Converting a `pcl::PointCloud<pcl::PointXYZRGB>` to an `EPointCloud`

Here is the code snippet to fill an `Easy3D::EPointCloud` object from a **Mech-Mind** `pcl::PointCloud<pcl::PointXYZRGB>`:

```
CameraClient camera;

// Connecting to camera
if (!camera.connect("192.168.1.118"))
{
  // Connection to camera failed
  throw(std::runtime_error("Connection to the camera failed"));
}

const pcl::PointCloud<pcl::PointXYZRGB> rgbCloud = camera.captureRgbPointCloud();

const size_t nbPoints = rgbCloud.size();

std::vector<Easy3D::E3DPoint> points;
points.reserve(nbPoints);
std::vector<EC24A> colors;
colors.reserve(nbPoints);


for (size_t i = 0; i < nbPoints; ++i)
{
  const pcl::PointXYZRGB& p = rgbCloud[i];
  if (p.x != 0 && p.y != 0 && p.z != 0)
  {
    points.emplace_back(-p.x, p.y, -p.z);
    float color = p.rgb;
    colors.emplace_back(p.r, p.g, p.b, 255);
  }
}

Easy3D::EPointCloud pointcloud;
pointcloud.AddPoints(points);
pointcloud.FillAttributeBuffer((int)Easy3D::E3DAttribute_Color, colors.data());
```

ZMap

- You cannot generate a ZMap (a gray scale image encoding distance from a reference plane, also called an orthographic projection of the point cloud) directly from the **Mech-Mind** 3D sensors.
- Generate a ZMap from the point cloud with the `Easy3D::EPointCloudToZMapConverter` class.

✓ **TIP**
The sample application **Easy3DGrab** implements these conversions.