# AnyPick


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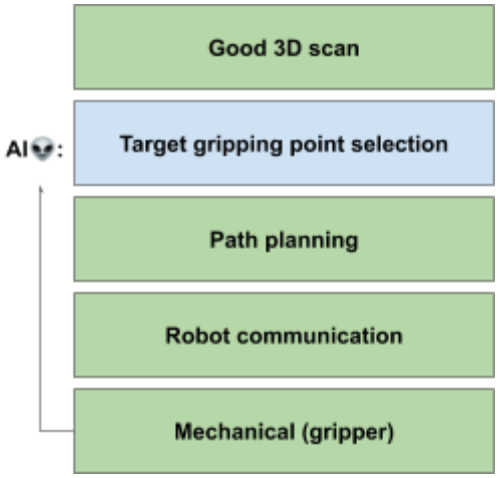
*Photoneo's AnyPick enables robots to pick randomly placed objects, using machine learning. AnyPick comes pre-learned which means that it is not necessary to provide any CAD model of the objects. This allows the robot to pick objects that it has not seen before. Photoneo provides a complete solution, including a 3D area sensor, calibration & alignment, set-up in a friendly user interface, large gripper database and trajectory planning including inverse kinematics for major robotic brands. An important component is the AI/ML module which evaluates the scene, creates a heatmap and suggests gripping points.*


## Motivation behind

Coming up with a flexible solution for object picking has been a significant step forward in advancing automation for several reasons. One of the most important ones is that many objects do not have CAD models so it is not possible to use a fixed-model geometric solution. Another important argument is that the picking performance improves over time as it learns about objects and situations which regularly occur in the production.

## Approach




A high-quality scan is at the top of the stack as good data are necessary for fast and precise picking. The data are then evaluated by a convolutional neural network which looks at the scene, evaluates the objects and surfaces, and selects appropriate candidates for picking. Only those candidates which the robot can reach get to the path planning stage, whereby three main factors are being considered here: inverse kinematics of the robot model (specific for each brand and type), robot model itself (also specific) and the model of the environment. After the evaluation and selection of the best candidate, the movement is executed. The final stage is feedback from the gripper. This allows us to, for example, monitor the air pressure so that we know whether the part is firmly attached to the gripper or whether it is going to fall off.

## Results

We actively cooperate with our customers and continually evaluate various objects and materials. The capabilities of AnyPick include:

- Envelopes picking: demonstrating a good gripping point selection for objects with small height differences
- Stone picking: demonstrating picking of objects with extraordinary variable shapes and rough surface
- Parcel picking: speed, weight, precision
- Mixed objects: demonstrating flexibility

## Advantages

Integration with Photoneo's PhoXi 3D Scanner ensures:

- **Great precision**
- Ability to work in various lighting conditions thanks to **ambient light suppression**
- **Large depth of field, enabling to work with deep boxes**
- High speed, generally up to **1000 picks per hour**
- **Environment awareness**
- **Customized, easy-to-set manipulation after the pick,** using a robotic pendant
- Running with **any robot from major robot brands**: ABB, FANUC, KAWASAKI, KUKA, MITSUBISHI ELECTRIC, OMRON, STAUBLI, UNIVERSAL ROBOTS, YASKAWA

## Performance

- AnyPick can pick almost **any type** of objects, including **non-transparent and non-porous materials**
- Uses a **vacuum cup** (sufficient flat surface)
- Can pick even objects as small as **5x5 mm**
- **Weight limit is customizable** with the gripper

## Applications

- Logistics, sorting
- E-commerce, online shops, stores
- Processing of parts that can vary in shape or size, e.g. metallurgy, food processing, etc.

## AnyPick in action

- **Mixed objects:** https://www.youtube.com/watch?v=VkJaKeH9Yt8
- **Minerals:** https://www.youtube.com/watch?v=i6I873VI_bc&feature=youtu.be
- **Mango:** https://www.youtube.com/watch?v=yrvoNiTxTAU&feature=youtu.be
- **Postal parcels:** https://www.youtube.com/watch?v=Oc4Nj-Q3ZNA&feature=youtu.be