

# Robotic Grasp

A robotic hand which from one learned example can maximize the likelihood of a grasp being effective.



*Please note, header image is purely illustrative. Source: (C) Shadow Robot Company.*

## IP Status

Patent application submitted

## Seeking

Licensing, Development partner

## About **University of Birmingham**

At the University of Birmingham our research leads to new inventions and fuels innovation and business growth.

# Tech Overview

## What's the problem?

Robotic hands are typically designed and made to perform a limited number of actions which have either been learnt or for which the hand is specifically designed. Current hands have a very limited ability to learn a grasp for a novel object which has not been encountered before

## A new solution:

A robotic hand which from one learned example can determine the optimal spatial relationship between each part of the hand and the surface contours of the object to maximize the likelihood of a grasp being effective.

## Further Details:

The ability to grasp a variety of novel objects is an open problem. Researchers at the University have tackled this challenge and developed software to solve the problem of transferring grasps across objects. Given one or more grasp examples the algorithm aims to capture the configuration of the hand and its fingers with respect to neighbouring object surfaces and to adapt the hand and fingers to the shape of the novel object. The approach relies on a pair of models that capture two complimentary aspects of the grasping process. Firstly a contact model captures the configuration of one hand part relative to local features of the object surface. When given a 3D model of a novel object a contact model is developed which allows the robot to compute a set of poses for each and every hand part. If a robot is equipped with N hand parts up to N contact models can be instantiated.

Secondly a hand configuration model captures a set of hand shapes that comply with the demonstrated grasp developed from the contact model. This allows a set of corresponding poses to be simultaneously realised by the hand parts without diverging from the demonstration grasp.

The algorithm generates many possible grasps, each grasp having a set of hand part poses that independently comply with the contact models and the hand configuration model and selects the optimal grasp.

## Benefits

- Flexibility to pick up varied objects with one hand
- Able to pick up objects never encounter before
- Can handle fragile items

## Applications

- Manufacturing environments where the product and components frequently vary in size shape and form

- Handling varying objects in hazardous environments e.g. nuclear industry, bomb disposal

## Opportunity

Robotic hands which utilise the University of Birmingham algorithms are currently being developed for use in hazardous environments with a commercial partner. The university is seeking licensees who wish to collaborate in development of the technology in all areas of application.

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## Patents

- Patent applications filed in Europe and USA based on international publication WO2014/188177.