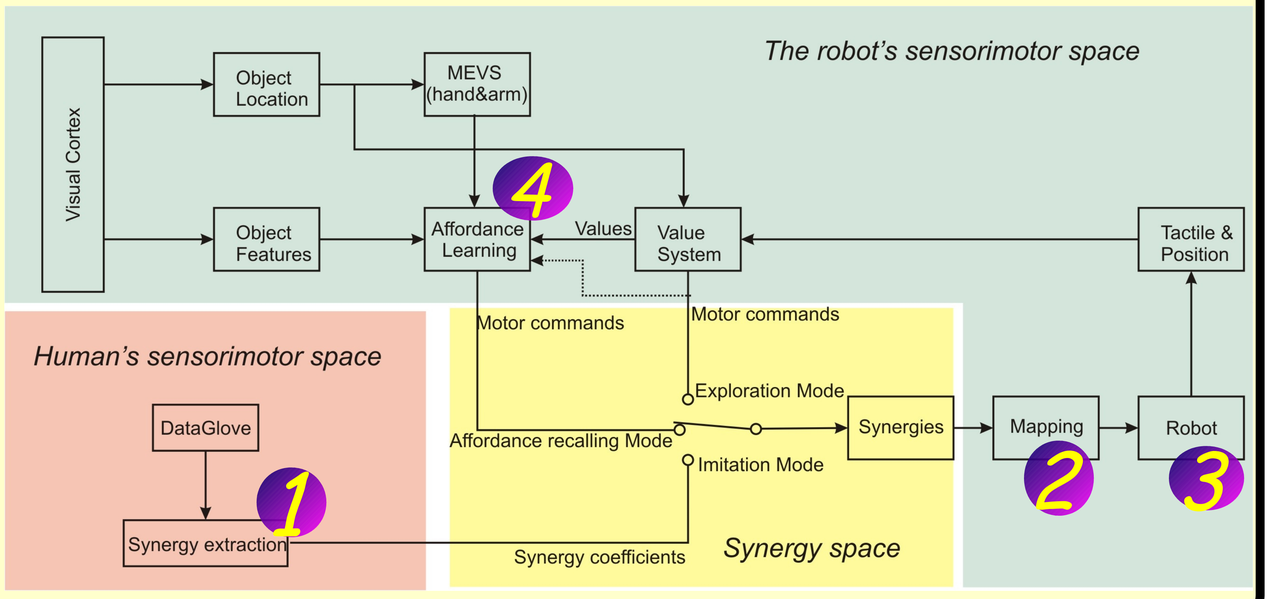
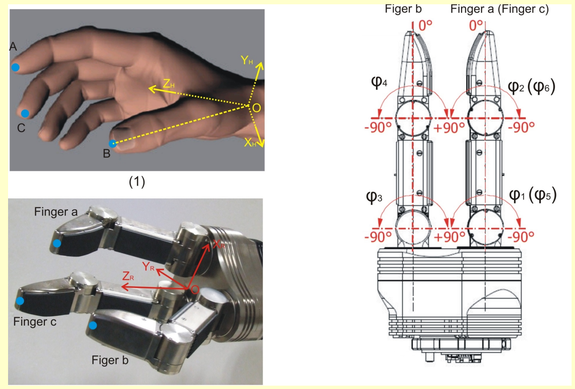
# Synergy-based affordance learning for robotic grasping

Tao Geng, James Wilson, Mark Lee
Department of Computer Science, Aberystwyth University, UK

## System structure

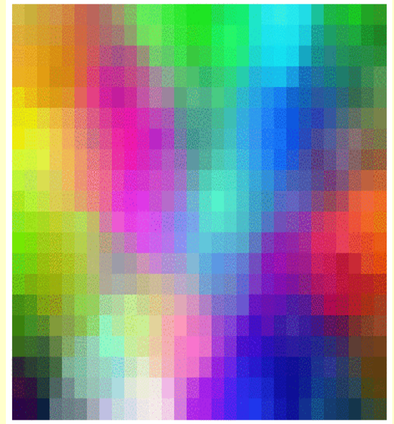


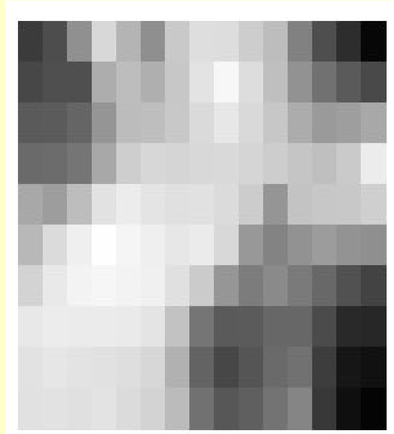

## 2 Use GA to optimize the mapping between human and robot hands



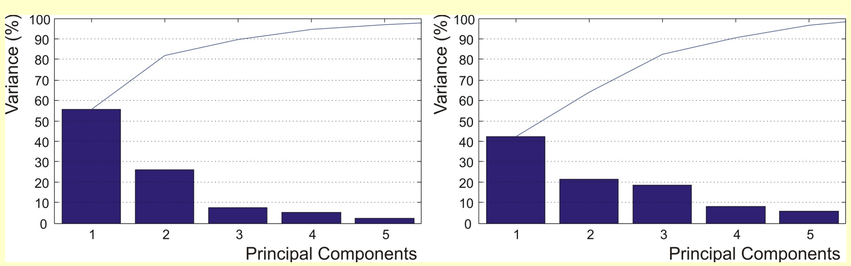

## 4 Affordance learning using a self-organizing map

*Once learnt, a partial input pattern can be matched with those in the affordance memory, and the closest complete pattern retrieved. As a result of the clustering algorithm, the SOM can generalise from presented input patterns to novel ones. After learning, this can be used to find the most appropriate motor commands to grasp an object described by any set of features.*



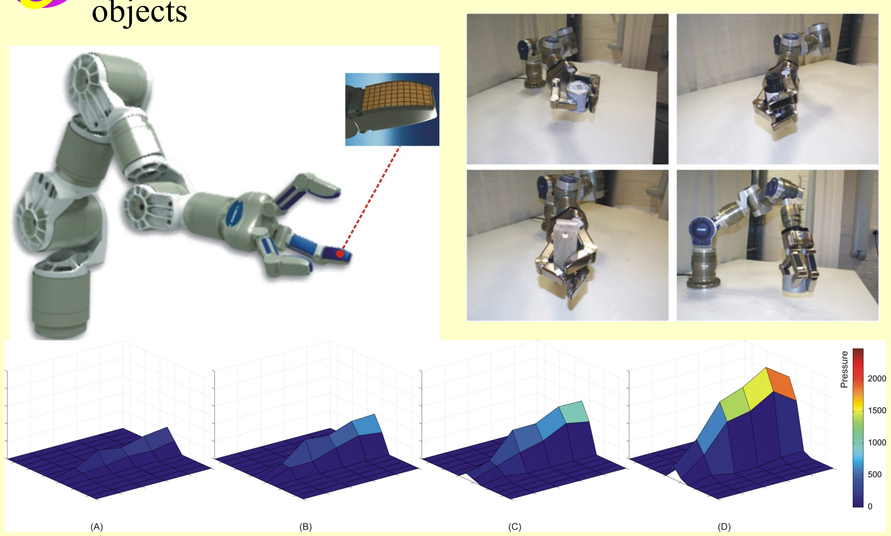


## 1 Extract synergies from human grasping data




*The first five principal components (synergies) of the grasp posture data and the hand approaching data.*

## 3 Exploit the tactile feedback to grasp and hold the objects




*The changing patterns of the tactile sensor array of one phalanx when the robot finger starts to touch and grasp an object..*