Creating Physical Structure from Disarray

EPSRC project EP/F031653/1

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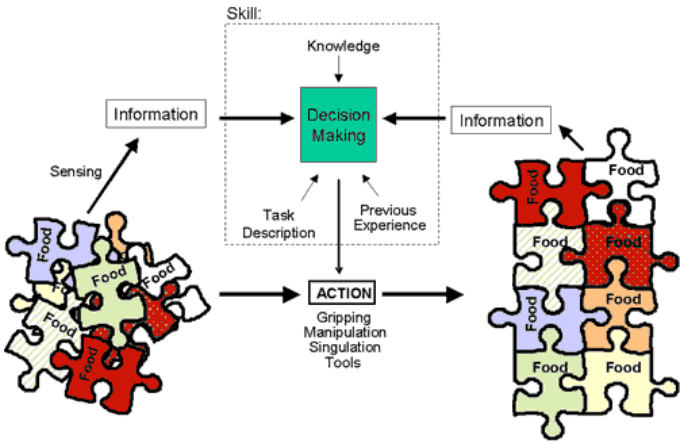
The food industry is a major sector in UK manufacturing worth over £70bn per annum. The introduction of robotics and automation can free staff from tedious and arduous tasks, yet the nature of the processes and products hinder direct application of many current automation techniques. Two key aspects are the variation in food products and the typical lack of physical order in their processing. Raw food products are commonly randomly positioned on conveyors, or heaped into bulk containers. Whilst some automation does exist for processing these disarrayed foods, the majority of food processing equipment requires oriented in-feeding of products. This is a typical task for a human operative, and once processed by the equipment the products are often ejected back into a disordered arrangement!



This Engineering and Physical Sciences Research Council (EPSRC) research project is to develop understanding of the structure creation process (see figure) for translating physically disordered products into structured arrangements whilst accommodating variations in the products and processes. This is aimed to improve the range of food and other difficult processes that can be automated, remove the need for people to perform boring machine feeding tasks, and enable the producers to use valuable human resource on more value-adding tasks.

The project will survey and categorise industrial physical structuring processes in terms of complexity, input sensing, and grasping requirements. For each of the categories, mathematical descriptions of the states of disarray and order will be defined and translational matrices created to transform between the disordered and ordered arrangement states. Dynamic modelling of the process will be used to improve the techniques. In parallel, appropriate sensory and handling technologies will be determined for each category. Finally a proof of concept system will be constructed to physically validate the new approaches on a number of example tasks from the food sector.

It is hoped this research will benefit the academic community in the fields of mechatronics and automation design, and industrial users and equipment producers from all industry sectors who will gain the potential for new equipment and broaden application areas for existing automation.

Contacts

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