Technology Offer:

System for inspection and failure detection in chrome-plated surfaces
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SUMMARY

A Spanish research group has developed a prototyping tool for reflective surfaces inspection systems. It can simulate all inspection process phases. It gives realistic images from surroundings, motif and gauging and implements the inspection defined in the model. Once simulated, it extracts conclusions about the perception scale of objects, angles, illumination conditions, etc. that allow defining the prototype. The group looks for partners to adapt the technology to their specific industry needs.

TECHNOLOGY DESCRIPTION

At present, there are only a few systems for visual inspection of reflective surfaces that can be used only in very limited cases, so the development of this kind of systems is a problem still not solved as a general application.

The prototyping tool for reflective surfaces inspection systems that has been developed can simulate all the inspection process phases. So, it gives realistic images from surroundings, motif and gauging (Figure 1). Moreover, it implements the inspection defined in the model. Once simulated, it extracts a series of conclusions about the perception scale of the objects, angles, illumination conditions, etc. that allow defining the prototype.

Figure 1
From the conclusions extracted of the study done with the tool, the group is capable of designing the inspection prototype that will have as test bench the motifs of the respective industry (for example the electroplate of chrome on plastics) (Figure 2).

The prototype must consider the conditions (environmental, positioning, cameras, processing, etc.) to cover the system efficiency. About the speed, two solutions with different cost and yield are proposed. On one hand, we will use accelerators as a less expensive solution and on the other hand specific designs with reconfigurable hardware (Figure 3). For this, and profiting the experience of the group in this field, it will be developed a prototype using reconfigurable hardware that will allow us evaluating the inspection system architecture to open the way to more ambitious high yield designs.
The attainment of a tool to do prototypes of reflective surfaces inspection systems has a high impact in all levels: industrial, scientific, socioeconomic, etc. Besides its strategic nature for traditional sectors where innovation is necessary to be competitive, the socioeconomic impact of the offered tool is direct if we think about the high economical cost necessary for the inspection of products with reflective surfaces, both in material and in staff and time. The industrial impact and the repercussion in traditional sectors as toys, footwear and textile, can be crucial as regards cost reduction and the increase of competitiveness due to systems of quality improvement in the product. From the scientific and technologic point of view, developing tools to systematize inspection tasks is a high advance, more if we bear in mind the difficulty to deal with very reflective surfaces.

MAIN ADVANTAGES

When the surfaces show predominance of the specular reflection and not of the diffuse, as occurs with metal-faced products, enamelled, plastic-coated, etc. the discrimination between reflexes and defects is complex even for experts. In general, the inspection done in companies is not very safe due to the variable capacity and experience of the workers, as well as the weariness and the monotony of the work. The automatic inspection vision systems allow a supervision of the products that does not need human assistance and therefore improve the chain value of the companies. These systems improve the productivity and the quality management and give also a competitive advantage to the industries that use this technology. When the inspection is on specular surfaces is even more interesting the automatization.

INNOVATIVE ASPECTS

The prototyping tool is new as regards visual inspection systems for specular surfaces. This tool presents a novelty because it allows facilitating the design of inspection systems for specular surfaces: feasibility studies or design of the system. In the tool, the proposed model presents novelties about the way of inspection through the use of a general sketch that can be applied in any area without using heuristics as kind, shape, size, defects, etc. It uses knowledge bases for all the process parts.
CURRENT STAGE OF THE DEVELOPMENT

The prototyping tool for reflective surfaces inspection systems is currently under development.

INTELLECTUAL PROPERTY RIGHTS

The software is protected by copyright.

MARKET APPLICATIONS

The interest is in the development and implantation of quality control systems for plastic or metallic objects with chrome coating and with any volumetric shape.

Specific sectors could be wall fitting, strips and components from the automotive or cocks industry among others.

COLLABORATION SOUGHT

Technical Co-operation

Comments:
- Type of partner sought: the group looks for companies or entities interested in adapting the technology to their specific applications.

- Specific area of activity of the partner: companies or entities related to navigation systems or to tourist or guidance activities.

- Task to be performed: the companies that are interested in this particular area of activity should be willing to adapt the technology to their specific needs as well as to finish the parts of the technology that need a further development.
RESEARCH TEAM PROFILE

The research team of this project belongs to the research group of “Industrial Computing and Computer Networks” of the Computer Technology and Computing Sciences Department from the University of Alicante. The research fields of the group are artificial intelligence, control, vision and networks. They have carried out several contributions that are applicable in industrial contexts (artificial vision systems, mobile robots control, design and computer-assisted manufacture) and in images and systems modelling with biomedical origin (diagnostic and classification).

The team is formed up by four doctors and three computer engineers that are now finishing their doctorate thesis in issues related to the image treatment and computer vision. The team members have a high experience in managing and participation in research projects with funding both public and private.

The former projects and the current ones in which the researchers have participated have been financed by public organizations as the Ministry of Education and Science, the Ministry of Science and Technology or the Presidency and the Culture, Education and Sport Department of the Valencian Government. At present, the group has four projects: “Vision by outer intelligent robot for autonomous mobile systems” financed by the Ministry of Science and Technology, “Computing Palaeontology: data management and computing applications development in palaeontology”, “Architecture model specialized in computing geometry processing” and “Quality control of glossy and reflective surfaces by artificial vision” financed by the Culture, Education and Sport Department of the Valencian Government.

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