

# RESEARCH DIRECTIONS

## Autonomous Welding Robots

**Dr Gu Fang from the School of Engineering will be researching the development of a robotic welding system that can perform quality tasks automatically and provide the necessary flexibility in performing low to medium volume welding productions. This research is an Australian Research Council Linkage Grant in partnership with the Automation Division of Lincoln Electric.**

'Arc welding (a fusion process for joining metal) is regarded as both dirty and dangerous for human workers' explains Dr Fang. 'Robots are used in this mass-production process in most industrialised nations, however, the current generation of arc-welding robots can't automatically generate welding commands (used to establish techniques and procedures followed by the robot). This lengthens the time needed for setting up and programming of the robots – and consequently increases cost of the final product. Developing a robot that can automatically generate welding commands by using computer vision to provide feedback and guidance, will provide quality products and lower the amount of human interaction.'

This research will develop a reliable vision system using a "robot-mounted stereo vision system" with a number of cameras which are mounted on the robotic arms. This system will be capable of identifying the locations and shapes of the welding seams. This information can then be used to determine the welding path the robot should take.

The research will also endeavour to create an intelligent system that mimics a human welder's decision making in determining the welding parameters. This will be done by collecting visual and other data about robotic welding processes.



The data will be collected in a variety of environments and welding projects, providing information relating to sizes, shapes and locations of different welding jobs. The data will then be used to generate an expert welding database which will be used online to facilitate the generation of automatic welding sequences.

Using an autonomous welding robotic system will result in greater productivity within industries using welding, providing economic benefits to both individual companies and the nation. These robots will also contribute to overcoming the skills shortage facing the welding industry and provide a safer work environment for those involved.

**Project Title:** A vision Controlled Autonomous Multi-Robot Welding System

**Funding has been set at:** \$91,140

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