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### Development and application of arc sensing and seam tracking algorithm for collaborative robots

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As there is a high demand for arc sensing technology in industrial settings, this study develops arc sensing technology applicable to the GMAW method and proposes a function that allows collaborative robots to replace skilled welders. We developed a weld seam tracking algorithm using arc sensing based on current data and applied it to Doosan Robotics' collaborative robot. Changes in CTWD distance can be predicted through changes in current signals, and based on this, we sought a method to accurately predict changes in CTWD during welding using weaving motion on V-shaped materials. In this study, real-time current data was collected using a Hall sensor, and the weaving cycle was identified by detecting sudden changes in slope in the current waveform. Through this, the seam tracking function of the collaborative robot was implemented by calculating the exact offset value when the weld seam deviates. The algorithm developed using the collaborative robot control software and motion offset function was applied to the collaborative robot, and the algorithm was completed by matching the area and offset values calculated through experiments.

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