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Creating a virtual model for additively manufactured structures with wire-DED monitoring data

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Wire Arc Additive Manufacturing (WAAM) is popular for building large structures. But, there's a problem: the light from the arc makes it hard to see additive manufactured shape as they're being added. This means you can't really tell what's happening with the current additive manufacturing unless you use special cameras and complicated software. Alternatively, by generating the layers in a virtual space through the measurement of different signals, it becomes possible to observe the current state of the layering without the need for complex algorithms via a vision system. So, in this study, we wanted to make a system that could take data from the additive manufacturing process and show it in a virtual space. We constructed a system to measure the voltage, current and sound. We collected this data with a Data Acquisition Board, looked at how the shape of the metal drops (beads) changes under different conditions, and watched how these shapes change based on the data. Then, we made a program that can create these shapes in a virtual space. We used this program to compare real additive manufactured structures with the ones we made virtually, to see how well our virtual creation matched the real thing.