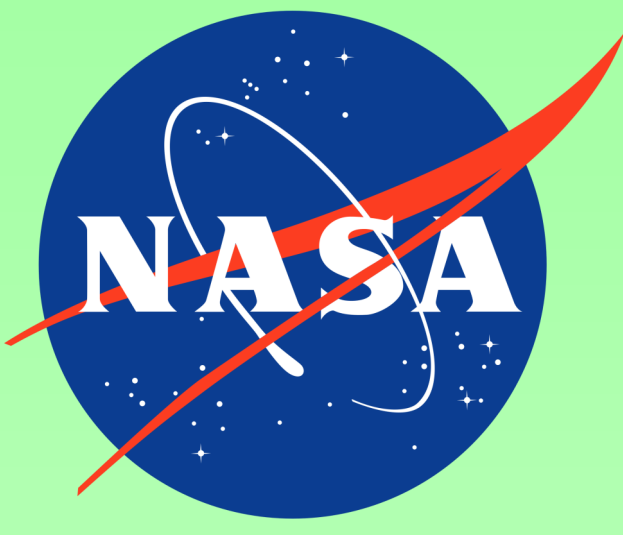




Friction Stir Welding Controls

using Machine Learning

Team:

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Robert Amaro (EM32/ESSCA)

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Support/Previous:

PAR Systems

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System Architecture

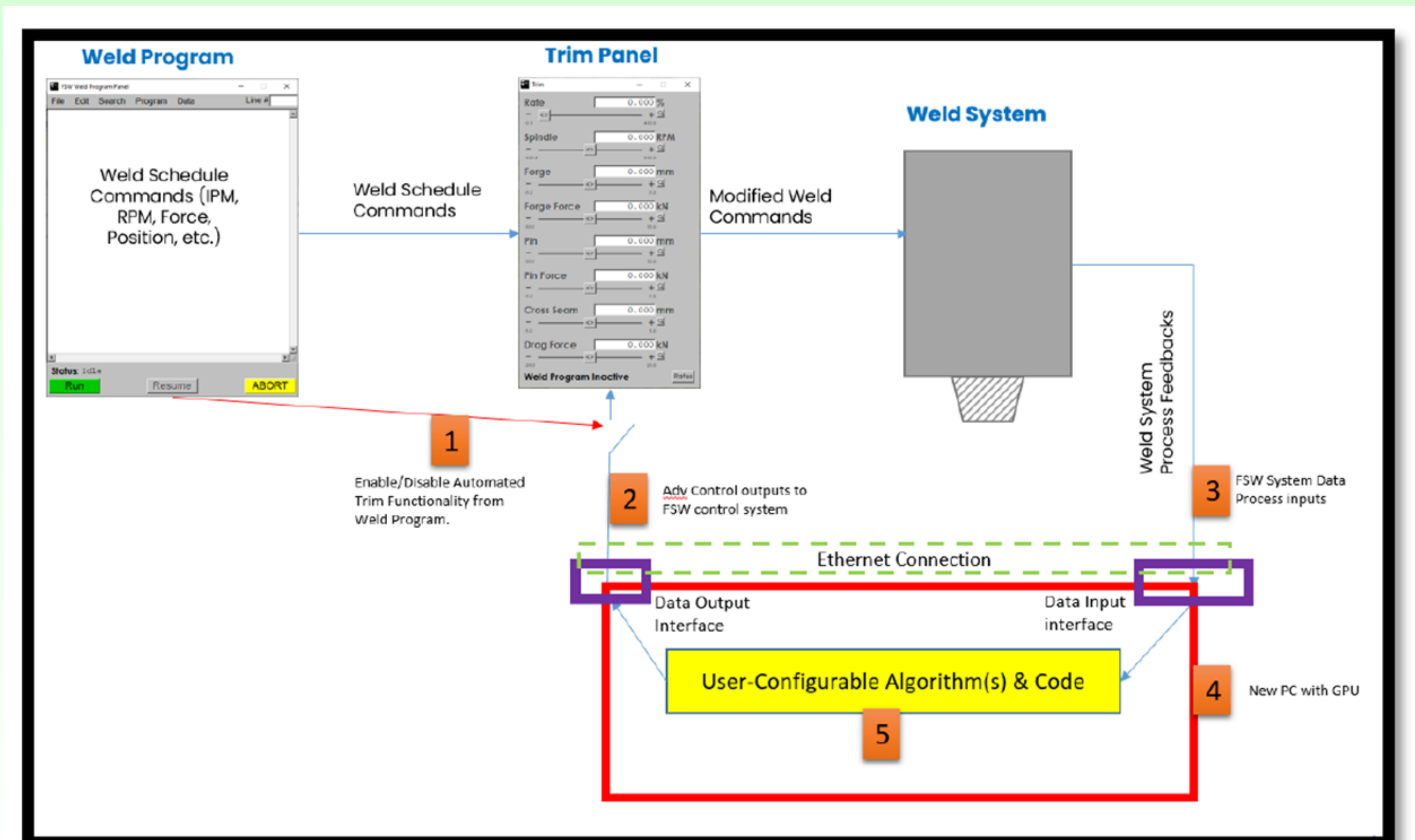
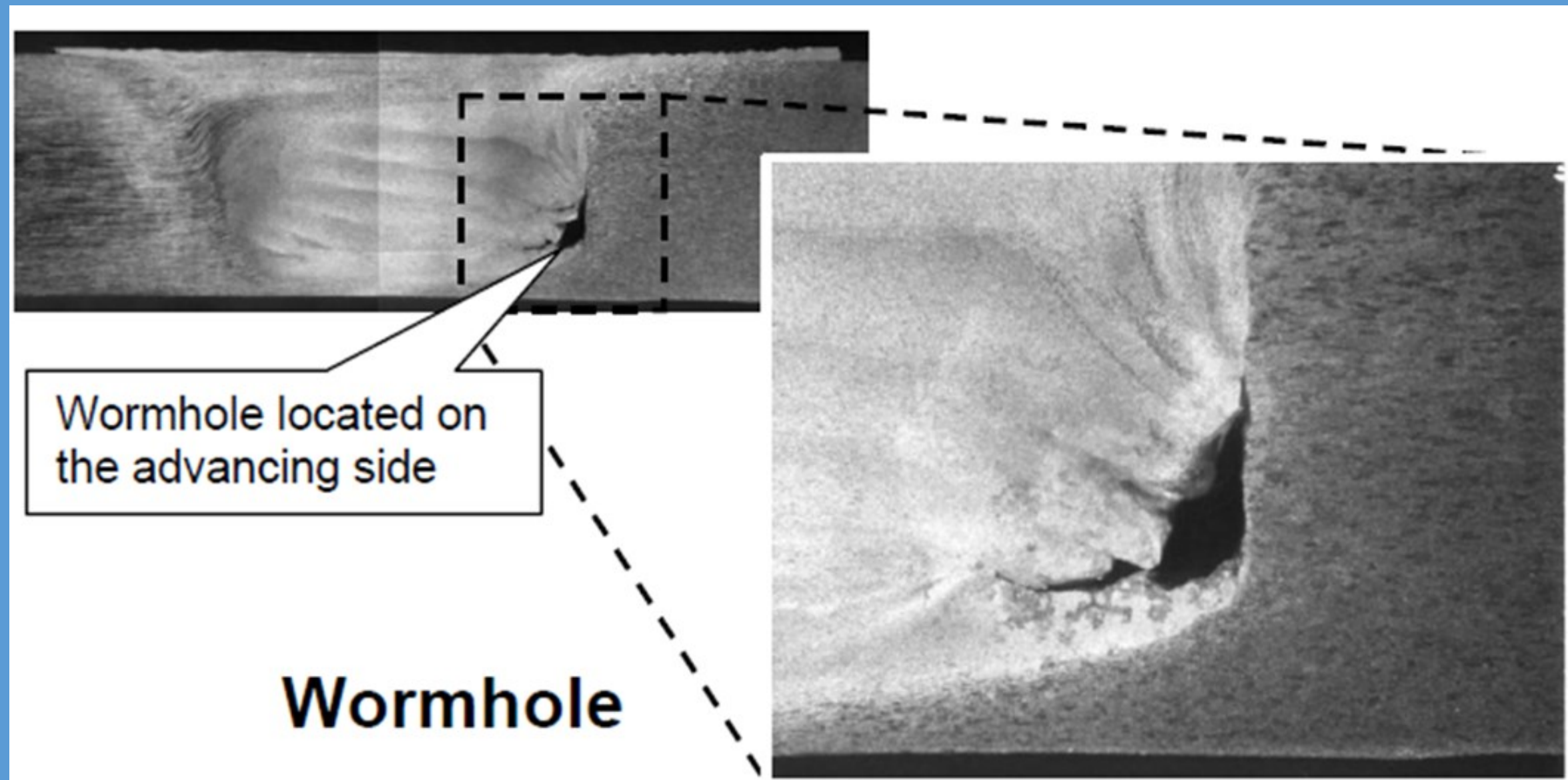
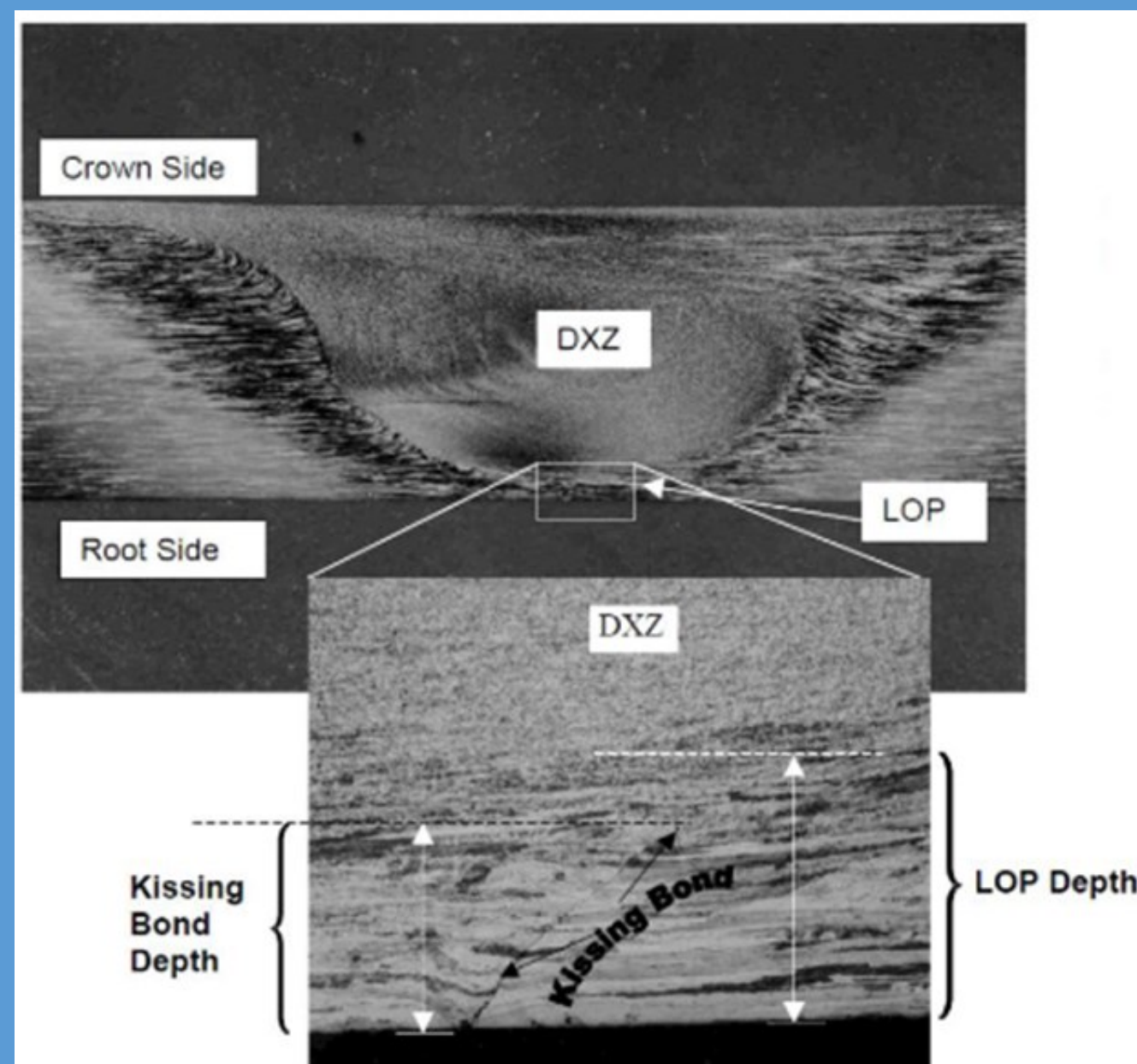
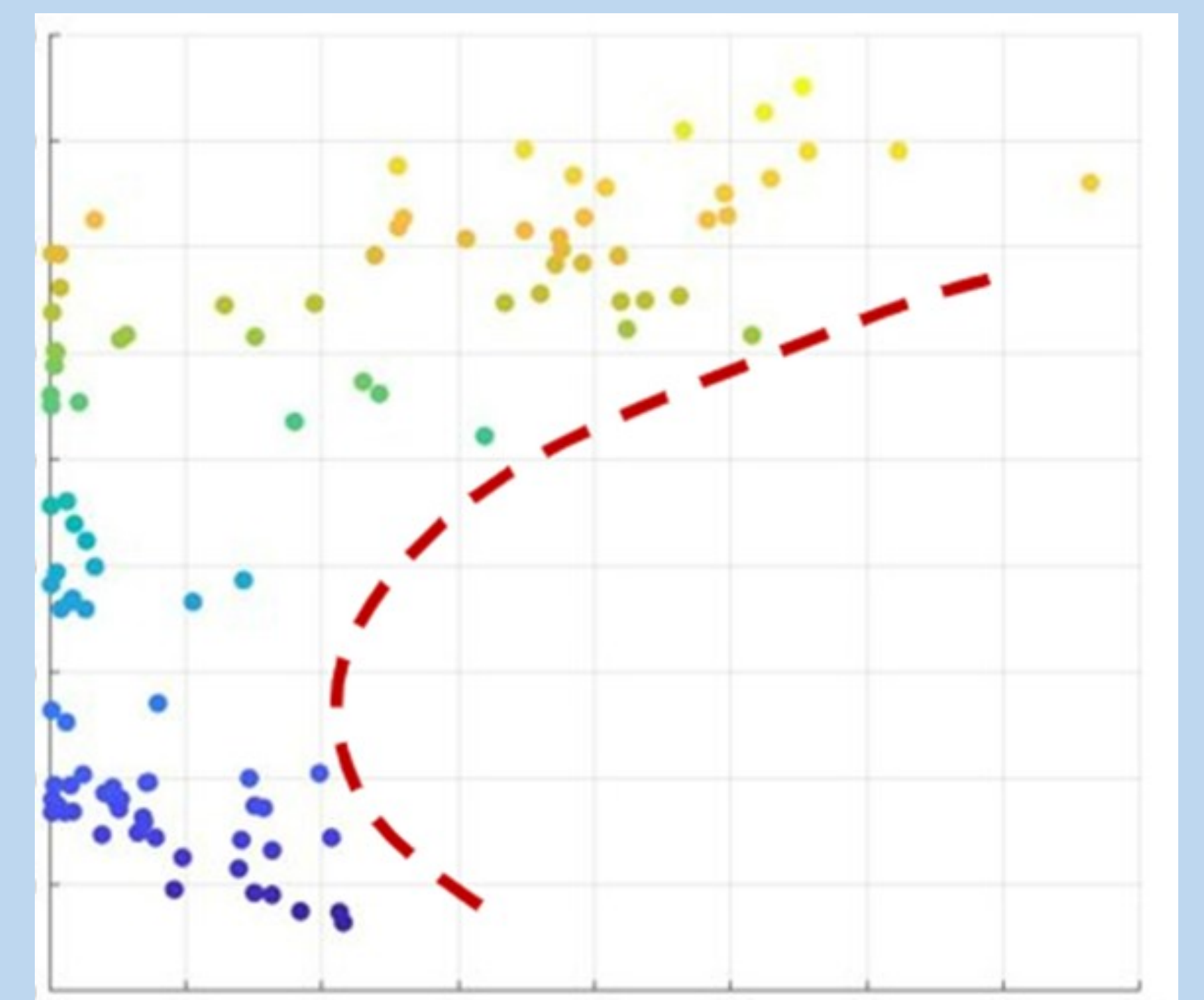


Figure 1) Anticipated System Architecture for PDS-1 integration

Possible Defects

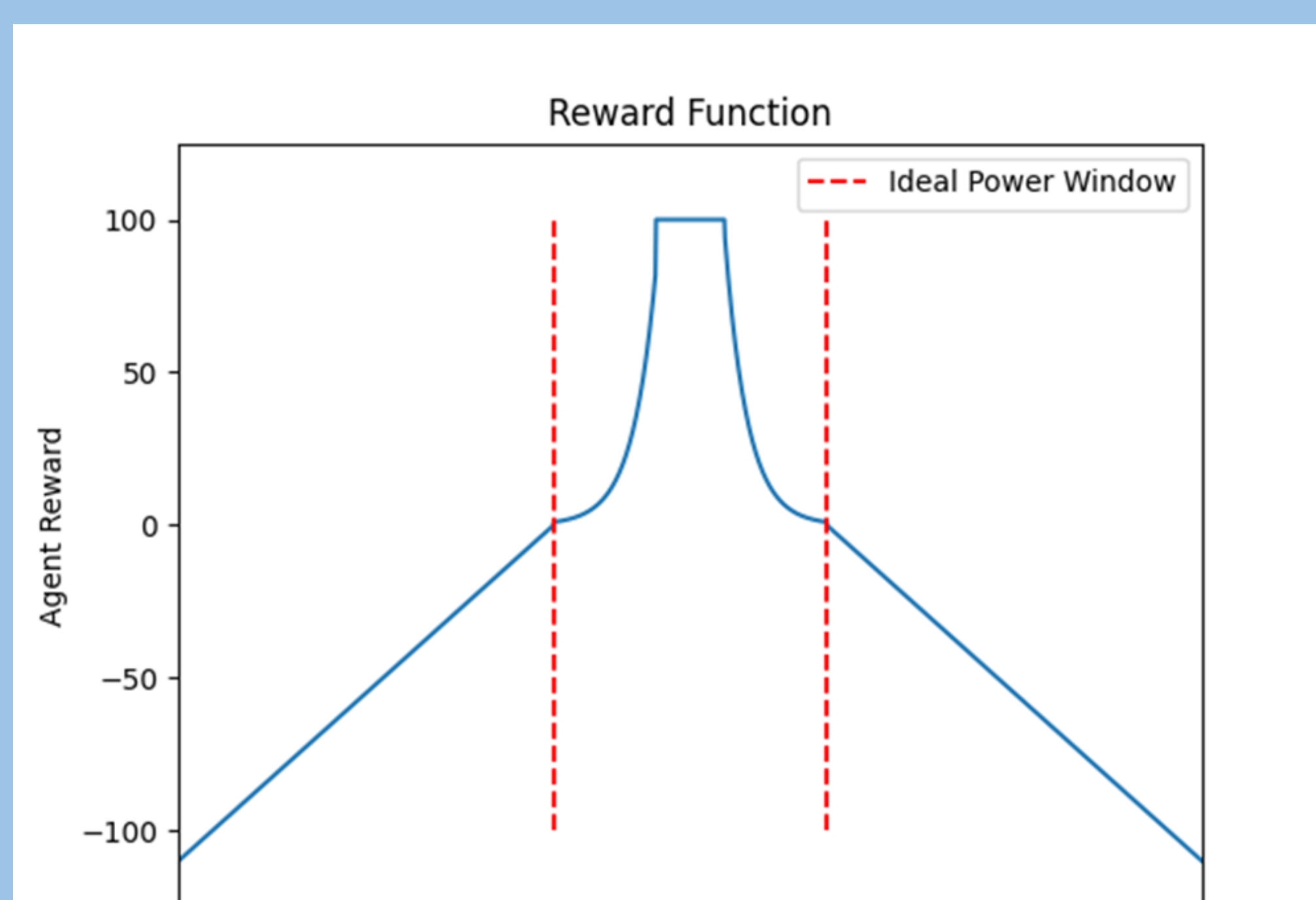
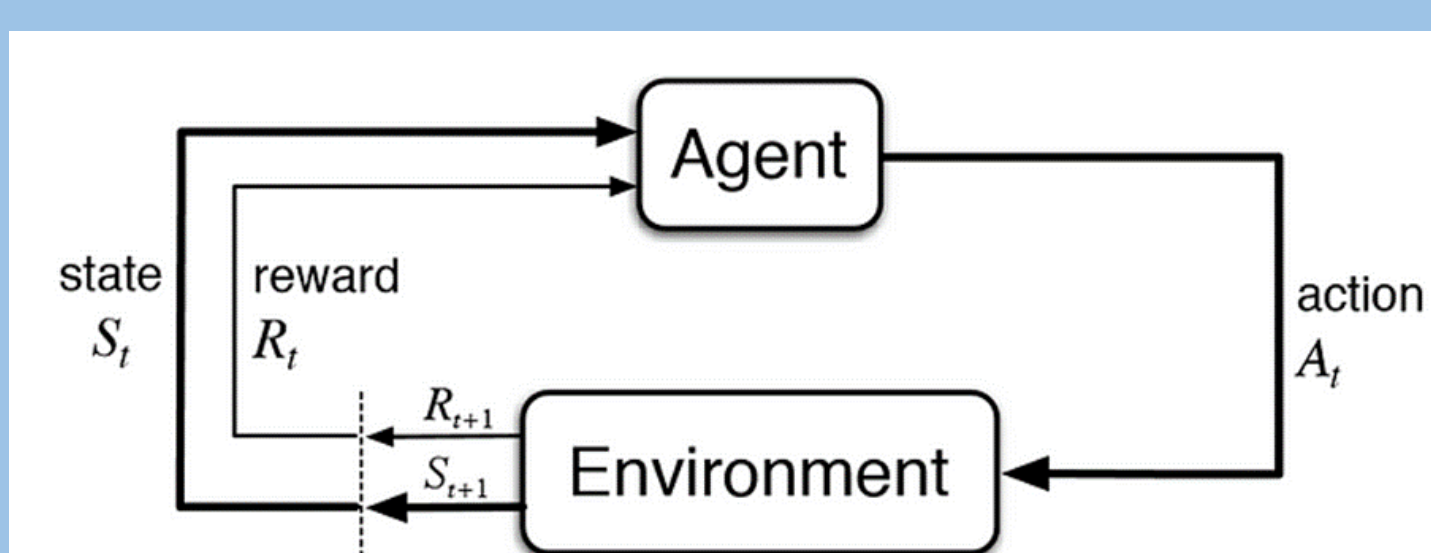


- Non-linear responses
- Causes possible defects if energy is too high or too low
- NASA/MSFC pushes the control to the limits for performance
- Needs to adjust based on the properties of the material and machine response



Current State

Machine Learning via Reinforcement Learning



- Center Investment funding and SLS providing resources for work
- Working with PAR systems on the interfaces (Purple boxes from Figure 1 PDS-1 integration)
- Updating the Friction Stir Weld Machine to run the Reinforcement Learning Algorithms
- Refining the algorithm based on simulation testing
- Identifying latencies and integrating into hardware