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Automating beam dump failure detection using computer vision

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The CERN SPS Beam Dump System (SBDS) is responsible for disposing the beam in the SPS in case of any machine malfunctioning or end of cycled operation.

This is achieved by the actuation of kicker magnets with predefined pulses, which aim to: i) deviate the beam towards the absorber block (TIDVG); ii) dilute the particle density. Evidently, a malfunction of this system may have negative consequences, such as the absorber block degrading if the beam is not sufficiently diluted, unwanted activation of the surroundings or even damage to the vacuum chamber in case of complete failure. By leveraging a combination of real images from a beam screen device and data from simulations, we train an online monitoring system to identify potential failures of the SBDS from real-time images. This work improves the safety of the operation of the SPS and contributes towards the goal of automating the operation of accelerators.

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Footnotes

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Yes

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