

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
12 March 2026 (12.03.2026)



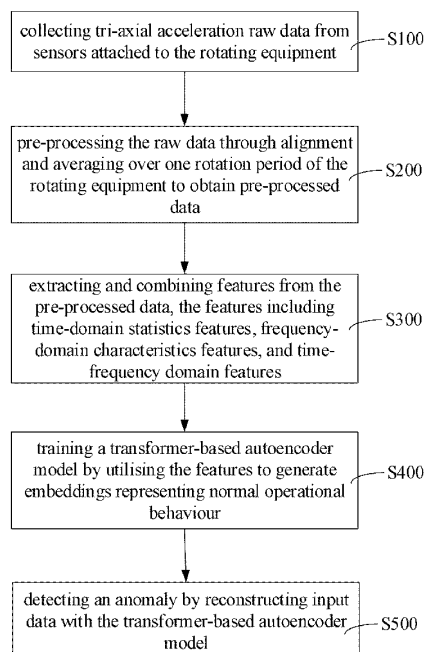
(10) International Publication Number
WO 2026/052134 A1

- (51) **International Patent Classification:**
G06F 18/2433 (2023.01)
- (21) **International Application Number:**
PCT/CN2025/120166
- (22) **International Filing Date:**
09 September 2025 (09.09.2025)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
22024096536.2 09 September 2024 (09.09.2024) HK
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- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UY, UZ, VC, VN, WS, ZA, ZM, ZW.
- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MU, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— with international search report (Art. 21(3))

(54) **Title:** ANOMALY DETECTION METHODS AND SYSTEMS FOR ROTATING EQUIPMENT



(57) **Abstract:** The present application relates to anomaly detection methods and systems for rotating equipment. The method includes the steps of collecting tri-axial acceleration raw data from sensors attached to the rotating equipment; pre-processing the raw data through alignment and averaging over one rotation period of the rotating equipment to obtain pre-processed data; extracting and combining features from the pre-processed data; training a transformer-based autoencoder model by utilising the pre-processed data; generating embeddings representing normal operational behaviour; and detecting an anomaly by reconstructing input data with the transformer-based autoencoder model; a deviation between the input data and reconstructed data beyond a pre-set range indicates the anomaly. Accurate and timely anomaly detection is vital for predictive maintenance, allowing issues to be identified before they escalate into failures, thereby reducing downtime and associated costs.

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