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ABSTRACT SUBMISSION FORM

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TITLE Better Feet, Better Lives: A Portable AI Platform for Early Detection, Monitoring, and Prevention of Diabetic Foot Complications

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ABSTRACT (maximum 450 words. Please use the following or similar headings: Background/Methods/Results/Conclusions)

Background: Diabetic foot disease (DFD) is among the most serious and costly complications of diabetes, affecting up to one-third of individuals with the condition and contributing significantly to hospitalisations and amputations worldwide. In Australia, the economic burden of DFD is estimated at $1.6 billion annually. Current clinical assessments often rely on subjective visual inspection, which can result in delayed diagnosis, inconsistent monitoring, and preventable outcomes. The need for accurate, accessible, and scalable diagnostic tools is particularly urgent in rural, remote, and underserved communities where specialist services are limited. This project addresses that need through the development of a portable, AI-powered platform that supports early detection, objective monitoring, and personalised risk prediction.

Methods: We propose an integrated diagnostic platform composed of three AI-driven components. First, a visual imaging module uses a 3D scanner (MultiScan3D) and deep learning to detect and segment diabetic foot ulcers (DFUs), quantify wound area, and monitor healing progression. Second, a thermal imaging component (ThermalScan3D) captures temperature heat maps of the foot; AI algorithms classify regions as normal, low, or high temperature to detect early signs of infection or vascular compromise. Third, a predictive analytics module analyses clinical and lifestyle data such as glucose levels, HbA1c, and comorbidities to stratify individual risk. These outputs are synthesised into concise, clinician-friendly summaries using a Large Language Model (LLM).

Results: Preliminary validation using a pilot dataset of 300 high-risk patients has shown excellent performance across all three components. The visual imaging system achieved a Dice similarity score of 98% in wound segmentation and measurement. The thermal imaging component demonstrated 97% classification accuracy for detecting abnormal temperature regions linked to inflammation or infection. The predictive analytics model attained 99% accuracy in stratifying patient-specific DFD risk based on clinical variables. Over 90 clinical and thermal data points will be analysed longitudinally in the planned larger study.

Conclusions: This AI-powered platform provides an end-to-end, point-of-care solution for early detection and monitoring of diabetic foot disease. Its compact, portable design enables deployment in primary care, aged-care facilities, and home settings significantly improving access to high-quality foot care for people in underserved areas. The system supports clinical decision-making, reduces the risk of amputations, and improves patient outcomes. These promising early results will inform a larger prospective study and support the platform's readiness for clinical trials, regulatory approval, and national implementation.