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Thesis: **"DESARROLLO DE UNA CÁMARA DE FONDO DE OJO DE CAMPO AMPLIO COMO DISPOSITIVO DE PUNTO DE ATENCIÓN"**

Summary:

Diabetic retinopathy (DR) is the leading cause of blindness among working-age adults, but 80% of its complications can be prevented with early diagnosis. Wide-field fundus cameras based on smartphones offer a promising solution for DR screening, but they require improvements in image quality, field of view (FOV), affordability, and accessibility. This study presents the design, implementation, characterization, and validation of a wide-field smartphone-based fundus camera prototype optimized for point-of-care DR screening. What stands our design apart is the use of a smartphone's macro-camera with a high diopter ophthalmic loupe for wide-field in a single shot, our cross-polarized ring for reflection-free fundus images, and the two-handed mechanical design to enhance stability. The prototype is safe (Group 1 according to ISO 15004-2), easy to use (static FOV of 80°), affordable (less than $10,000 MXN), portable (hand-held, 280 x 90 x 90 mm and 410 g), and reliable (46 pl/mm on the fundus according to ISO 10940, sensitivity 67%, specificity 92%, accuracy 89%). The agreement with DR screening using indirect ophthalmoscopy is moderate ($\kappa = 0.55$). Additionally, an artificial intelligence (AI) tool for DR screening was developed with sensitivity, specificity, and accuracy of 81%, 80%, and 82%, respectively. The prototype represents an ideal alternative for DR detection at the point-of-care, and by incorporating appropriate AI and teleophthalmology tools, it offers a potential improvement in preventing blindness in the diabetic population