**Development of a Mobile Application for Foot Scanning**

**Abstract:**

Precise foot measurement is a key to designing comfortable and proper-fitting shoes, in particular in custom shoe design, orthotics, and medical shoes. Ill-fitting shoes can cause a set of problems ranging from minimal discomfort to serious foot disorders, especially among those with irregularly shaped feet or medical conditions. Foot measurements are traditionally done by hand with scales, rules, or with markers. Although easy, they are time-consuming, skill-dependent measurements and tend to vary. They also are not scalable in situations requiring frequent or bulk foot measurements.

With the expanding market of smartphones and image processing technology, there is a chance to streamline and digitalize the process through a simple mobile application. The project is aimed at the creation of a mobile application that allows a person to scan the shape of his/her foot through the smartphone's built-in camera and obtain accurate 2D measurements of the foot length and width. The application shall be light, user-friendly, and free to access. The application makes use of open-source libraries like OpenCV to process images and Flutter or Android Studio to create the mobile application.

For ensuring measurement precision, the application employs a simple reference object, like an A4 sheet of paper or a readily available coin, that is kept alongside the foot in the image. The reference object is then applied to determine a pixel to centimeter proportion that makes results independent of the device. The image is then processed through OpenCV algorithms like contour detection and thresholding to segment out the foot and determine its measurements. The principal intention of this application is to assist users of any type—be they consumers, students, designers, or professionals in the shoes industry—to accurately measure the foot from the comfort of home or from a workshop environment, not requiring access to costly 3D scanners or commercial foot measurement software. The solution is especially valuable in environments where cost and mobility are factors.

Developed through a summer internship at the Footwear Design and Development Institute (FDDI), under the aegis of the Centre of Excellence (COE), the project is a practical illustration of how free and open-source tools can be used to computerize traditional processes within the footwear industry. The latest iteration of the application includes support for the major functionalities of real-time camera capture, auto-detecting foot contour, reference-based calibration, and on-screen presentation of foot length and width measurements in centimeters. The application also supports saving and comparing previously taken scans locally to monitor changes over time.

In the next iteration, the application can be augmented with sophisticated functionalities such as AI-powered foot type classification (e.g., detection of flat feet), recommendations based on sizing, cloud synchronization of user profiles, and also photogrammetry-based 3D scanning. Nonetheless, the priority at the moment is to have a dependable, affordable, and widely applicable 2D foot measurement solution for education, design, and the workplace.