# uPrevent: Project Overview of a Smart Insole for Diabetic Foot Ulcer Prevention

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Diabetes Mellitus (DM) affects around 422 million people globally according to WHO [1], and is directly responsible for 1.5 million fatalities per year. One of the most common and dangerous consequences in diabetic individuals is Diabetic Foot Ulcer (DFU). In fact, a lower limb is amputated every 30 seconds around the world due to DM, increasing death rates as well [2]. DFUs are not only a patient issue, but also a serious health care concern worldwide. Infection treatment in DFUs is challenging and costly [3].

The goal of the uPrevent [4] project is to create a smart insole for DFU prevention. The architecture of the device includes pressure sensors and actuators that will be placed in personalized insoles to redistribute high-risk plantar pressures in specific plantar regions such as the metatarsal head and heel.

The software counterpart of the system, which will process data from pressure sensors and make actuator control decisions, will follow a hybrid/distributed computing approach. Part of the software will run on the device (the shoe) and part on an external device with more computing resources and less energy constraints. When the plantar pressure recorded by the insole sensors exceeds the predefined threshold level, automatic adjustments of the shoe insole's rigidity will disperse it.

It is expected that the device will alleviate treatment costs and deliver better quality and more timely prevention for DFU, by allowing an affordable and objective way for patients to monitor the condition remotely and continuously.

**Keywords:** Diabetes Mellitus, Diabetic Foot Ulcer, Smart Insole Device

[1] https://www.who.int/health-topics/diabetes#tab=tab_1

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[4] https://uprevent-project.gr/