Live Demo: Real-time Focal-plane Face Obfuscation through Programmable Pixelation

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Abstract: Privacy concerns are hindering the introduction of smart camera networks in application scenarios like retailing analytics, factories or elderly care. Indeed, there is usually no need of dealing with sensitive data when it comes to carrying out a meaningful visual analysis in these scenarios. Time spent by customers in front of a showcase, trajectories of workers around a manufacturing site or fall detection in a nursing home are three examples where video analytics can be performed without compromising privacy. But still the idea of networked cameras pervasively collecting data generates social rejection in the face of sensitive information being tampered by hackers or misused by legitimate users. New strategies must be developed in order to ensure privacy from the very point where sensitive data are generated: the sensors. Protection measures embedded on-chip at the front-end sensor of each network node significantly reduce the number of trusted system components as well as the impact of potential software flaws. In this demonstration, we present a full-custom QVGA vision sensor that can be reconfigured to implement programmable pixelation of image regions at the focal plane. According to the literature, pixelation provides the best performance in terms of balance between privacy protection and intelligibility of the surveyed scene. A general scheme of the demonstratrion is depicted in Fig. 1.

The sensor captures images that are sent to a PC from the test board. The Viola-Jones frontal face detector provided by OpenCV is run on these images on the PC. If faces are detected, the coordinates of the corresponding bounding rectangle are sent back to the test board for the vision sensor to reconfigure the image capture in real time. Pixelation of the face regions will take place from that moment on at the focal plane. The degree of pixelation of these regions is adjustable through a button of the test board.
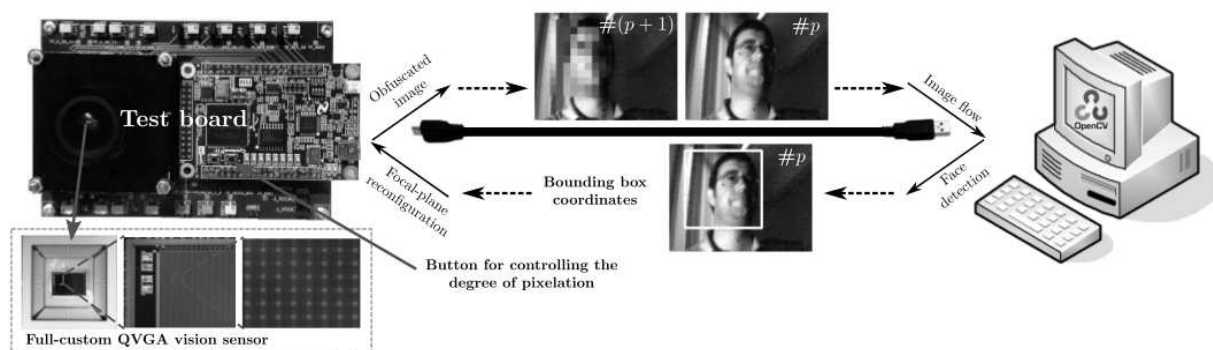
Fig. 1: General scheme of the demonstration.