

## Public Abstract

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Department:Electrical Engineering

Degree:MS

Title:REDUCING CHIP COUNT WITH A PROGRAMMABLE SYSTEM ON CHIP IN PERSONNEL DETECTION USING SIGNAL SCAVENGING

Our laboratory has implemented a personnel detection system, Smart Carpet, which can detect the walking of older adults. The existing system consists of traditional individual components and chips, leading to a large system size, which is inconvenient.

To reduce the number of chips and the size of the system, we have implemented a fully functional hardware system for the Smart Carpet using Programmable System on Chip which is short for PSoC. Using functional units in PSoC, we meet the requirement of smart carpet functionality. Using software, the program can be loaded to PSoC chip to control each component on the chip using in the system. The system implemented by a PSoC has been successfully tested with the PSoC development board. Based on the functional units we need, we have designed the necessary peripherals circuitry for the chip, which I have placed onto a Printed Circuit Board. The I2C communication with PSoC has been applied to achieve multiple boards working cooperatively. The new design can handle 80 sensors. It enjoys smaller size and scalable with carpet size.

The reduction in the total number of IC chips is from 17 to 1 and components from 98 to 56 and the reduction of the system size from about 26.3 square inches to 8.7 square inches.