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I-IMAS: a 1.5D sensor for high resolution scanning

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The I-ImaS (Intelligent Imaging Sensors) is an EU project whose objective is to design and develop intelligent imaging sensors and evaluate their use within an adaptive medical imaging system, specifically tailored to Mammography and Dental Radiology. The system will employ an in-line scanning technology approach and proposes the use of CMOS active pixels sensors. The I-Imas system will have the capability of processing the data on every pixel and be able to dynamically respond in real time to changing conditions during imaging recording.The result will be to minimise the radiation exposure to areas of low diagnostic information content while extracting the highest diagnostic information from regions of high interest.

We have developed a 1.5D CMOS active pixel sensor to be used in conjunction with a scintillator for X-ray detection. Multiple sensors will be aligned to form a line-scanning system. Each sensor contains a 512 by 32 array of pixels and the electronics to convert the collected amount of charge to a digital output value. These include programmable gain amplifiers (PGA) and analogue to digital converters (ADC). The gain of the PGA can be switched between one or two, to increase the sensitivity for smaller collected charge; the ADC is a 14-bit successive approximation that runs at 20MHz, with a sampling rate of 1.25MHz.

The ASIC also includes a programmable column fixed pattern noise mitigation circuit and a digitally controllable pixel reset mode block.

Here we will describe the sensor design and the simulated performance.

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