Project Title: Image Capture and Processing for TESS and REXIS

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Abstract: The MIT-led TESS and REXIS collaborations intend to build two satellites based on the same image-capturing platform composed of a custom CCD sensor designed to detect X-rays from distant stars and asteroids and an on-board FPGA for image preprocessing and data storage. While both of these projects have been in development for several years and some hardware has been designed and constructed the FPGA code that manages data collection and processing has not yet been written. Building upon an existing codebase, this project will implement a digital system that acquires an image from the CCD, stores it in memory (in this case an on-board CompactFlash card attached to an FPGA development board), and reconstructs the image on demand. Once this basic functionality is achieved, preprocessing to ready the images for TESS' data analysis routine will be implemented. This includes stacking a series of 10 captured images on top of each other, clipping out areas of the composite image from a star catalog of known locations, storing them in memory, and reconstructing them on demand. If there is additional time other preprocessing routines such as filtering and feature detection may be constructed in order to speed up data analysis.