

Dear Massachusetts Space Grant Consortium

This summer I participated in two NASA projects led by two mentors at The Goddard Spaceflight center in Maryland. These projects were organized through Steve Holt, a professor at Olin and former director of science at Goddard.

Peter Shirron has developed a Continuous Adiabatic Refrigerator, designed for cooling a heat sink to 50 thousandths of a degree kelvin, for the purpose of detecting the thermal energy of incoming x-rays. The first project I was involved in entailed a reworking of his control algorithm, towards the aim of decreasing the RMS variation in heat sink temperature by an order of magnitude. A complete report can be found on the project website: <http://nasa.ece.olin.edu/projects/2008/adr/> Though the original project aim was not achieved, I have learned many things through this endeavor. I now have a thorough understanding of labVIEW, an industry standard program used to interface with and control virtually any sensor or actuating device. Additionally, I have gained valuable experience working as a member of a team of four, as well as experience in engaging with a project member in a remote work environment (Peter). Though we did not manage to reduce the noise variation by an order of magnitude during the eight week program, we have made significant progress. Most importantly, we have given Peter the chance to have a group of outsiders come into his project, and become familiar with his control algorithm. We have offered up many suggestions for improvement that will hopefully be built upon in the succeeding years.

Keith Gendreau has suggested that in order to automate certain routine X-Ray detection tasks, an inexpensive Multi-Channel Analyzer would be invaluable. A multi-channel analyzer detects the height of incoming pulses and the approximate time at which they occur. The second group that I participated in was tasked with the creation of this piece of equipment - the 25 dollar MCA. Again, a complete report can be found on the project website: <http://nasa.ece.olin.edu/projects/2008/mca/> through this project, My responsibility mainly entailed the design of the analog front-end which accepted pulses from a 50-ohm-impedance BNC Cable, and detected and stored their heights, as well as triggering logic pulses that were sent to other components of the device. This was the first completely analog design experience in which I had participated. Throughout the summer I had the chance to use my previously only theoretical and experimental knowledge of analog circuitry in a design context. In doing so, these skills became reinforced to a tremendous degree. Although some firmware changes still need to be made before the device can function, the project is essentially complete.

Through both of these projects, I have consistently had the feeling that I was contributing to an interesting and worthy cause; advancing mankind's knowledge of the cosmos. I would like to thank the Massachusetts Space consortium, Steve Holt, our two mentors, and all of my teammates for making this endeavor possible.

-James T Switzer
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