

## Senior Design Presentation

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### Solar panel system

Large scale solar systems are currently deployed in many parts of Western United States with quite a bit of success [Wang, 2009]. But despite their successful deployments in the last 10-15 years, they remain marginalized because of their inability to compete with traditional fossil fuel based systems. As energy becomes more and more important in the economic development of our society, there is a need to investigate the potential viability for expanding the use of small solar panel based systems throughout the United States. In this project, we investigate a class of small solar panel systems [Salameh et al., 2003]. They are built using a top-down design with material readily available on the market place so as to make them easy to build in remote areas of the world. The idea is to develop small cost effective solar system solutions that are adaptable and easily portable to the national grid [C. Suh, 2011]. We utilize a body of previous works from the National Renewable Energy Laboratory [NREL, 2012] to investigate the behavior and performance of small solar panel systems in both controlled and open environments. We analyze their expected behaviors based on our knowledge of the sun interaction with Photovoltaic materials and compare/contrast this expected behavior with actual and synthetic data. The overall goal of this project is to gain a better and deeper understanding of small solar panel systems. The hope is to better understand how they could be successfully integrated in urban networks as part of a hybrid renewable energy system.

**Wang, Uclia** (Nov. 16, 2009), "[Here Comes China's \\$3B, 'Golden Sun' Projects](#)", Greentech Media - Retrieved October 5, 2011

**Salameh and A. Davis**, "Case study of a residential-Scale Hybrid Renewable Energy Power System in an Urban Setting", Proceeding of the IEEE-PES Meeting , Toronto ,July 13-18, 2003.

**C. Suh**, S. Glynn, D. Biagioni, J. Scharf, M.A. Contreras, R. Noufi, K. Munch, and W.B. Jones, 2011, Photovoltaic Informatics with Data Origami: Uncovering Processing-Property-Performance Relationships, SPIE Newsroom, April 2. DOI: 10.117/2.1201103.003577.

**NREL**, National Renewable Energy Laboratory (<http://www.nrel.gov/docs>)