

Abstract Submitted
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System for the Generation, Compression, and Storage of Hydrogen Gas from Renewable Sources. JOSHUA LEWIS, WALTER SMITH, ANTHONY GANNON, The Naval Postgraduate School — The purpose of this research was to implement a control system to support the autonomous generation, compression and storage of hydrogen gas from renewable sources. The system was designed using commercial off the shelf components and was required to be mobile for operating in remote locations. A photovoltaic (PV) array was utilized to power the system. Ambient moisture in the air was collected via dehumidifiers and processed through an electrolyzer to produce hydrogen gas. The hydrogen gas produced from the electrolyzer was required to be dry, so a vacuum dehumidifier with a semi-permeable membrane was utilized to remove residue moisture from the hydrogen gas. An electrochemical hydrogen (ECH) compressor was used to compress the hydrogen gas for storage. The system performance was constrained by the compressor flow rate, and output from other components had to be subordinate to this. Hydrogen produced from this system can be stored for an indefinite amount of time in order to provide steady stable power regardless of fluctuations in demand. The hydrogen can then be used in fuel cells to provide electricity or to power long endurance drones from remote locations.

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