

Thesis Project Portfolio

HEDGE: Hypersonic ReEntry Deployable Glider Experiment

(Technical Report)

Analyzing Influences and Barriers to Nutritional Health

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Spring, 2022

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Sociotechnical Synthesis

How can hypersonic research be justifiably funded when many United States citizens do not even have their basic needs met? Hypersonic flight research and nutritional health are topics that do not have much in common, targeting vastly different subject groups. Nutrition research benefits those living in low-income areas battling food insecurity. Hypersonic research is a field that reaches people with the privilege of having their basic needs exceeded, who can expand their field of study to worlds beyond Earth. The motivation for each of these projects stems from the goal of making knowledge accessible to the majority. Not everyone is afforded food security, and there are numerous influences affecting one's ability to care for themselves through nutrition, and barriers to this aspect of health. There needs to be more information available to the public about the failures of current federal aid, preventative health care, the accessibility of dietary needs, and how these factors play a significant role in one's well-being. Similarly, hypersonic research is not accessible to undergraduate students making space travel and technological exploration inaccessible for students. More research of hypersonic flight increases the accessibility of space travel and resulting opportunities in the exploration of the technologically expanding horizon.

Hypersonic experimentation is an exclusive expanding field of study within the field of Aerospace Engineering. These experiments are not readily available to undergraduate students because they cannot be replicated in wind tunnels and are expensive projects when utilizing rockets or aircrafts. The conduction of hypersonic research on a hypersonic glider utilizing a CubeSat will result in cheaper, faster, and more accessible data collection. CubeSats are small satellites deployed in low or extremely low Earth orbit and are utilized by various undergraduate research groups. This technical project assesses the capability of a CubeSat to house a hypersonic glider flight experiment in order to conduct hypersonic research. Space Mission

Engineering (SME) is, "... the process that takes a set of broad objectives and constraints and then proceeds to define an affordable space system to meet them," (Microcosm Inc., n.d.). The SME process is used to construct the project based on several mission-critical events: the successful deployment of the CubeSat and hypersonic glider, the stability of the glider during flight, and data being relayed during reentry. The goal of this project is that the hypersonic glider will experience decreased drag on the test article with stable hypersonic flight conditions. The importance of this research is understanding that educating undergraduate students in the field of hypersonic flight may lead to significant advancements in commercial aircrafts and spacecrafts. Captured data from these experiments has considerable implications for military and commercial aircraft and spacecraft as well as implications for the public, benefits including the accessibility of space travel for the public and space research for ground applications.

There are drastically different standards of living for different socioeconomic classes. Access to proper healthcare, poor dietary choices, and clean air and water are characterizations of food insecurity, which affect chronic conditions and the risk factors that impact one's life expectancy. This naturally poses the following question: what are the influences and nutritional barriers to dietary choices and how do they affect subsequent health of individuals and populations? The importance of nutrition is evident through its impact on preemptive health care, mental well-being, and a generally healthy lifestyle. Yet, despite its importance, many people are prevented from adequate education about this topic, limiting their health and life expectancy. Dieting and the various influences of nutrition on specific communities and marginalized groups is analyzed in this research to identify social and political barriers, provide more accessible information to the public, and discern any significant influences. The spread of nutritional requirement information, and consequently preventative healthcare practices, naturally stands to

benefit the public. Social Construction of Technology (SCOT) Framework is used concurrently to analyze the social barriers affecting one's ability to receive proper nutrition considering relevant social constructs and external influences such as government policy (Klein & Kleinman, 2002). Further connections to the development of society, underfunded federal programs, and the current state of marginalized communities contextualizes the importance of this nutrition research.

The combination of the information gained from learning about hypersonic and nutritional research has created new connections between these topics. Hypersonic and nutritional research are most significantly connected by their respective improvements to the accessibility of public education. Greater education about nutrition is needed to improve the quality of life through the ability to make health-conscious decisions. Greater undergraduate hypersonic experimentation is needed to improve the accessibility of space flight research beyond the professional sphere. Each of these fields of research has corresponding outcomes that result from this newfound accessibility of information. Nutritional health research leads to the identification of social and political nutritional barriers, providing more information to the public about discerning factors that play a significant role in one's well-being. This information will help the public care for themselves amidst systemic barriers to ensure the spread of nutritional requirements and healthier lifestyles. The impact of the technical CubeSat satellite project and hypersonic experimentation will create cheaper, faster, and more accessible space research data, and a greater hypersonic experience for undergraduate students. Space research leads to technological advancements in a variety of fields that stands to benefit the entire public population. Crop satellites, weather satellites, and isolated nutritional research on the International Space Station are all examples of technology currently improving the lives of American citizens. Hypersonic

research is justified since it provides opportunity to better assist those in need. Improving the accessibility of information and education has the potential to improve the quality of life of all people by handing them the tools to make informed decisions and improved technology.

Works Cited

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