

Thesis Portfolio

Self-Balancing Remote Control Toy Bike

(Technical Project)

The Motivations of College Diet Stakeholders and Impacts on the Student Relationship

(STS Research Paper)

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On my honor as a University Student, I have neither given nor received unauthorized aid
on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Nutrition is the science of food and nourishment, and most of its application revolves around creating healthier and happier people. The premise of most research surrounds the topic of nutrient profiles and correlated diets. This has been used to both explain and provide solutions to nutrient deficiencies and health conditions in numerous environments, including poverty-ridden slums, disease-filled villages, and similarly struggling environments. My research format takes after the preceding nutrition research mentioned, however, it has been focused on college students and the college environment. My research addresses an environment with high nutrition and performance demands and the means to satisfy it rather than one lacking both the supply and demand for hyper-optimized nutrition. The structure for this research was the following: Addressing the stakeholders in a college diet, defining the stakeholder-student relationship, and creating an action plan for changing the student diet. The stakeholders were identified in the prospectus. This was followed by the research paper defining each stakeholder-student relationship. Finally, the conclusion and unwritten part of this research is the written action plan, which accumulates nutrition knowledge and research completed in the prospectus and research paper. Initial ideas for the technical project involved an autonomous food delivery system, capable of working in tandem with the to be proposed action plans. However, for the sake of time and resources, a self-balancing remote control toy bike was the subject of the technical project, containing many similar development challenges to that of the proposed project.

Abstract of Technical Project

This technical project details the development of a self-balancing remote control toy bike, designed to engage young learners in the fundamentals of physics through hands-on interaction. The bike includes a small playground set, where children can conduct experiments and play with

modular components such as the reaction wheel, wheels, and steering column. This modularity allows children to actively engage in learning by adjusting and reconfiguring the bike to understand the principles of balance and dynamics. Central to the bike's functionality is a system comprising sensors, motors, and a STM32 microcontroller, which collaboratively processes environmental and operational data to maintain stability and maneuverability. The bike is equipped with a reaction wheel mechanism inspired by spacecraft technology, adapted here to control balance through dynamic adjustments in angular momentum. Additionally, an intuitive mobile application allows users to control the bike, providing a user-friendly interface that enhances the learning experience.

Abstract of Research Paper

In my research of the stakeholders-student relationships, a categorization methodology was used to analyze and define the relationships. Through case studies, I observed the interactions and intentions of college diet stakeholders toward students. By studying physical interactions, I learned and better understood the role that these stakeholders play towards students. By valuing individual opinions, perceptions, and intentions, I gained a better understanding of the motives for these groups to maintain relationships with the students. I grouped interactions conveying a similar sense of relationship, and deduced 3 major relationship categories defining stakeholder-student relationships: community, next-generation, and customer. Through deeper analysis, I determined categories that most dominantly presented itself in the relationships and learned the implications of these labels. Most importantly, these groups are more accepting of changes closely relating to their perceived relationships. For example, end-users in a customer relationship would be more open to transactions, while those in a community relationship would be more open to selfless gifting. Ultimately, I found college

administration to bias the customer relationship with students while food providers held both customer and community paramount to their relationship with students. These have obvious implications on the action plan, which must be accepted by the stakeholders in order to be feasible.

Considering the initial proposal for the technical project, clear links can be drawn between the motivations for it and the research. The most evident question and overarching motivation is the best approach for improving college student performance. The research, given its focus on improving nutrition in college diets, has relevant and strong cases that support its tie to performance. Similarly, the bike, a stepping stone to the autonomous food delivery system, holds connections to performance, as it impacts meal timing, a well studied contributor to performance. Overall, there exists countless evidence supporting the impacts of diet on performance. Thus, by tackling multiple angles of dieting, I intend to propose a thorough and effective solution to college performance.