

Introduction

The distribution of zones and land property in Charlottesville, Virginia has impeded on the tranquility of many residents as imposed by the Brandon Avenue Master Plan. With the aim to create a vibrant eco-district, the University of Virginia has designed a blueprint that will renovate the facilities and residential buildings residing on Brandon Avenue and open a space that allows for student creativity to flourish while establishing a safe and healthy environment for everyone. However, the street on Brandon Avenue was inhabited by various groups of people including student, professors, staff and the general public. Under the assumption that the plan would be generating a greater good, the impact on the lives of the people residing on Brandon Avenue were arguably overlooked when asked to vacate their homes all under the name of the University of Virginia Administration, approved by the city council. This approval allowed the University to redistribute the city zones in their favor, relabeling the existing housing residential zones on Brandon Avenue into academic-use zones. The University of Virginia has a significant influence on government decisions and it brings to question how the University of Virginia can compromise the land and zone that is not owned by them and if it's ethical to request vacancy for the residents on Brandon Avenue for the sake of a project that is designed to help the general student body. Although the goal envisioned by the University Administration was to bring students together in a vibrant environment, the lack of consideration for the impacted residents and the influence the University has on the city government has instead created a contradiction in their mission. This governing power over the zones within Charlottesville has neglected the lives of a multitude of people and has brought light to an issue of entitled influence. This influence is ambiguous and allows for the University to bypass many legal yet unethical movements. Why and how does the University have this great of an influence on the city government and should they be granted such influence? Without established boundaries, the University is capable of endorsing community engagement yet simultaneously create division within the community, ironically thriving in this paradox. I would argue that if community engagement was prioritized and implemented with the goal of including the community in their decision making, there would be less of a divide between the community members and the University. As there have been negligence over integral components of a design for the city, I would question what sort of considerations and influences would impact the technical framework of a mechanical apparatus designed to power an electrical battery.

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Technical Topic:

The outcry and prevalence of electrical devices such as phones, music players and wireless headphones has enlisted a demand for people to own a phone in order to be integrated honestly in society. The perks and conveniences that come from a phone have become working tools that people cannot abstain from using, they now stand as essentials in our busy everyday life. In these busy days, time has a heavy hold on us and often determines what sort of decisions we make. In light of using our time efficiently, there needs to be a device that can both address the issue of time while optimizing the use of electric devices, phones in particular.

The principles of kinematics along with the fundamentals of energy conservation were used to design an apparatus that would induce enough electrical charge to power up a battery through mechanical means. The kinematic components of the bicycle can be studied in the patent of the bicycle (Rice, Charles D., 1890). The inner workings of how a battery can be charged mechanically can be furthered explored in a patent of a portable battery (Batson, David C. and Pinnell, Leslie J., 2007). The objective of the design is to optimize the output charge produced by the generator while being both material and cost efficient.

The design introduces an apparatus that can be easily installed onto a standard bicycle. The apparatus is comprised of three essential components, the battery mount, the generator and the spindle arm that holds a small wheel, all of which are assigned to different group members. The dimensions are not finalized each component must fit within the frame of the bicycle with no lingering parts and each secured at a portable weight.

The battery mount, which holds the battery and the device being charged, is placed in between the handlebars on the stem and is the portion of the device that I, Jonathan Moon, and my group member, Michael Shiu, are assigned to designing in SolidWorks and building. The mount is connected to the generator placed on the seat tube through a wire that coils around the top tube. The generator is also connected to the spindle arm by coiling the wire around the seatstay and is assigned to group members David Braatz and Dylan Ishikawa. The spindle arm will hold its wheel which is placed on top of the back wheel, making contact with the tire. There will also be snapfits from the spindle arm attached to the spokes of the wheel to stabilize the system and to maintain constant contact between the bicycle wheel and the spindle arm wheel. The spindle arm is assigned to group member, Craig Wendelken.

The process in sequence starts with the rotation of the back wheel of the bicycle once the system is in motion. The rotation of the back wheel will cause the smaller wheel to rotate but at a much higher rotations-per-minute (rpm). This rotation from the smaller wheel is produce rotational kinetic energy that is then transferred to the generator. The generator will take kinetic energy as an input and convert it into electric energy through electromagnetic induction which is the process of generating electric current with a magnetic field. This electric energy will be taken in by the battery and charge the device through an electrochemical process.

The battery mount is designed to hold the device, in this case a phone, in place and visible to the user. The utility of this feature is to allow the user to take advantage of the position of the mount and have it act as a gps device. As a complete system, the apparatus is to mechanically generate electricity for a battery that will charge a phone and the phone can be used as a gps device. Logistically, the design aspect of the entire system should be finalized by November 27th, 2019 as seen by the Gantt Chart in Figure 1.

STS Topic:

Designed by the University of Virginia (UVA) in 2015, the Master Plan aimed to transform Brandon Avenue into a healthy eco-district, “vibrant, mixed-use, sustainable district that links the Health System to Central Grounds” (BrandonAveMasterPlan., 2017). With the intention to establish a positive environment for students, the University of Virginia has paved the way for more opportunities where students can vent out their creativity outside the classroom setting in the likes of music practice rooms, student art galleries, media/sound studios, fitness rooms and a variety of other expressive outlets. Although the changes to Brandon Avenue were installed to ultimately create an uplifting space for students, the entire project was tied to several costs that involved and affected crucial stakeholders. The primary stakeholders can be sectioned into three groups, the University Academic Administration, the city government officials and the city council, and the former residents of Brandon Avenue and the neighboring buildings. The University Academic Administration formed the Master Plan and was the party primarily responsible for conducting the renovation of Brandon Avenue. The city government officials were the ones to approve the plan and approve the vacancy of the residents on Brandon Avenue, expelling them from their homes without any form of compensation. The former residents had a significant change in their lives and were heavily affected in a short period of time.

On November 14, 2017, the Planning Commission voted to certify to the City Council to close Brandon Avenue in correspondence to the Master Plan. The University of Virginia may have owned most of the land on Brandon Avenue but did not have complete ownership over it, yet the city council approved the plan to reconstruct the street on Brandon Avenue. The role of the city council is to approve or decline actions that propose a change to zones or buildings within the zones but should also be cognizant of the people affected by it. I believe that the people affected by these changes are entitled to a voice and action directed to both the school and the city government, encouraging community engagement and thereby highlighting their presence and their role in this city.

The city of Charlottesville is responsible for a parallel story of negligence on residents in the case of Vinegar Hill in 1965. Vinegar Hill was the largest African American neighborhood in Charlottesville at the time, having cultivated the land for former slaves. It was located by the Downtown shopping district and was stagnating the potential growth of the district and thereby the city. The neighborhood of Vinegar Hill was planned to be torn down “for the sake of progress” (Smith, 2017). This progress is acclaimed to be for the general good but who is the progress for and who is affected by this decision? I would deem it as immoral to destroy the home of over a hundred people in exchange for a gateway to a possibility. I understand that progress is what we as people thrive on but it should not outweigh the livelihood of multiple innocent lives, tearing homes and families apart.

The Social construction of technology (SCOT) is a theory within the field of science and technology studies which argues that technology does not determine human action, but that human action shapes technology. The theory of SCOT explores the reasons for acceptance or rejection of a technology or technique by examining the social world and its response to the technology which is defined as technological constructivism. This framework alludes to the idea of not necessarily finding the “best” technology based off its success as who is the one to

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decide what is best but rather defining what is considered to be best and for whom. In the case of Brandon Avenue Master Plan, the intended stakeholder was the student body within the University as the entire Brandon Avenue renovation was designed to create a welcoming and encouraging environment for students to thrive in their academics and creativity, standing in contention as the “best” technology and the proper course of action for the University to take. However, the stakeholders most impacted by this project are the former resident of Brandon Avenue, with their homes and livelihood taken away in a similar manner to the victim of the incident at Vinegar Hill, raising the question of whether or not the actions taken by the University were appropriate or even ethical. The SCOT framework follows that it is far more crucial to understand the context behind the actions taken by the stakeholders and how those actions impact the community as opposed to narrowly viewing the potential outcome of a technology or in this case, a project.

The power dynamic with the University and the city government regarding zoning codes is a social construct. As SCOT theory suggests, it is the actions of the people that shape technology and I would argue that this is a perfect example. Zoning codes are complex and although accessible to anyone within the community, the zoning codes are not well known and that aspect is taken advantage of. The influence of the University on zoning is far stronger than the responsibility they hold themselves up to. The zoning codes do not dictate the courses of action from the University of the city council but rather, the University utilizes their influence to manipulate the codes in their favor. The politics involved in this relationship with the school and the former residents of Brandon Avenue are also subject to unethical behavior. The University advocates for community engagement yet the influence of the affected stakeholders do not reflect that. In fact, their push for community engagement and the lack of actual input is creating and divide in this relationship. Again, it is not the politics that dictate the courses of actions but the actions taken that define the standing politics within the school. Both politics and zoning codes are forms of technology that are being shaped heavily by the school with little input from the affected stakeholders.

How can UVA compromise the zones and land on Brandon Avenue with the residential areas that do not belong to them? Is it fair to reject the proposal to create a vibrant environment for the students to express their intellectual and creative minds? The technology at hand invites a positive reinforcement onto the community that needs it and emphasizes the need for an outlet where students can grow. This may even suggest a benefit to the residents affected by the Master Plan (Pinch and Bijker, 1984). However, those eligible for such space are not benefited yet they were stripped of their homes. Where is the line and what are the costs?

Conclusion:

The mechanical apparatus can be easily installed onto a bicycle and addresses the issue of excessive phone usage in today's day in age and the lack of time there is in the life of a working individual. The mechanical device welcomes a means to operate in society while making use of the spent energy biking, utilizing every aspect of riding and bike and considering

the use of time. The social construct regarding the zones implemented in Charlottesville and the influence of the school brings to question how much influence an entity such as UVa should truly have and at what cost. How can the stakeholders have stronger influence within the city?

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