Project Statement and Specifications

Bicycle for 16 year old (CP)
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Team #12
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Client:
Scott, Julie and Abby Miller
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Statement of Need

The purpose of this project is to provide a bicycle for 16 year old Abby Miller. Abby has Cerebral Palsy and therefore has limited control over her body. Ever since she was little she wanted a bicycle but due to her medical condition she isn’t able to ride a regular bicycle. She used to have a pull-behind that her father built her but she grew out of it. Abby needs complete body support including support of her head, her neck, and her torso. A modified bicycle will allow her the freedom to ride on her own without being constrained to sitting in a pull-behind. However, since she can’t steer the bike on her own, her parents will be able to control her speed and direction through the use of a remote control. The bike would also allow her to better interact with other kids her age while enjoying the outdoors.

The goal of this project is to design a bicycle that Abby can safely use with some independence while giving her parents ultimate control of the bike. The bicycle must be easy to operate as well as being compact enough to conveniently travel from their house to the nearby park. It must also provide the necessary support for her head, neck and torso as required by her Cerebral Palsy.

Introduction and Overview

The proposed device is a modified bicycle that will best suit Abby’s needs. Since Abby can’t hold anything with her hands, the device will be controlled remotely by her parents. The device must be safe for Abby to use since she has limited control of her body. There must be enough support for her upper body as well as straps to hold her in so she won’t fall out since she moves her whole body when she talks. The bicycle will be motorized, with an adjustable seat for height versatility. Since Abby’s favorite color is yellow, the bike will be yellow.

The main point of this device is so that Abby will be able to ride recreationally while enjoying a greater degree of freedom than she has had in the past. The bicycle needs to be fun so that Abby will enjoy riding it but also safe so that her health/ well-being will not be compromised while riding.

Realistic Constraints

This project’s main constraints are budget and safety. The parents have stressed that the safety of their daughter comes first and for most so the production of the bicycle must be very safe. Some of the conditions that must be addressed would be the fact that her neck, head, and torso need to be supported. To ensure her safety she must be strapped in so that she does not fall off. Her parents have mentioned that when she talks she uses a lot of body motion so keeping her arms secured on the bike is a must. The parents would like the bike to be portable so that they can bring it to the local park, so the bike needs to be able to be collapsible or able to be disassembled and reassembled. In either case, the bike would have to be safely secured into place before Abby can ride it in order to ensure her safety and so the bike won’t collapse once she is on it. The economic constraints are also
a big factor since the bicycle will be motorized and remotely controlled. Also, since this bike will have to be completely constructed from scratch the metal, tires and seat will all needed to be purchased separately. The majority of the allotted budget will go into the motor and remote control. Since the bike will need to last for years to come, an adequate metal and motor will need to be looked into so ensure the longevity of the device. The only environmental constraint that would pose a problem would be any byproducts released by the motor. Since this is a customized bike for a certain individual, there is no manufacturing constraint. Finally, there are no prevalent political, social or ethical constraints in creating the bicycle.

Other Data
The client lives in Illinois on a big hill. Her parents would need to transport the bicycle to the nearby park before Abby could get out and ride. The roads in their town are either dirt or concrete.

Questions
How much independence does Abby have?
Is it possible to have the bicycle be remote controlled?
What will our budget be?
What should the maximum allowable speed be?
How big should the vehicle be? Weight?
How many wheels should it have?
What type of supports can we use for her head, neck, torso?
How can we make the bike more interactive so that Abby will have fun riding it?
Can the bicycle be made to be compact enough for convenience in travel/ storage?
What is the distance in which the remote control will need to be operated?

Operational Specifications:
The device needs to be a motorized bicycle controlled electronically by a second party remote control. The driver needs to have support of her head, neck and torso. She must also have strap constraints so that she won’t fall out of the device. The seat of the device must be adjustable for versatility in growth.

Technical Specifications:

Physical:
Type of Material: Steel frame

Mechanical:
Size: To be decided (TBD)
Weight: TBD
Speed: 5-10 mph

Electrical:
TBD

Environmental:
Storage/Use Temperature: 0 – 100 °F
Operating Environment: Concrete pavement

Software:
TBD

Safety:
Head, neck and torso support
Arm, hand and feet restraints
Device maintains upright position (support wheels)

Maintenance:
Ability to disassemble/reassemble
Cleaning