Design Proposal Template:

School:_____   **State:**_____   **Division:** ☒Middle School or ☐High School

Team Members' Names: _____

Project Title: Should be creative and give readers a general sense of what the project is about and want to read more. (20 words maximum)

Biddle Products Introduces the Smart Spoon and Smart Liquid Alert for the Visually Impaired *(14 words)*

Community Challenge Being Addressed: Describe the community challenge that you will attempt to address with your proposed solution. (75 words maximum)

Our classmate is visually impaired and struggles with eating, a simple task for most. When pouring a drink, she has to use her finger to avoid spillage, and she is unable to tell if she had anything on her spoon unless she touches the food. This makes meal times, especially at school, stressful, difficult, and unsanitary. We want to assist our friend and thousands of students like her enjoy meals quicker, safer, and cleaner. *(74 words)*

Community Research and User Identification: Explain the process used to identify the community challenge and select your user. Include any research done to identify issues in your community and understand which groups face challenges because of these issues. (150 words maximum)

We began by talking as a group about things that we struggle with everyday. Our classmate shared that lunch at school is stressful and messy because of her visual impairment and the limited time available for lunch, typically 25-30 minutes in most k-12 schools). Our research showed mealtimes can be difficult for visually impaired students and accommodations are important to promote independence and social acceptance. Most accommodations require special arrangements, equipment or help from others. These accommodations do not address all of the challenges our classmate identified and can be difficult for schools to implement or too costly for the student's family.

According to the Centers for Disease Control and Prevention, over 12 million U.S. citizens have visual impairments. Our research showed that many people nationwide struggle with eating and drinking due to their visual impairments. *(136 words)*

User Profile: Provide a detailed description of your selected user. Include information about challenges they face, how those challenges impact their lives, and specific project needs based on user feedback. (150 words maximum)

Our classmate must touch her spoon or food to know if she has picked up anything, often spills when pouring liquids, and uses her finger to tell when her cup is full. This makes lunch at school stressful and messy. She often packs a sandwich and bottled drink to make lunch easier but wishes she could enjoy school lunches with her friends without having to ask for help. When she does ask for help, she doesn't get to finish before lunch is over.

Through our research we identified the following needs for this project.

1. A cup and/or utensil would be the most helpful.
2. The cup should inform the user when the cup is almost full.
3. The utensil should inform the user when food is on it.
4. They must be durable, small, and easy to carry and use at school.
5. They should be inexpensive.

(148 words)

Project Goals: List your project goals and explain how these goals will address the community challenge. Project goals should define the desired outcomes, not specific features of the proposed solution. (150 words maximum)

1. Create a utensil that will automatically detect the presence of food and alert the user via sound so that it is easy to use for anyone.
2. Create a cup that will automatically detect when the cup is almost full and alert the user via sound so that it is easy to use for anyone.
3. Make both low-cost and durable so that it can be packed in a backpack and is usable by school-age children.
4. Make both battery powered and easy to turn on and off.

These three simple goals should provide accessible tools that are cheap, portable, and easy to use for anyone to use whenever and wherever they enjoy meals.
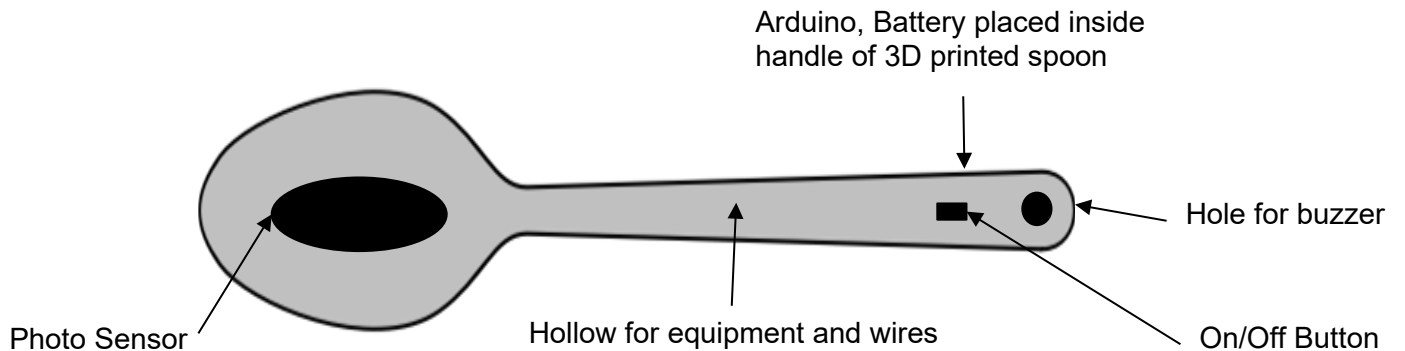
(115 words)

Proposed Solution: Describe your proposed solution, including any innovative and unique features, and explain how this solution will address your users' needs and the challenges they face. (150 words maximum)

Our team has decided to create a 3D printed spoon that uses an Arduino microprocessor and a photo sensor to detect and make a buzzing sound if there is food on the spoon. We will also create a 3D printed cup attachment that uses an Arduino and non-contact water level sensor to detect and make a buzzing sound when the cup is almost full. This will be attached using elastic straps to adjust to fit cups up to six inches in diameter. Both will include a battery holder for two 3v coin batteries which should provide enough power and be small enough to not be bulky. These two designs should be cheap, durable, portable, easy to replace, and easy to use for anyone with visual impairments making meals less stressful and time consuming. *(133 words)*

> **Initial Design:** A single graphic of your first design idea with key features adequately labeled. It should be easy to understand, and the reader should have a general understanding of how the prototype functions by looking at the graphic. Max size 8.5" x 11". May contain up to 4 views of the design.

Spoon Sketch

Arduino, Battery placed inside handle of 3D printed spoon

Hole for buzzer

Photo Sensor

Hollow for equipment and wires

On/Off Button

Cup Attachment Sketch

On/Off Button

Arduino, Battery placed inside 3D printed box

Elastic Straps

Hole for buzzer

Water Level Sensor