Timothy Erckert
Project 3 – Problem Definition

1. What topic area did you choose your project to be related to?
I chose “accessibility support – physical challenge.”

2. What issue or challenge does your project aim to address?
This aims to help people that have issues with fine motor control to practice carrying containers, such as trays, in a level manner.

3. What is the goal/purpose/objective of your project?
My goal is to design a device that can be placed on a carrying container that will provide notification, auditory and visual, if what they are carrying is skewed and allow them to correct back to level.

4. How does this project relate to the topic area you chose?
This device can be used to help train users who struggle with fine motor control to coordinate their hands and arms when carrying something that needs to be close to level.

5. How does this project address the issue/challenge you selected?
By providing visual and audio feedback when the tilt sensors detect a dip the user can make the necessary corrections to bring it back to a level state.

6. What are the inputs to the system you need to consider for this problem?
a. These need to be in terms of the problem, not anything related to devices (so no mention of things like GPIO)
b. Each input will need to have a statement of how it is part of the system
4x4 membrane keypad
Allows the user to turn off audio indicator for the device.
Tilt sensors
Senses when a side is dipping.

7. What are the outputs from this project?
a. These need to be in terms of the problem, not anything related to devices (so no mention of things like GPIO)
b. Each output will need to have a statement of how it is part of the system
LCD
Provides menu interface to the user
LEDs
Provides visual warning when tilt is detected. Initial plan is that when LED is off indicates that side is skewing downwards.
Buzzer
Gives audio warning when the system detects that a side is dipping.

8. Are there any constraints?
a. Consider physical behaviors for the implementation and elements of the design.
1. Tilt sensors and buzzer need to be incorporated.
2. The angle that the tilt sensor activates cannot be so shallow that it is almost always active, but not so severe that warning comes too late to avoid issues.
3. Buzzer is active low and needs to be controlled directly by the STM board.
4. Membrane keypad, LCD, and LEDs must be incorporated into design.

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5. Program needs to incorporate watchdog timer, one bitwise controller, and all critical sections must be protected.
6. Needs at least one interrupt and a task/thread incorporated into design.