

Final Project Proposal

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1 Overview

This final project will create a device that responds to the ambient noise level. The ambient noise level will be detected with a decibel meter, and will be compared to a programmable noise level threshold. Outputs can include a variety of actions: showing the noise level on a 7-segment display or VGA output, moving a robotic arm, etc.

2 Tasks

2.1 Decibel-level detection

- **Description:** This task will involve using an ADC to convert a decibel meter's output to a digital format, reading it with our FPGA, and indicating somehow that an output has been read.
- **Difficulty:** This is a pretty difficult task, as it is the core functionality of our project.
- **Point value:** We propose that this be worth 20 points.
- **Input:** FPGA pins to read in decibel information.
- **Output:** likely an LED to indicate when the noise threshold has been crossed.
- **Processor use:** Significant.

2.2 Robotic arm movement: Waving

- **Description:** In response to the noise level crossing the noise threshold, the robot arm would wave.
- **Difficulty:** This is a very difficult task, as it requires building support for a robotic arm, which can be challenging to control.
- **Point value:** We propose that this be worth 20 points.
- **Input:** FPGA pins to read in decibel information.
- **Output:** Robotic arm action.
- **Processor use:** Significant.

2.3 Robotic arm movement: Pressing a button

- **Description:** In response to the noise level crossing the noise threshold, the robot arm would press a button.
- **Difficulty:** This is a very difficult task, as it requires building support for a robotic arm, which can be challenging to control.
- **Point value:** We propose that this be worth 20 points.
- **Input:** FPGA pins to read in decibel information.
- **Output:** Robotic arm action.
- **Processor use:** Significant.

2.4 Customizable arm actions

- **Description:** Have the user define which action (from a list of specified actions) the robotic arm takes when the noise threshold is crossed.
- **Difficulty:** A simple, but non-trivial task, as it requires user input but not terribly much processing.
- **Point value:** 10 points
- **Input:** User pressing onboard buttons to choose which action the robotic arm will take.
- **Output:** The robotic arm's motion when the threshold is crossed.
- **Processor use:** Mild.

2.5 Customizable threshold

- **Description:** Have the user define what decibel level should be considered the threshold for the aforementioned actions.
- **Difficulty:** This is a non-trivial task, which requires user input but not much processing.
- **Point value:** 10 points.
- **Input:** User flipping switches to set threshold (in binary, as an 8 bit number).
- **Output:** No additional output.
- **Processor use:** Mild.

2.6 Displaying noise level: seven-segment display

- **Description:** Have the noise level in decibels display on the seven-segment display.
- **Difficulty:** A simple, but non-trivial task, as it requires continually updating the display based on the input value.
- **Point value:** 10 points
- **Input:** FPGA pins to read in decibel information.
- **Output:** Decibel level displayed on the seven-segment display.
- **Processor use:** Mild.

2.7 Displaying noise level: VGA

- **Description:** Have the noise level in decibels display on an attached monitor through the VGA output.
- **Difficulty:** A complex task, as it requires continually updating the display based on the input value and using the VGA output.
- **Point value:** 20 points
- **Input:** FPGA pins to read in decibel information.
- **Output:** Decibel level displayed through VGA output.
- **Processor use:** Mild.

3 Rough Timeline

- Week 1: Core functionality (Task 1)
- Week 2: Arm basic functionality (Task 2, 3)
- Week 3: Programmability and display (Task 4, 5, 6, 7)