ECE153B Final Project Proposal

Christopher Lianides

8899338

Stranger-Danger Mole Rat

Overview:

I am going to develop a toy with the STM32L476G board. This toy will be a stuffed-animal mole rat with a mounted oscillating sonar system. This sonar system is constructed from a HCSR04 ultrasonic sensor on top of a micro servo motor. When an object gets too close to the HCSR04 ultrasonic sensor's range, the STM32L476G board will trigger the use of the CS43L22 audio codec to output the audio data "Stranger Danger" on the 3.5 mm jack, halt the servo on the object, and display "HELP" on the 16x2 LCD Display until it has been removed.
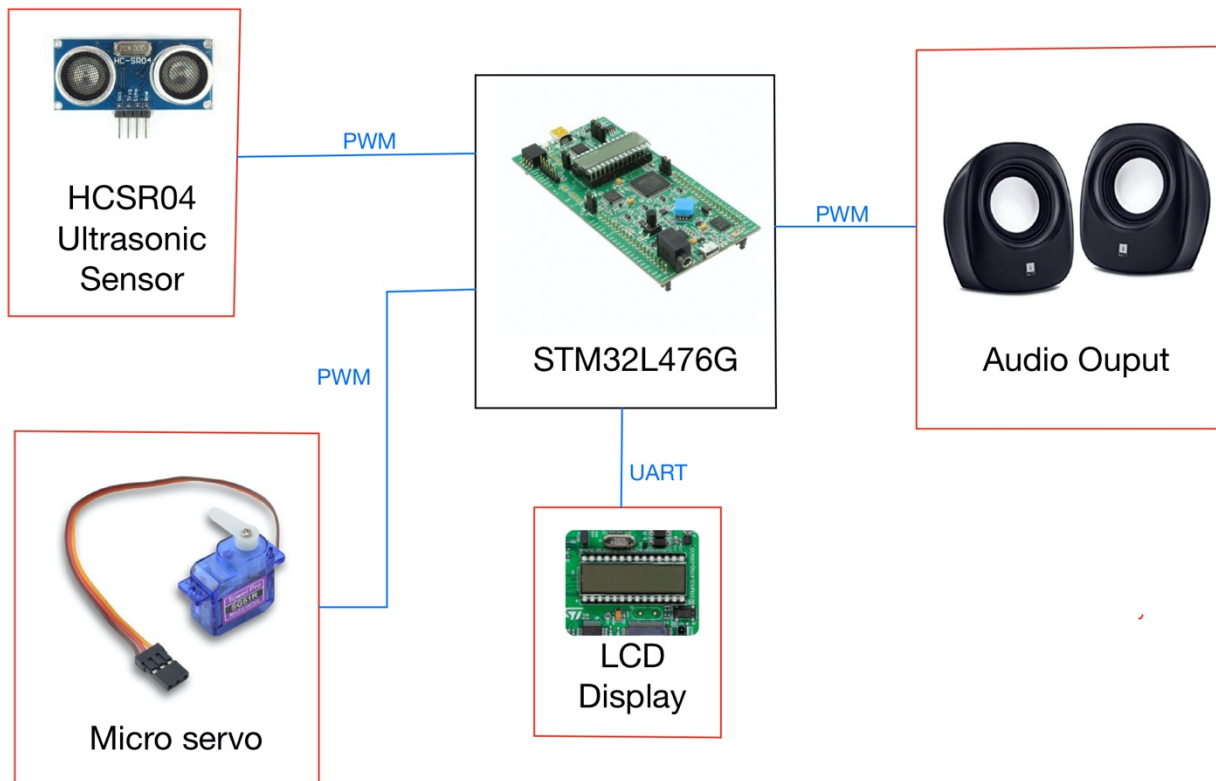
Peripherals:

1. HCSR04 Ultrasonic Sensor

2. SF180M Digital Micro Servo Motor

3. On-board CS43L22 DAC

4. 16x2 LCD Display

Software Design:

The HCSR04 ultrasonic sensor constantly records distance measurements on top of a servo that sweeps the front 180 degrees of the stuffed animal. When minimum distance threshold is met, the STM32L476G board will use a GPIO interrupt to halt the servo's movement, output the audio data and display "HELP" on the LCD display. When the object is removed, the servo

will continue to sweep the front 180-degree view until another object triggers the distance threshold.

Block Diagram:

Goals:

1. Servo continuously oscillates 180 degrees until triggered to halt.

2. Ultrasonic sensor continuously records distance measurements in every protocol.

3. Audio output triggers and disengages properly.

4. Entire assembly appears cosmetically pleasing.

Chris' Responsibilities:

1. Programming the ultrasonic sensor and servo

2. Programming audio output

3. Construct mount onto stuffed animal

Website: https://sites.google.com/view/sdmolerat/home

Required Components:

1. https://www.amazon.com/HC-SR04-Ranging-Detector-Ultrasonic-Distance/dp/B01GNEHJNC/ref=as_li_ss_tl?s=industrial&ie=UTF8&qid=1533378563&sr=1-5&keywords=HC-SR04&linkCode=sl1&tag=howto045-20&linkId=7a61f8a95b7bbdd1e39112eac0b59cd7

2. https://www.amazon.com/SunFounder-Digital-Helicopter-Airplane-Controls/dp/B01M5LIKLQ/ref=as_li_ss_tl?keywords=SG90+Mini+Gear+Micro+Servo&qid=1577025647&s=hi&sr=1-7-catcorr&linkCode=sl1&tag=howto045-20&linkId=c77a7007e60c3c67f4b60d08c34328ba&language=en_US

3. https://smile.amazon.com/AmazonBasics-Stereo-Audio-Cable-Meters/dp/B00NO73MUQ/ref=sr_1_1_sspa?keywords=3.5+mm+jack&qid=1581363728&sr=8-1-spons&psc=1&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUFIMlNCNVc0UDJBVzAmZW5jcnlwdGVkSWQ9QTAxNzc5MTgyNUwzUUg3M0ZUM1VFJmVuY3J5cHRlZEFkSWQ9QTA2MzA1NTIzMjRTUUFLWkZEM1FVJndpZGdldE5hbWU9c3BfYXRmJmFjdGlvbj1jbGlja1JlZGlyZWN0JmRvTm90TG9nQ2xpY2s9dHJ1ZQ==

4. https://smile.amazon.com/ADORE-Double-Plush-Stuffed-Animal/dp/B01401PX1U/ref=sr_1_3?keywords=stuffed+mole+rat&qid=1581365204&sr=8-3