CSE 316 Project
Hand Gesture Laptop Controller

Group 31
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1 Description

Our project is a device to control a laptop via hand gestures. Using ultrasonic distance sensors, the device can recognize various hand gestures made by user and decode them to specific commands for the laptop. Our device can recognize when a hand is in front of the sensor, whether it's distance is changing and whether the hand was just used for a momentary swipe. Then it maps those gestures to, various keyboard button clicks. The mappings are

- **Hand swipe**: *alt + tab*, this changes application tabs.

- **Hand coming close**: *up* button

- **Hand going far**: *down* button

- **Stationary hand**: this is dependant on application, on vlc player, it acts as *space* (pause). In google chrome, it acts as *ctrl+tab* (tab change)

The information is sent to laptop via an arduino mega and then converted to keyboard clicks by python autogui library.

2 Components

- Hardware

    1. Atmega32
    2. Arduino Mega
    3. Ultrasonic Distance Sensor HCSR-04
    4. 9V battery
    5. IC 7805
    6. Breadboard and wires

- Software

    1. Python Autogui Library
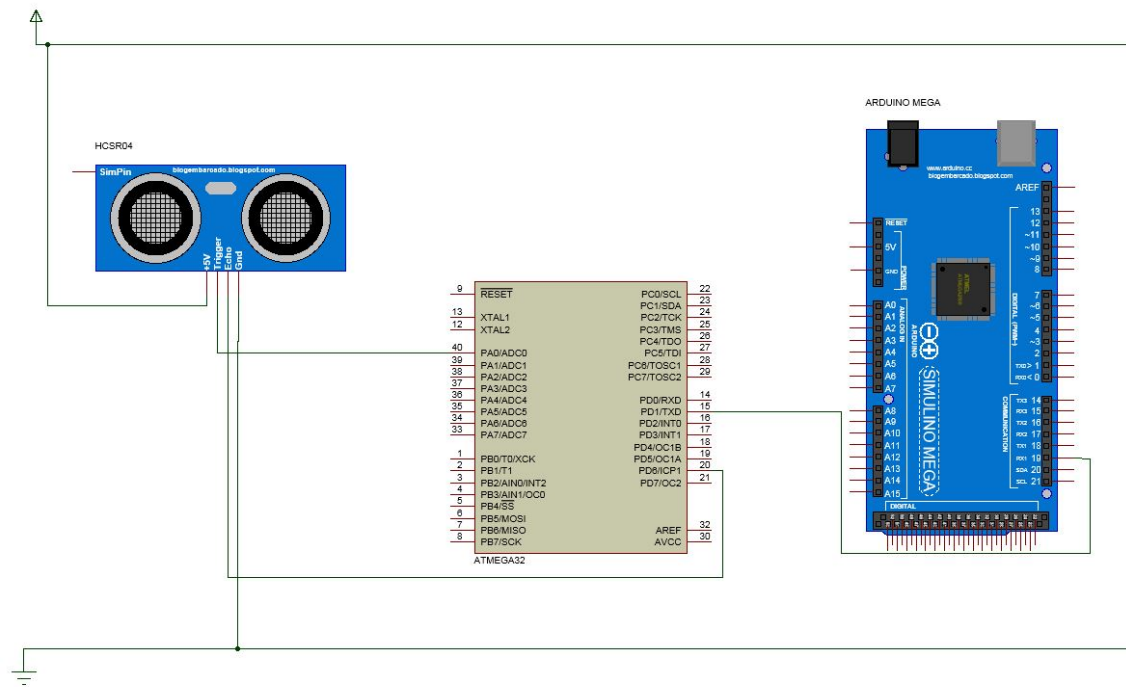   2. Arduino IDE

3 Circuit Diagram

Figure 1: Circuit for our project

4 Problems and Solutions

1. Initially, we planned to use bluetooth moudle HC05 to send data from Atmega32 to the laptop. But our bluetooth module had some configuratins issues, so we shifted to using an Arduino Mega. The arduino just reads data and forwards them to the laptop.

2. HCSR04 requires 5V power source, we had tried to use laptop to power both Atmega and HCSR04. But then the inaccuracy was too high. So we used a 9V battery and IC7805 to power the sonar.

3. HCSR04 sometimes reads very high distance. This is due to a mixture of hardware limitations and crude hand movements. So in the Atmega Program we implemented logic to ignore very high readings. This improved our programs accuracy greatly.