

Project Description

Comp 3601: Multimedia Remote Control Box for PC

Project Description:

Each group will create a multimedia remote control box/ system to operate the PC using an IR remote control.

Provisions

Each group will be provided with the following items to help building the project:

- Two Digilent Nexys FPGA Boards (<https://store.digilentinc.com/nexys-retired/>)
- Breadboard add-on board that connects to the Nexys board
- IR sensor and other basic hardware components needed for the project
- One Digilent Speaker

The final product must demonstrate the following features:

- Increase and decrease the volume, change the song, pause currently playing song, and play and stop the song currently playing using a household remote control which uses IR technology (not Wi-Fi/Bluetooth). The song could be either in audio or video format.
- Volume control should be achieved via a potentiometer/volume control resistor. Play the next song, pause, play and stop the song functionalities of the PC software should also be handled by the push buttons of the Digilent Nexys Board (as well as the remote control).

Purchasing

Each group will be given the parts to implement the hardware circuits. When additional parts are needed, each group will be reimbursed for up to \$20 spent on parts, although the total cost of parts used in the final design should be much lower than this amount.

Specification

- IR remote controls use different encoding formats to send the data from the remote control of the receiver. You can use any IR remote control which you can find in your household. Based on the remote control type and manufacturer, the format of the IR information sent by the remote control will change.
- We assume only one IR remote will be used to control the PC. You do not need to implement multiple IR decoding algorithms to support different types/ models of IR remotes (can be implemented as a bonus feature).

- The decoded IR code received from the remote control should be displayed on the multimedia remote control box (you can be creative and display a hex decimal digit on a seven-segment display)
- Once the IR code is decoded, commands should be sent to the PC via USB or using a wireless communication method.
- Using the volume controller and the buttons on the multimedia remote control box, the user can control the PC without a remote control: e.g., turning the volume control knob clockwise will increase the volume.
- Using the Digilent speaker, a beep sound should be made when the song is started playing, paused, stopped or skipped (duration 0.5 seconds, frequency 400Hz – 600Hz).
- **Additional Functionality:** Everybody loves a startup sound. You can add a nice startup sound with a duration of 2-3 seconds to indicate that the multimedia remote control box is ready.

PC Software

- The PC software should be able to load multiple audio or video songs for playing (like a playlist where users can navigate between songs). You can decide whether to support only audio files/ video files or both.
- The commands/ information sent from the PC remote control device will be executed on the PC by the software. Thus, the changing songs/ play, pause, stop and changing volume functionalities will be performed.
- **Additional Functionality:** displaying the button pressed on the remote control and saving/ loading different button mappings (profiles).

Examples:

1. The user may like to open a custom program (let's assume outlook) when a button on the remote control is pressed.
2. You may map the power button on the remote to shut down the PC.
3. Prank someone by mapping the volume down button of the remote to increase the volume of the PC.

Assessment

Assessment of the completed design will be performed via demonstration by the group at the end of the session. The project will be marked on a combination of the following criteria (in order of importance).

- Adherence to the provided specification
- Ease and intuitiveness of use
- Additional functionality (for example, making differing sounds when different buttons are pressed)
- The budget of components used in the final design (if additional components are purchased)

Due to social distancing guidelines, the assessment will be done via online or at CSE (depending on the COVID-19 situation).