Tested by: Malin Eliasson and Tobias Hallberg
Date: 2014-05-19

Test protocol

Tone control

Description: The tone control and the related buttons on the Soundlie device are tested by sending sound through the Soundlie device and listen to the result when different tone control settings are applied by the buttons on the Nexys-4 board. The switches and buttons used and their function are described in table 1. The test is carried out by changing the amplification of one tone control band at a time. For each band, the corresponding switch is set to '1' (see table 1) and then button BTNU(F15) and BTND(V10) is used to change the amplification of the currently chosen band. Each time BTNU(15) is pressed the amplification is increased by 3 dB and each time BTND(V10) is pressed the amplification decreases by 3dB . All amplification steps are tested, from +12dB down to -12 dB. In addition, it was examined what happens when the maximum amplification level have been reached and button BTNU(F15) is continuously pressed. A similar examination is also done for the minimum amplification level and button BTND(V10).

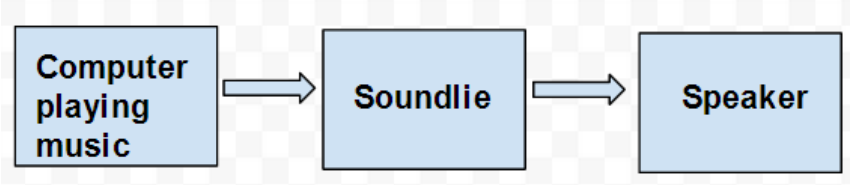
Table 1. The tone control knobs on the Soundlie device and their function

Knob	**Function**
Switch SW1(U8)	Set to '1' to change amplification of base
Switch SW2(R7)	Set to '1' to change amplification of mid-range
Switch SW3(R6)	Set to '1' to change amplification of treble
Button BTNU(F15)	Increase amplification of currently chosen band (band chosen by SW1-3)
Button BTND(V10)	Decrease amplification of currently chosen band (band chosen by SW1-3)

Equipment:

- Nexys 4 board with implemented Soundlie design and power supplies
- Computer playing music
- Cable to connect the computer audio jack to the input of the Soundlie device
- Speaker

Setup: The computers audio jack is connected to the input of the Soundlie device. The output from the Soundlie device is connected to a speaker.



Tested by: Malin Eliasson and Tobias Hallberg
Date: 2014-05-19

Results: By listening to the resulting sound when the amplification level is changed for each tone control band, the tone control and its related buttons are determined to work. For each band, a clear difference can be heard in the corresponding band of the music when changing the amplification up and down. When the maximum amplification level has been reached, the amplification level stays on the same level even though button BTNU(F15) is pressed more. This result shows that the tone control is stable and not breaks down even if the user would press the button more than required to reach the maximum amplification level. The same result was seen for the minimum amplification level.