## ECE 3710 External Factor Analysis

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### Environmental Factors

Our team’s Piano Tile game is based on the DE10 board, so its direct environmental impact is expected to be minimal. However, the hardware required to run the game could contribute to electronic waste over time. This project uses four pads as input devices, which may lack recyclability or general usability.

To mitigate these issues, the system can be designed to run on various input hardware, such as keyboards, touchscreens, or mobile devices, in addition to the pads. This approach can minimize environmental impact while enhancing user convenience. Furthermore, implementing a software-focused interface or enabling the system to operate in a simulation environment without requiring physical input devices could further improve the project’s sustainability.

### Health and Safety Factors

The Piano Tile game utilizes an FPGA development board and a breadboard, which leaves the circuit exposed. Although it does not use high voltage and therefore poses no major safety risks, caution is necessary, especially for younger users. Additionally, the game involves frequent visual stimuli, which could cause discomfort for users sensitive to light or screen flickering.

To address these concerns, a protective case can be applied to cover the exposed circuits, except for the parts that users need to touch. Additionally, safety instructions and precautions should be clearly documented. Furthermore, to enhance user convenience, features such as notifications encouraging regular breaks during gameplay or a reduced visual stimulation mode could be added to accommodate users sensitive to intense visual effects.

### Economic and Sustainability Factors

This project is an experimental development for academic purposes, and one limitation is the high cost of hardware such as the DE10 board and FPGA. To make it more accessible for a broader range of users, it could be implemented using low-cost microcontrollers like Raspberry Pi to enhance accessibility.

Additionally, sharing the project code as open source would allow other developers to modify and expand it, further improving its sustainability. This approach could extend the project beyond an academic exercise and make it more widely applicable.

### Political and Regulatory Factors

This game is not directly related to political regulation, but legal aspects related to digital content, such as copyright issues, need to be considered. Since this game is based on music, there could be potential copyright infringement concerns when adding additional music in the future. To address this, the game can use royalty-free music or music with a public license. If necessary, music can be added after obtaining the proper copyright usage permissions.