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Title

Pulse: An Implementation of Emotionally-Aware VR Gaming

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Pulse: An Implementation of Emotionally-Aware VR Gaming Andrew Tran, Reigan Alcaria, Jude Collins, Jong Seon "Sean" Lee

Introduction and Goal

While virtual reality (VR) games offer players increased immersion over traditional games, they lack the ability to interface with a key driver behind human perception and reasoning: emotions. This inability presents a barrier to maximizing the immersive potential of VR interactive media.

We sought to solve this issue by developing a biofeedbackenabled emotion recognition system that empowers users to create and experience emotionally-aware VR games.

Methodology

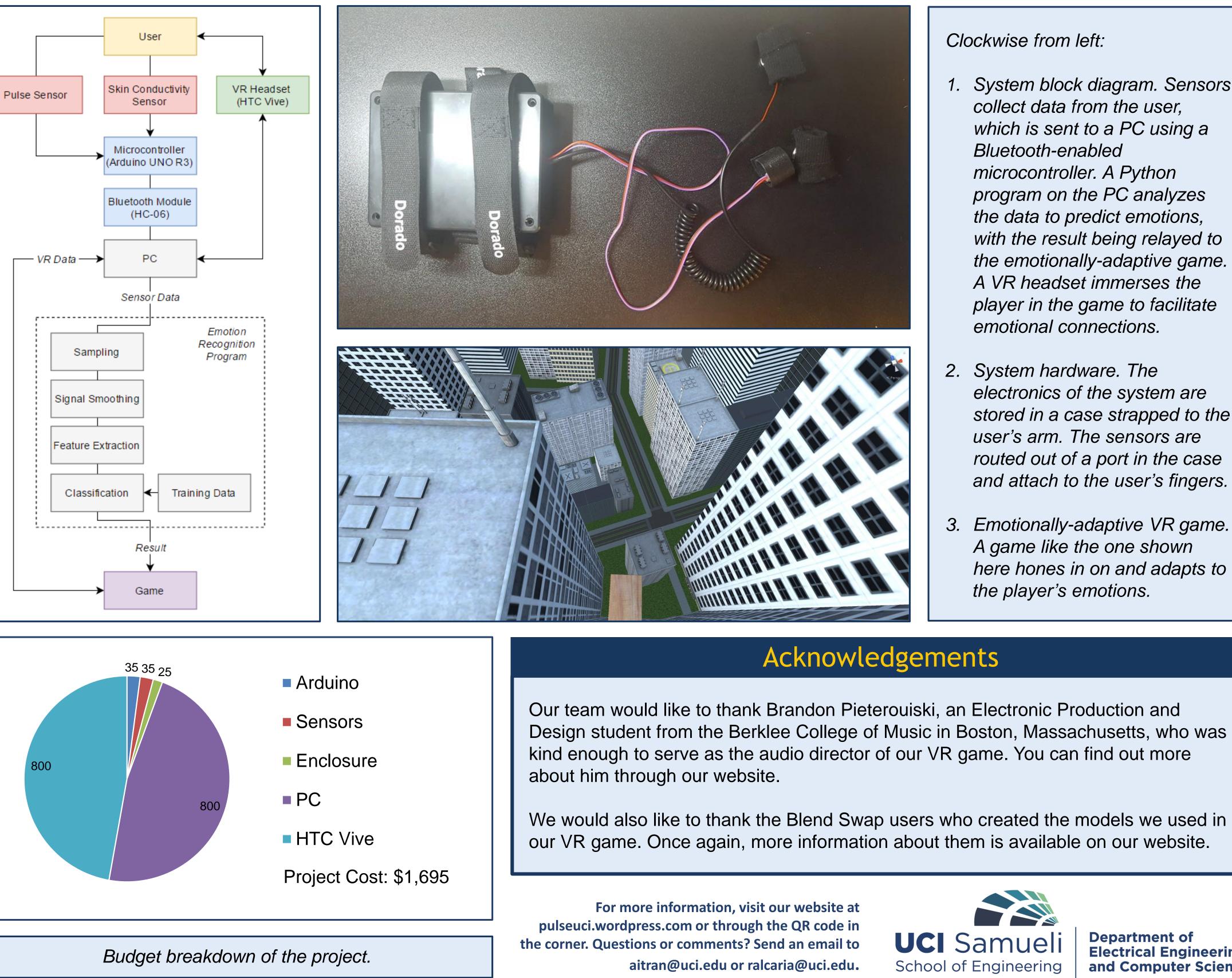
Our approach revolves around the observation of changes in biosignals, which correlate to changes in emotional states.

We use pulse and skin conductivity sensors to collect data from a user and apply digital signal processing and machine learning to it on a PC in real time to analyze changes in the data and predict the user's emotions, which can be used as game input.

For the scale of our project, we focused primarily on two emotions: fear and calmness. In order to showcase our system, we designed a small-scale, emotionally-adaptive VR game.

Team	
Name (Major)	Roles
Andrew Tran (EE)	Hardware, digital signal processing, machine learning, game design
Reigan Alcaria (EE)	Hardware, digital signal processing, machine learning, game design
Jude Collins (CSE)	Digital signal processing, machine learning, game design
Sean Lee (EE)	Hardware, digital signal processing, game design

Advisors: Ahmed Eltawil, Ahmed Khorshid Department of Electrical Engineering and Computer Science





Clockwise from left:

- System block diagram. Sensors collect data from the user, which is sent to a PC using a Bluetooth-enabled microcontroller. A Python program on the PC analyzes the data to predict emotions, with the result being relayed to the emotionally-adaptive game. A VR headset immerses the player in the game to facilitate emotional connections.
- System hardware. The electronics of the system are stored in a case strapped to the user's arm. The sensors are routed out of a port in the case and attach to the user's fingers.
- Emotionally-adaptive VR game. A game like the one shown here hones in on and adapts to the player's emotions.

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