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Our group name is Tetrikinesis, and we aim to build a device that utilizes a player's biometric inputs to play the classic game Tetris and other simple games. We will build an instrument that is worn on a player's arm to control a game with arm gestures and movements. The goal of our instrument is twofold: one, contactless controllers would increase accessibility in the gaming industry for consumers that aren't able to use standard gaming controllers; two, the instrument would be proof-of-concept for contactless controllers in virtual reality applications.

We will need three sensors to build our instrument: a GY-521 gyroscope and accelerometer sensor that we already have and a MyoWare DEV-21265 myosensor from Sparkfun. We would use a Nano 33 BLE microcontroller from Arduino to connect to the gaming device via Bluetooth. We will also need other hardware like a PowerBoost 500C rechargeable battery from Adafruit, a 3D-printed PLA casing from Texas Inventionworks, a strap that we already have to secure the casing that we will make, and other basic circuitry components we will get from our FUN kits.

Software will need to be written to acquire and process the signal from the three types of sensors. The GY-521's Arduino library can be used to read the attitude, acceleration, and angular velocity. These can be mapped to piece rotation and horizontal movement in Tetris. The DEV-21265 doesn't have a library, but the sensor only sends an analog signal that measures muscle activity. A contraction that exceeds a set threshold will act as a "press" input; for Tetris, this will perform a "hard drop." The intended actions will be parsed from these sensor readers on the Arduino and sent to the gaming device via ArduinoBLE.

A challenge we expect to encounter is syncing the sensor output with game actions, since input delay in games can be devastating. If we demonstrate play of one of these simple yet fast-paced games, we will need to ensure that there is little input lag caused by our device. An alternative approach we may consider is choosing a different game with less complex controls (like 2048) if Tetris proves to be too difficult. We also anticipate that BLE will be a challenge, and an alternative approach is using a USB cable to connect the controller to the gaming device.