The goal of the Fitness Regulator is to fight child obesity by restricting the amount of hours children spend using digital entertainment devices such as TV and videogame consoles based on the amount of exercise they perform. By wearing a chest strap and an armband that can receive, interpret, display and store heart rate information, the child can exercise anywhere to earn “carrots”, or 15-minute blocks of digital entertainment time. After carrots are earned, they are wirelessly transmitted to a base unit that receives workout information and provides power to digital devices according to the amount of carrots earned.

The focus of this semester’s project was to design the armband unit and to provide a functional prototype with all the requirements listed above. The design drivers, in their order of importance were: functionality, easy of use, durability, comfort, cost and aesthetics. The final prototype is a fully functional armband unit that is capable of getting user input according to age, date and time in order to successfully perform all the required functions and display relevant information. It is powered by a lithium battery that can last more than 6 hours, store up to 16 hours of heart rate information, and wirelessly transmit information to the base unit when it is up to 200 feet away from it.

To achieve full functionality and meet the customer’s needs, the project had a strong focus on component selection, system level design, and implementation of code to obtain a reliable and easy-to-use user interface. The main component in the armband is an Arduino Uno microprocessor, which is connected to a Sparkfun Polar heart rate converter that captures data from the chest strap, an LCD screen that displays necessary information to the user, an XBee transceiver that allows wireless communication with the base unit, three buttons to gather input from the user, and the aforementioned lithium battery. The system, with the exception of the battery, was enclosed in a modified Arduino hard-plastic box and attached to a modified neoprene armband with a special pocket for the battery.

Recommendations for the next group to work on the Fitness Regulator are to focus on energy savings, especially in the LCD screen, minimizing data entry, reassessing component selection to reduce the size of the prototype to then redesign the casing, automatic wireless transmission when the armband is in range of the base unit, child-proofing the device to avoid children cheating the system and researching other technologies such as ANT/ANT+ that could possibly minimize the number and size of components needed to achieve full functionality.