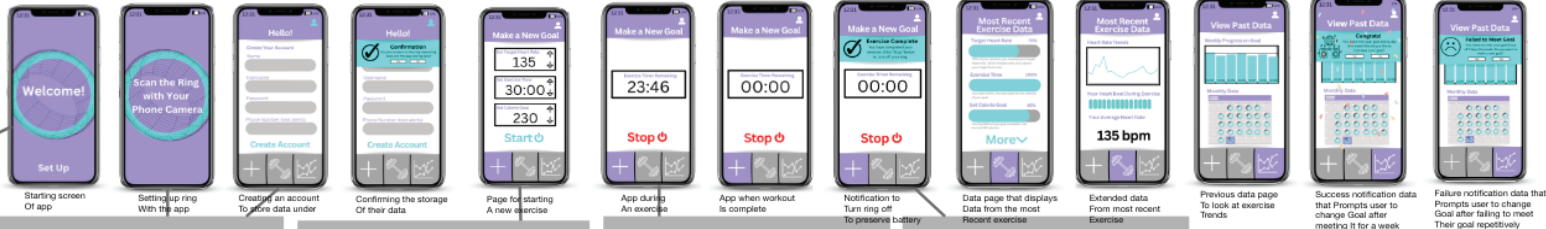


App Interface and Physical Prototype Explanation: Housing + Start State to End State

Start State:

User purchases ring
And connects it to the
Corresponding app.



End State:

User is able to look
At data from exercise,
Reflect on it, and make
new goals according to
their progress.



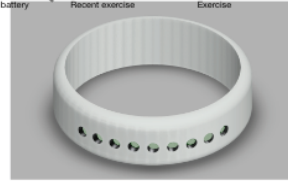
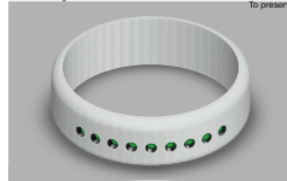
Ring is gotten out of box and is
Turned off. No LEDs are on.



Near Field Communication is within the
ring. Phone will put the camera near
The ring and will immediately connect
That particular ring with that app.
When it is connected the 10 LEDs
Will be flashing green.



After account is started, ring will turn
Off again and only turn on again when
Exercise is started.



Ring stops displaying LED progress once the "Stop"
Button is hit and then the screen is back to creating
A new exercise. A notification will pop up on App to
Remind user to hit "Stop." The haptic motor will
buzz twice again, indicating it is off. Ring will be
turned off until a new exercise is started.
This is a very important step as the ring only
Needs to be on when the exercise is in progress
The ring can be turned off after the exercise is
Complete and it is done measuring. This will preserve
Battery life in the small battery within the ring.

Ring is on, measuring, and turned on once exercise is in started. The haptic motor will buzz twice to indicate it has started. When the user is exercising at their target heart rate, all 10 LEDs will be lit in green. If they are not at their target not all LEDs will be lit. If user is close to their target, 8-9 LEDs will light up red indicating they are close to the full 10 LEDs being lit. If they are not close to their target, fewer LEDs will be lit, indicating that they need to push harder. The LEDs will be changing the entire exercise depending on what the persons heart rate is in that given moment. This will signify to the user when they need to push it or if they need to stay steady during their exercise.

Use Case Scenario

Exercising and training when part of a team is essential. For the plays to be seamless, all teammates must be on a similar page and level. Reaching a stamina level does not happen overnight, so athletes must train their bodies, especially their hearts, to allow the body to push itself to extremes.

The use case for this device is solely based on a user that is goal-driven in exercise. These gradual goals eventually lead to a significant change, allowing them to progress as athletes. Exercising and keeping a goal of a specific heart rate for stamina and calorie burning is the ideal purpose for this device. As measured by the device, the goal is to keep the target heart rate for the entirety of the exercise. When the target heart rate is not reached at that moment, the athlete can see it on the device, indicating that they need to try harder and push for that heart rate goal.

Setting goals before workouts and seeing your progress toward your goal afterward allows the athlete to grow and gradually train their body for game day. Framing new heart rate goals afford progression while not pushing their bodies too far. The ability to know your heart rate compared to a goal by visibly seeing a simple 10 light-code, especially in a present workout, is essential information for athletes to go the extra mile and know when their body is working efficiently. Whether to better your performance on a team or desire to increase stamina, this device will let the user know if they are at their target heart rate during the entirety of their exercise.

Explaining the Physical Device

Actuators: 10 LEDs, Haptic Motor, Pulse Sensor

The device will be a ring made of silicon, which is especially great for sweaty workouts full of high intensity. To display if the target heart rate is met, there will be 10 LED lights. Since the ring is small, the visibility will depend less on the wearable and more on the corresponding app. Since the user will not need to worry about continuing to check an interface, they will be more focused on their workout. As the exercise progresses, the LEDs will indicate to the user if they are, in the moment, at their target heart rate. All 10 LEDs will be lit green if they are exercising at their target heart rate. If they are not at their target heart rate, not all will be lit, and they will be red. If nine lights are lit, they are not at their target but are semi-close to it. If only one red light is lit, they are far from their target heart rate. A haptic motor will buzz twice once the workout starts and twice when the workout is over to indicate to the user when to start and stop. Along with the haptic motor and LEDs, a heart rate sensor will also be in the device to measure heart rate for the entirety of the timed exercise.

Features Explained

- **On/Off:** The device will start measuring as soon as the exercise is started on the app. To know that the ring is beginning to measure, the haptic motor will buzz twice. To indicate the exercise is complete, the ring will buzz twice again. In a state where the device is not on and not measuring, no lights will be on, no buzzes will happen, and the ring acts as a regular ring.
- **Input:** the primary input is not on the wearable itself but on the app. The user will put their heart rate goals, the designated exercise time, and their calorie goal in the app and then start the workout. The ring will then begin to start measuring.
- **Feedback:** During the measuring, the feedback to the user on the wearable end will be the gradual lights and the buzzes from the haptic motor to indicate if they are at their target heart rate and when the exercise starts and is complete. The feedback after the exercise will be located on the app to view the user's progress on the goals they had recorded before the workout in a more detailed manner. If goals are continually not met or are very much exceeded, the app may prompt the user to create a new goal that is more reasonable.

3D Printing Prototype

I 3D printed twice—one with the draft setting and one with the greater detail. The draft did not get the look I wanted, as you could see the LED holes through the entire band on the left in picture A. The second one had much more detail, closer to how I would like it to look.



A



B

Picture B is the second print in greater detail. There are small holes where the LEDs would sit that would not affect the feeling and wearability of the actual ring. After 3D printing and seeing the size the ring turned out, I believe that if I were to build the true wearable, the ring would have to be wider on the finger and a little thicker to afford the actuators and microcontrollers. 3D printing the model has shown me that the ring's design will have to look a little different to do the functions it is designed to do.