

Executive Summary

The Workout Buddy is a standalone, wireless system designed by Bravo Builders to help users keep track of their fitness progress by monitoring reps and sets in free weight workout routines. Created for any gym-goer seeking to fast track their fitness goals, The Workout Buddy provides a seamless connection between the user and free weight equipment to log workout data effortlessly. This is done by using a motion tracking sensor that is fitted to a barbell and communicates raw movement data to its respective weight rack-mounted base system. The user can simply choose the weights they would like to use, transmit their workout plan from their smart device to the base system, and proceed with their workout. Figure 1 below illustrates the placement of the motion sensor and other circuit components.

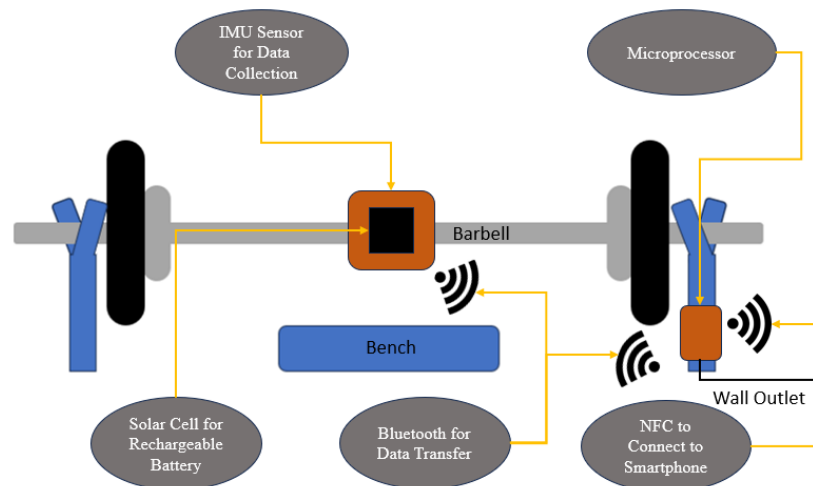


Figure 1: The Workout Buddy Flow Diagram

For The Workout Buddy to realize this process, a battery-powered, wireless sensor system is mounted to the barbell. The chief priorities for this system are both long-lasting battery life and accurate, reliable measurements of user movement. The sensor system housing is designed to be durable enough to protect the sensor without adding cumbersome fittings to the bar. To streamline the overall design further, the base system's power receptacle is oriented in a way that allows for a power cord to be run along the body of the weight rack itself, reducing risks to the user that may result from snagging equipment or tripping on cords. Industry standards, such as IP-67, IEC 61960-3:2017, and Bluetooth Core Specification Version 5.4, are observed in The Workout Buddy's design, ensuring proper safety measures and compatibility features are included.

The Workout Buddy is designed to be compatible with any standard barbell and rack system. Integrating a six-way inertial measurement unit to track barbell velocity and acceleration, the sensor system detects and periodically transmits raw movement data to a Raspberry Pi, which serves as the primary processor on the base system. The processed data is transmitted to the user's smartphone application via NFC once the workout is complete. The application displays the user's workout metrics, logs, and feedback.

By virtue of its aforementioned qualities, The Workout Buddy bridges the gap between conventional, wearable fitness trackers and free weight exercises. With improved automation in their fitness tracking routine, users are provided greater freedom in their workout journey without inhibiting progress towards their goals. The straightforward tap-in/tap-out method and wireless communication that The Workout Buddy employs ensure that the design scheme is user-friendly for both young adults and less tech-savvy seniors alike. These combined factors make The Workout Buddy the optimal solution for any gym-goer looking to make the most of their workout.