

CycleWatch

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Introduction

This proposal document outlines the goals this project aims to achieve, the product's features and what it contains, along with the requirements, an in-depth description of the product and the best and most efficient way to work to complete the development for the CycleWatch. The business, at its core, aims to assist cycling enthusiasts with their rides and provide a platform for them to enjoy and compare rides with other riders.

For avid cyclists, there are many options to choose to help you find your way when going on long bike journeys, but for the most part, they are expensive and require additional attachments to the bike itself. In short, the CycleWatch aims to solve this issue by acting as an all-in-one device, that comes with all the features its competitors force its users to buy. In short, if you are enthusiastic about cycling and would like to level up your experience while riding, the CycleWatch is the perfect device.

When compared to basic alternatives, such as a smartphone, using bike computers boasts many advantages. As said by Chip Hawkins, CEO of Wahoo, "For anyone doing more than two-to-three-hour rides once a week or wants to utilize cycling data outside of speed, distance and time I highly recommend a GPS bike computer. They are designed specifically for cycling and to record all of your data - not to mention using cycling apps as your data recording device does use cell phone battery."(1). Simply put, the CycleWatch is tailor-made for cyclists, multiple features make it preferable to use over a smartphone, battery life, splashproof design and better aerodynamics, just to name a few.

Project Aim and Objectives

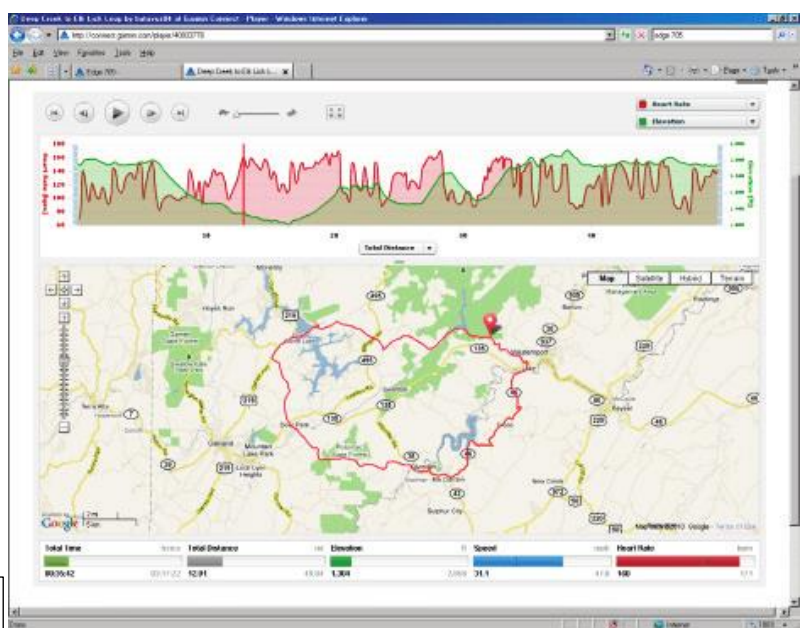
The aim of this project is to create a hardware device which complements enthusiastic cyclists during, and after, a ride. The device will allow users to easily set a route for an upcoming ride; this will also be where the user can set a target mileage for a trip, allowing for targeted muscle groups – longer, more flat routes to work on cardio, or steep, high gradient routes to target muscle gain, the choice is all down to the customer! This mileage goal feature will also include a notification system to show the user how close they are to reaching this goal, shown as a percentage, while cycling on the road. A notification will appear at regular 25% intervals, and, in the final 25%, will show when the user is 10% and 5% away from the target. This hopes to improve the cyclist's motivation, especially near the end of a ride when fatigue can start to take hold.

Another aim for the device is for it to automatically detect when the user has started riding, it allows for a seamless transition into riding from start, or after taking a much-needed break, whether it be a 2-minute stop on the side of the road, or a quick coffee. This feature is to make the user feel as though they don't have to interact with the watch more than they need to, all that is required is to 'strap and go'. Further to this, in the past, some cyclists may have forgotten to turn on their tracking software, this eliminates this will eliminate the problem as no buttons need to be pressed to start the ride, as long as a route is set up prior to leaving, the device will start by itself.

The final aim of this project is for the device to be active after the cyclist has been cycling for one minute. The reason for this is similar to the last, however this specifies the delay of one minute. This delay is to ensure the user has actually begun the ride, rather than mistaking other movement, such as walking or driving, for cycling. It ensures any data collected about the ride is reliable, thorough and consistent.

Throughout this project, there are many objectives that are all dependent on the aims specified above. With 2 main aims to work towards, there many features which will need to be implemented to achieve this task. One objective, potentially the most important one, will be the ability to plan a route within the CycleWatch app prior to the ride itself. This will use integration from Google Maps 'Directions Service' (2) within the app to enable the route setting feature. Another notable objective is to allow users to upload and backup their ride data to a database, allowing users to effectively see their progression over time. To assist with this, a third objective is to have a section in the app dedicated to showing statistics from previous rides. This allows users to visualise their progress through various graphs and comparison strategies (Akin to what is shown in Figure 1), with the intention of keeping riders engaged with the device.

Figure 1



Project Scope

The overall aim of this project is to create an all-in-one device for cycling enthusiasts to act as a companion to help track progression, set routes and stay motivated to keep riding. The CycleWatch device will be an aerodynamic accessory, designed in such a way that it makes no difference to a usual ride but will provide various insights on the user's performance through an intuitive app that can be downloaded to any smartphone.

To carry out this project, there will be one product to deliver – the watch itself. This will be made from quality – yet affordable materials and will be designed in such a way that doesn't affect the aerodynamics of the user. The watch interface will be as simple as possible, showing clear directions while the user is actively cycling, and when stopped, will show a more detailed view of how far the user has been, how far to go and a percentage of the target mileage. This difference in views is made possible due to the CycleWatch's core feature – being able to detect when the user is actively cycling.

To pair with the device, a downloadable smartphone app will be developed, shipping with multiple features, including a route setting function and a log of previous ride data. To enable this, user's ride data will be kept on a secure database, which will need to be bought/hosted due to the importance of data integrity. To enable access to the database through the app, a quick and secure server will be created; due to this, the user will have to have an internet connection to view previous ride data.

With regards to the development of the device and accompanying app, to ensure all deadlines are met, the business can set goals to meet in the form of prototyping. This sets tangible goals to motivate team members and will be an easy way of tracking the development progress.

The unique selling point of this project will be the ability to automatically detect when the user is cycling. Other devices have general activity detection, but unlike the CycleWatch, is not used in such a core way. Due to this, a patent could be considered, adding revenue in the form of other businesses looking to use similar features.

Requirements

To fully prepare for this project, certain requirements must be set and met. Of these, there are two types: functional and non-functional requirements. Functional requirements define the product, they are what you want the product to do, while non-functional requirements do not affect the functionality, and, for the majority, are set to improve the customer's quality of life.

The first functional requirement is set to meet the most important aim, the ability for the watch to automatically detect when the user has started their ride. This requires the implementation of a 3-axis accelerometer in the device. This measures the user's velocity, acceleration and direction of movement while active, thus enabling the movement detection feature. Without this, the device cannot collect as much relevant – or accurate – data, significantly hindering the selling point of the watch.

Another functional requirement is the implementation of the app. This is imperative to the user as it acts as the interface for all the route-setting, statistics and previous ride data functionality. The app allows the user to easily and effectively access each feature at the touch of a button, making this a key unique selling point of the device, having everything in one place. This is an extensive requirement and so comes with it multiple other requirements. One of these is the database implementation, which is to store all previous user data aligning with the in-app objective of displaying previous ride data to visualise users' progression.

As for the non-functional requirements of this project, the feature to deliver notifications would be the most important. While this doesn't affect the overall functionality and isn't imperative to the device working, users may find benefit in receiving notifications at various points along their ride.

Product Description

The CycleWatch is a mid-range, GPS and health-monitoring device at its core. The health device has 3 core features to improve the user's quality of life while cycling.

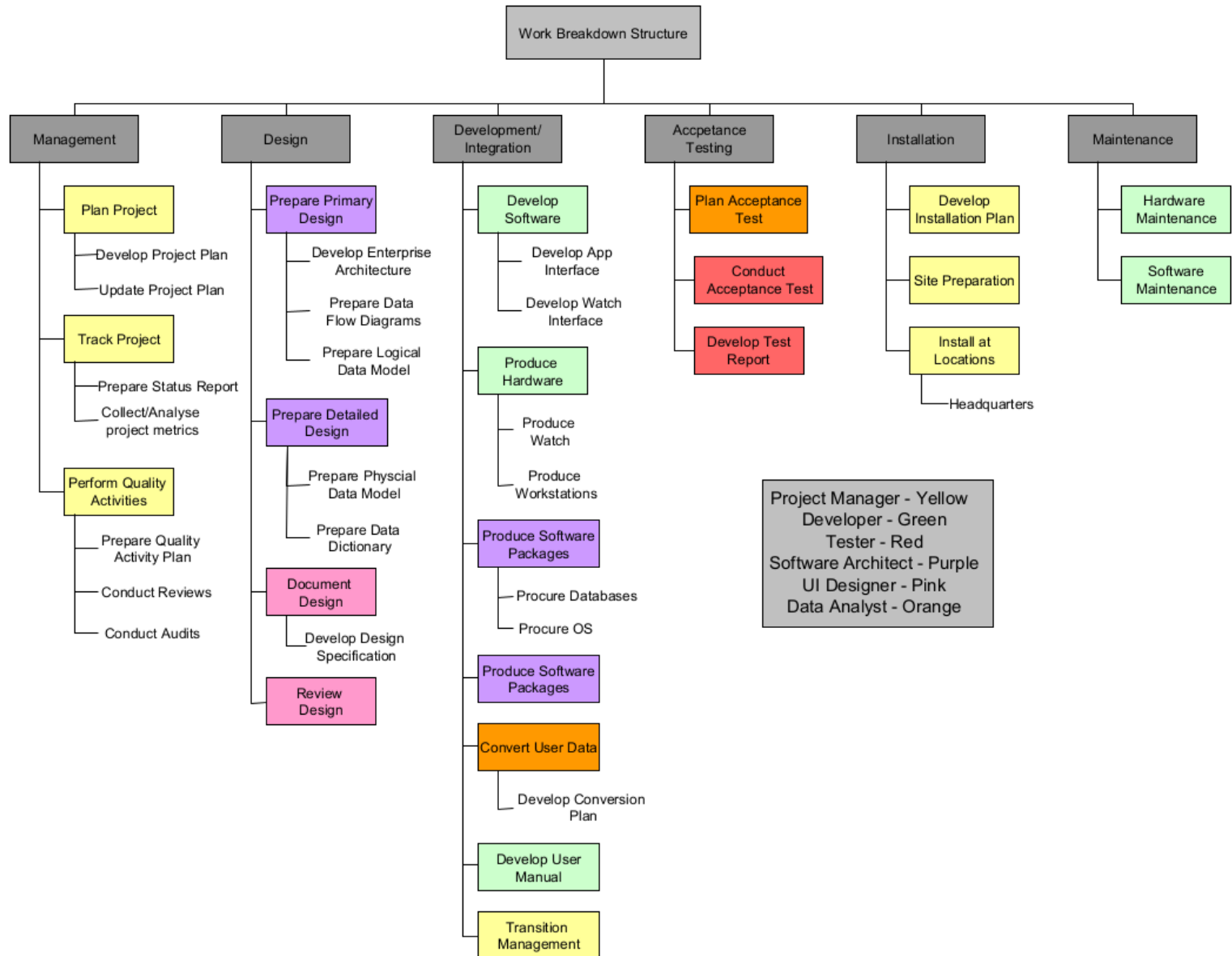
The first is simple, the device will automatically detect when the user starts the ride. This feature is important to implement so as to make the user experience as simple and easy as possible – so anyone can use the device. The idea is that the watch is automatic, all the user needs to do is to strap it on, and ride away!

The second core feature follows nicely from the first and is that the CycleWatch activates when the user starts cycling after one minute. This feature will be implemented to further reduce user interaction, the idea is that anyone can put the watch on and go. By activating after the user starts cycling, there is no reason to press any start/stop button – no more forgetting to start and having a half-finished ride on record. While riding, provided the user has entered a target mileage, the watch will notify the user when they have reached certain distances in their ride. These notifications are shown at 25% intervals, and in the last 25%, will show at 10% and 5% to the target mileage. This hopes to keep the rider motivated, however these can be disabled in the app settings if they prove irritating.

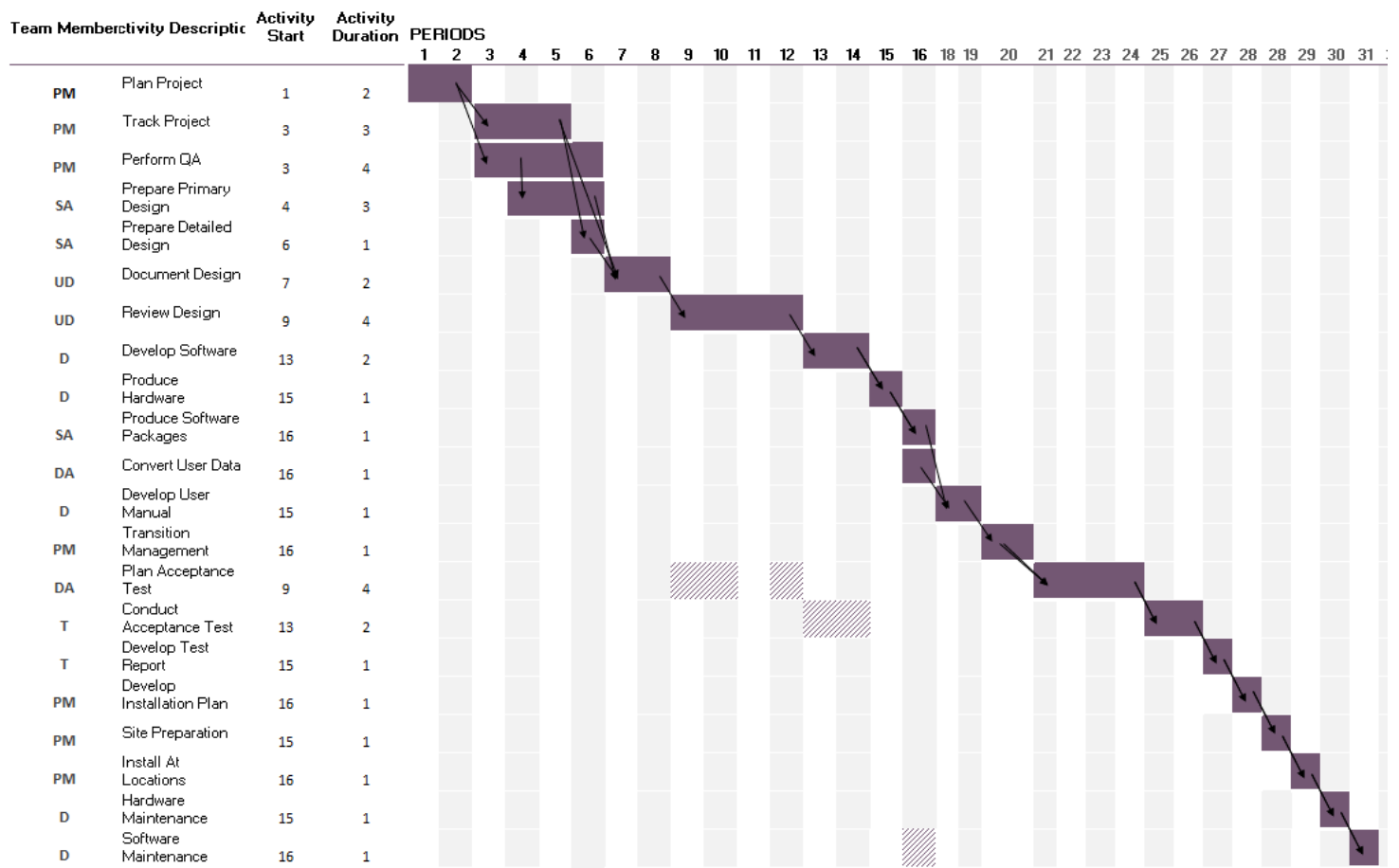
Finally, the third core feature involves the feedback the user receives after finishing a ride. Once finished, the feedback received from the watch is shown on an app, which must be previously connected to the watch and contains details about the ride, including, but not limited to, the number of miles cycled on the ride and whether or not the target for the ride was reached.

Further to this, the project's main deliverable will be a smartphone app and accompanying website, an important feature for the watch, as it enables the user to interact with the device easily. The app will have multiple features within it, including a route-setting function, showing a map with mileage, elevation and target distance, statistics to show previous ride data and a basic profile section, which shows the user's averages and personal bests. One drawback to this, however, is that the user must have an internet connection to access previous ride data, this is because this data is not stored on the phone, but in a database. A database was chosen to decrease the size of the app, incentivising watch owners to download and keep using it, while taking up a small space on the device.

Work Breakdown Structure



High Level Schedule



References

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3. Kessler, F.C., 2013. The interactive environment of the garmin connect web ... Volunteered Geographic Information: A Bicycling Enthusiast Perspective. Available at: https://researchgate.net/figure/The-interactive-environment-of-the-Garmin-Connect-web-service-The-red-line-plotted-on_fig1_261647963 [Accessed November 5, 2021]. Figure 1