Customer Needs

The device is going to optimize the performance of a sprinter by collecting data that can be used to analyze different sprinting techniques. To figure out what exactly our customer wanted, we came up with a list of questions to ask the Assistant Strength and Conditioning coach of the FSU Track and Field team Erik Myyra. The questions asked revolved around sprinting techniques and what separates an efficient sprinter and inefficient sprinter. We wanted to collect as much data about sprinting as possible, such as different phases of sprinting, the different variables that are used to analyze a sprinter (stride frequency, stride length, ground contact time, maximum velocity, arm swing, body position, etc), and the distances sprinters run. This information will be used to decide what important information we want the device to analyze and what the device can be used for. We also asked about the specifications of the device, such as the quality of the video analysis, if there are any specific features wanted, and the size and durability of the device. This device will be used outside on the track and field so it is important for it to be convenient for the coaches to use and to be durable in outdoor weather conditions.

Before talking to the FSU Assistant Strength and Conditioning Coach Erik Myyra, the device had an extremely wide range of possibilities of where the design can go. After our meeting, the possibilities were narrowed to a more specific design and function. The customer wants something that is convenient and of good quality that can help improve the performance of a sprinter. Video analysis, sensors, and lasers are all viable options in order to capture specific sprinting variables and software analysis (such as mobile applications) will be used to easily display the data.

Table 1: Questions and customer interpretations

Number	Question	Customer Statement	Interpretation/Need
1	What are the most important characteristics of a good sprinter?	Sprinting has different techniques and can be different for different types of runners. Good sprinters force feet into the ground as fast as they can. Good genes play into account for elite sprinters.	This software can detect the proper form of a good sprinter.

2	How does training differ between different distances?	Elite sprinters run 100m in under 10.2 seconds, 200m in 21 seconds and lower, 400m in 45 seconds and lower. There are energy system differences. 60m is a lot of accelerating or pushing unlike 200m. 400m is much different. Focus on 60m,100m, 200m events for sprinting.	This software will be useful during the sprinting heavy runs such as the 60m, 100m, and 200m events.
3	Are you already using some video analysis software? If so, what do you like or don't like about the current system?	The sprinting coach usually records the runners. No software just recording using a camera or phone. There is something called the 1080 sprint machine that would be nice (~$17,500).	Video recordings will display the form of a sprinter. This device will provide specific statistics of the sprinter for a more reasonable price.
4	What features are necessary for this system?	High frame rates (60 frames per sec) with 1080p. Useful if this device can determine how many frames are on the ground for ground contact time. Stride length/frequency (how fast you run), from 0-40m when does accelerating phase end or highest	A clear image can be seen so the analyzing of the sprinter can be easily displayed. This device will be able to analyze features such as stride length, stride frequency, time in acceleration phase, etc.
5	What part of the training process do you feel could be improved?	Being able to have as much info as possible in order to quickly change things. Determine whether the sprinters are at 80% or 90% velocity. Immediate output would be nice.	Information about the sprinter will be readily available and easy to access with this software/device

6	Are there any hardware preferences or specifications (such as size, durability, controls, etc)?	Immediate output, no size preference. Phones are convenient. Laser and timer gauges could be used.	The device will produce feedback immediately and will be accessible on a mobile device. Some type of sensor will be used to detect specific variables.
7	What constitutes an efficient and inefficient run?	Efficient runs have less time on ground and the ankle at ground contact is dorsi flexed. Force from ground can get absorbed in ankle which makes a not as crisp pulling motion which is less efficient. How high the heel gets in back swing: too high can have bad back side mechanics, feet behind them too long during swing phase. As soon as ground contact occurs, foot goes back forward.	The software will analyze and detect both efficient and inefficient sprinting forms and provide feedback if necessary.
8	Are you more focused on your athletes efficiency or power?	Being too power focused can have diminishing effects. Power is from strength, (force and how fast you can apply that force). Being on the ground longer could equal longer stride length at the same stride frequency. Or same force and increase stride frequency. Too strength focused could make things slower	This device will collect data about how the speed of the sprinter can change with different variables such as stride frequency and stride length.
9	How do the mechanics of the race differ as the race progresses in each of the events?	60m - majority is acceleration, more forward lean 100m- acceleration majority (ends around 70m) to max velocity 200m- acceleration and transition phase and hold max velocity as long as you can.	The software will focus on sprinting distances/races such as the 60m and 100m.

10	What are the different sprinting phases?	Acceleration, transition (forward to upright), max velocity.	The software will detect and analyze the sprinter in the different phases of a sprint.
11	How important is the arm positioning?	Mechanical position was more strict, 90 degree elbow bent- cheek to cheek. Elbows usually hold 90 deg. Bring it back to almost straight (elbow extension shoulder extension) then fling back to 90 degrees back up (flexion of shoulder).	Arm positioning will be included to analyze the form of a sprinter

Table 2: Needs:

Number	Need
1	This device will improve the performance of an elite sprinter.
2	The runner will be recorded for analysis
3	The device will produce feedback immediately and will be convenient to use on the track
4	The software will collect quantitative data about the runner (stride length, stride frequency, maximum speed, etc)
5	This device will not affect the runner and will withstand sweat
6	This device will be cost effective
7	This device will have user inputs

Table 3: Requirements

Number	Needs	Requirements
1	1,2,4	Detect both efficient and inefficient sprinting form/technique
2	2,3,4	Live video output and data collected displayed
3	5	Lightweight and durable
4	3	Fast and easily accessible on a mobile device
5	7	User inputs for specific data about runner
6	6	Cost effective

Table 3: Constraints

Number	Constraint
1.	Budget
2.	Time