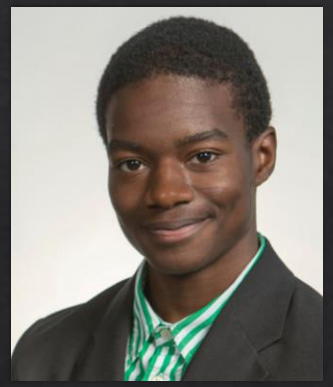
Sprinter Data

Team Introductions

Dylan Cedeno
Project Manager

Marc Griffiths
Design Engineer

Jordan Noyes
Quality Engineer
Presenter



Handy A Pierre
Research Engineer
Presenter

Edwin Ulysse
Data Engineer

Handy A Pierre

Sponsor and Advisor

<u>Sponsor</u>
FAMU-FSU College of Engineering
Academic Institution

<u>Academic Advisor</u>
Jonathon Clark, Ph.D.
Associate Professor

Handy A Pierre

Objective

The objective of this project is to develop technology that can be used to objectively measure and predict a sprinter's performance.

Handy A Pierre

Project Background

Jordan Noyes

Key Goals

- Develop a method to objectively measure a sprinter's performance
  - Takeoff form
  - Instantaneous velocity
- Predict a sprinter's performance
  - Personalized inputs
  - Creating trends based on inputs
- A product that will be desirable for purchase
  - Cost effective
  - Self-contained
  - Minimal hinderance to performance

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Markets

Collegiate Track Teams (Primary)	Fans/Parents (Secondary)	Professional Running Teams (Secondary)
Other Sports (Secondary)	High School Track Teams (Secondary)	Master Sprinters (Secondary)

Assumptions

- The technology will be used on the average sized sprinter
- The sprinter/coach/scout has prior knowledge and experience about running form/technique
- The sprinter is starting out of a standard starting block
- The technology will be used in fair weather and that it will not have access to a power outlet during use
- The technology will be used on a collegiate approved track
- The consumer is more concerned about performance accuracy than about the product price

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Stakeholders

- Sponsor-like stakeholders:
  - Dr. Devine
  - Michael Ormsbee
  - Ricardo Argo
- Advisor:
  - Dr. Clark
- Professors:
  - Dr. McConomy
  - Dr. Gray
  - Dr. Hooker
- Others:
  - FAMU-FSU College of Engineering
  - Investors in the InNOLEvation

Customer Needs

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Persona:
Sprinter

- Jake is 20-year-old college sprinter
- Currently in his junior year & 3rd year as a sprinter
- Practices 5 times a week
- Trying to go to the next level in his track career
- Doesn't know what areas he can improve on (form, speed, start)
- Has not been able to accurately measure his performance with the best sprinters

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Interpreted Needs

- Track performance at start
- Incorporate professionals for comparison
- Improve performance
- Does not affect performance

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Persona

Coach

- 47-year-old Collegiate Track Coach for over 10 years, has a family
- Budget of $5,000-$20,000
- Looking to train hard working sprinters with potential
- Desires information about the overall race
- Would like an easy way to assess a sprinters speed and acceleration

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Interpreted Needs

- Reasonable price
- Visualize line of attack
- Capture videos of sprinters
- Measure instantaneous velocity
- Measure force out of blocks
- Personalized for multiple body types
- Used daily
  - Durable and water resistant

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Persona

Scout

- Robert is a 48-year-old college sprinting scout
- Travels to see prospects after evaluating their performance online
- Wants to bring something that stores his prospects' performance so he can come back and view their numbers
- Doesn't like to waste time
- Needs equipment to fit in his car or in checked baggage

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Interpreted Needs

- Track performance
- Easily transported

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Functional Decomposition

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Major Functions

Customer Needs

Interpreted Needs

Functions

- Take Measurements
- Make Predictions
- Make Product Desirable for Purchase

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Take Measurements

Customer Needs	Functions
Track performance at start - Visualize line of attack - Measure force out of blocks	Observe takeoff form - Line of Attack - Kickoff force from blocks - Hip flexor's stretch - Second step - Starter gun reaction time
Measure instantaneous velocity	Track instantaneous velocity of the runner

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Make Predictions

Customer Needs	Functions
Improve performance	Create Trends - Collect Data - Store Data - Extrapolate Data
Capture videos of sprinters - Personalized for multiple body types - Track performance at start	Collect data - Personalized Inputs - Start measurements
Incorporate professionals for comparison	Store Data

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Make Product Desirable for Purchase

Customer Needs	Functions
Reasonable price	Make Cost Effective
Used daily Easily transported	Is Self-Contained
Does not affect performance	Has Low Hinderance on Performance

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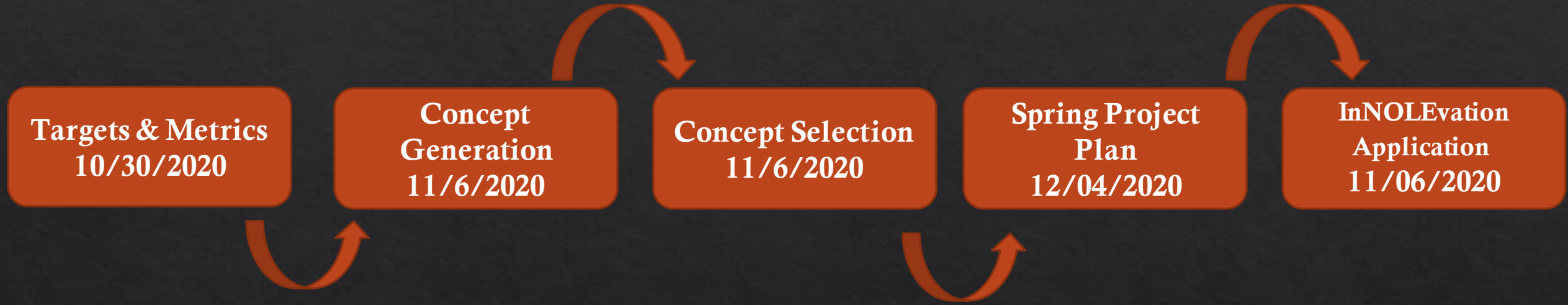
Next Steps



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Backup Slides

Customer Needs Backup

Customer Needs

- Question: Do you feel like your form and personal record are correlated? (Sprinter)
  - Answer: Somewhat. some of my best runs have been back when my form wasn't as refined as now, but vice versa is also true
- Interpreted Need: The tool provides the ability to store both sprinter data related to form, and recorded race times.

Customer Needs

- Question: If there was a tool that could help improve your sprinting speed would you be more concerned about your start or the overall race? (Sprinters)
  - Answer: "Every runner is different because some lack explosiveness in their start and others have trouble with the rest of the race. I personally was an explosive runner; I had a lot of strength and an amazing start. But after the first 10 meters I would have a problem maintaining the same speed throughout the rest of race so for me personally I would like a tool that would help me with that"
  - Answer: "That's a tough one. A good start can put you ahead of the pack, but it won't guarantee you a win. I think I'd still choose the start though."
- Interpreted Need: The technology can track performance at both the start, and throughout the race to satisfy all types of runners.

Customer Needs

- Question: Would you be interested in comparing your ability to professionals'? (Sprinter)
  - Answer: "I already do that. Their records are what I strive for"
- Question: Who do you compare your sprinters to? (Coach)
  - Answer: I try to find a model athlete that fits every particular person. I have a guy right now that is about 5'5 or 5'6; I cannot model him off of Bolt because he is 6'7. I try to find an athlete around the same stature and body type
- Interpreted Need: The technology incorporates professional sprinters and eases the effort required for sprinter comparisons for different body types.

Customer Needs

- Question: Would you be willing to incorporate technology in your analysis of performance? (Sprinter)
  - Answer: “Yes”
- Interpreted Need: The product provides technology for sprinters to improve their performance.

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Customer Needs

- Question: Would you feel comfortable using a wearable to track your performance? What would be required of the wearable so that it does not hinder performance? (Sprinter)
  - Answer: “Yea I would have no problem with it. It just needs to be lightweight and feel like I am not wearing it. “
- Interpreted Need: In order to not hinder performance, the wearable is lightweight, and the user will not feel extra weight.

Customer Needs

- Question: What is a reasonable price point for the product cost? (General)
  - Answer: Personally $5,000 of my own money. If its like the 1080 sprint - $20,000 because it is only made in Sweden. The 1080 offers resistance and assistance. This allows the body to adjust to a particular speed. With Covid, $5,000 sounds doable. (Coach)
  - Answer: "Well, I can give you the price of existing technology to give you an idea. The Whoop system is about $400 per user. But track teams typically buy a subscription to the technology" (Sponsor)
- Interpreted Need: The technology will have varying price models for different markets and fall within a reasonable price.

Customer Needs

- Question: What are some of the aspects you notice most in a good sprinter's form (specifically at the start of the race)? (Coach)
  - Answer: Line of attack is most important. I look at the angle coming out of the blocks and decide whether that is the best angle for each sprinter. This angle will be different for every sprinter. I then look at the technique within that angle of acceleration. Every person has alignment issues; I try to find the issue with every runner immediately, so that I can decide the best form for prevention of injury.
- Interpreted Need: Make sure the technology is able to visualize the line of attack.

Customer Needs

- Question: Would you be willing to incorporate technology in your analysis of the sprinters' performance? (Coach)
  - Answer: I would like to have a video of the runners.
- Interpreted Need: The technology needs to be able to capture videos of the sprinters.

Customer Needs

- Question: Would you want to use a wearable to track sprinters' performance or would that get in the way? (Coach)
  - Answer: I wouldn't mind that as long as its light enough to not affect running ability. Maybe they could wear something that connects to checkpoints at every 5 meters and it can tell the velocity at each checkpoint. This can check where the runner reaches top speed and how speed can be maximized. We could decide from there if they are reaching top speed too early or too late and we can fix accordingly.
- Interpreted Need: The technology will be able to measure instantaneous velocity.

Customer Needs

- Question: Who do you compare your sprinters to? (Coach)
  - Answer: I try to find a model athlete that fits every particular person. I have a guy right now that is about 5'5 or 5'6; I cannot model him off of Bolt because he is 6'7. I try to find an athlete around the same stature and body type.
- Interpreted Need: Technology needs to have data of several different athletes for comparison based on body shape/size.

Customer Needs

- Question: Do you employ a specific training about how fast they are getting out of the blocks? (Coach)
  - Answer: Not necessarily. I want something that could measure the amount of force off the blocks. I do not get too caught up in how fast the runner gets out of the blocks, which is different than other coaches. I want to maximize the ability to accelerate as fast as possible so that the runner can reach the best end speed.
- Interpreted Need: Technology has to measure the force out of the blocks.

Customer Needs

- Question: Do you train all body types the same? (Coach)
  - Answer: Nope, all different.
- Interpreted Need: The technology needs to be personalized based on different athlete's bodies.

Customer Needs

- Question: How long can you allow for setup and how often would you use the product? (Coach)
  - Answer: Fairly quick setup during or before warmup would be ideal. It will be used twice a week during pre-season and potentially five days a week during season.
- Interpreted Need: The technology needs to be able to be used daily for about two hours at a time. Needs to be durable and water resistant.

Functional Decomposition Backup

Hierarchy Flow Chart

Cross Reference Table

	Take Measurements	Make Predictions	Make the Product Desirable for Purchase
Gauge Line of Attack	X		
Evaluate Hip Flexor's Stretch	X		
Observe Second Step	X		
Calculate Kickoff Force from the Block	X		
Record Starter Gun Reaction Time	X		
Instantaneous Velocity	X		X
Create Trends		X	X
Collect Data	X	X	X
Store Data		X	X
Extrapolate Data		X	X
Retrieve Personalized Inputs		X	X
Acquire Start Measurements	X	X	
Make Cost Effective			X
Is Self-Contained			X
Have Low Hinderance on Performance			X