

Overshoe Concept

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Problem Statement

Overshoe (*noun*): a shoe worn over a normal shoe, typically either of waterproof material to protect the normal shoe in wet weather or of fabric to protect a floor surface.

Traditionally utilized for more cosmetic or protective purposes, as well as increased traction, I wanted to create a pair of overshoes to improve the user's everyday walking experience.

The goal was to create an external system to be worn around the user's normal footwear, which would require less energy output with each step while simultaneously increasing the energy return at pushoff.

Initial Product Research

Upon beginning my initial research into this product category, I was surprised to find a wide range of options in this seemingly niche market

Through investigation of the various models available, I was able to determine three main use categories;

- Protection (for the shoes or the surface they're coming into contact with)
- Traction
- Style



Protective Solutions

Protective overshoes function in two different unique ways.

They either protect the user's footwear from weather or debris they might come into contact with during work, or they prevent existing debris and/or germs from coming into contact with the floor in a clean setting.

Traditionally the former will be reusable and the latter will be disposable, given the distinct differences in their use-scenarios.



Thorogood 11" Nylon Waterproof Overshoe



Totes Waterproof Rubber Overshoe



Plastic Reusable Waterproof Shoe-Covers



Disposable Textile Shoe-Covers

Functional Solutions

More functionally driven overshoe options consider extreme weather conditions with their designs.

These overshoes will improve the user's traction on icy or wet surfaces, but can still be easily removed without the need for an extra pair of footwear to be carried around and swapped when interacting with a harsh or changing environment.



SLKGRIP Anti-Slip
Overshoes



Tingley 1350
"Winter-Tuff" Ice
Traction Rubber
Overshoe



NewDoar Anti-Slip
Snow Ice Traction
Cleats



Vibram Portable
Performance Ice Sole



Fashion-Oriented Solutions

With an increased interest in utilitarian silhouettes and accessories in fashion currently, brands have been shifting their focus to modular designs which allow the user flexibility in creating unique combinations to highlight their personal style.

Deriving from functional designs in this category, these fashion-forward iterations consider formal elements to create standout accent pieces.

Vibram Portable
Performance Ice Sole worn
over Virgil Abloh's Air Jordan
Collaboration



Nike x Matthew Williams
Free TR 3 comes with a
removable Vibram
Overshoe

Matthew Williams'
1017 Alyx 9Sm
Removable Vibram
Sole Sneakers



SANKUANZ Chunky
Protector Sneakers



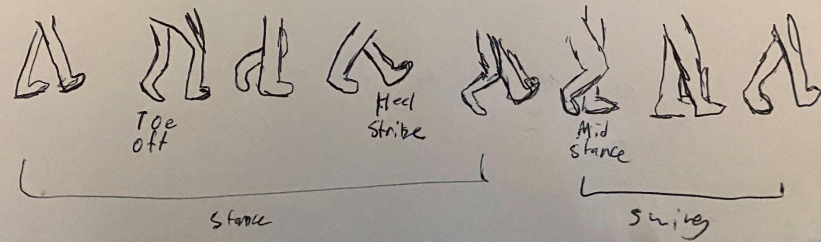
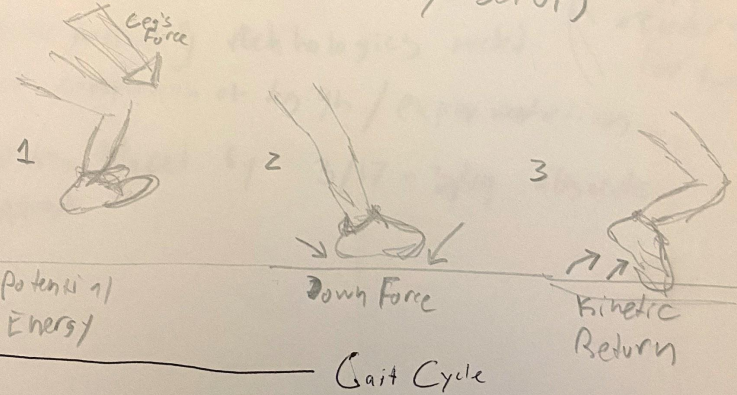
Concept Sketching

In keeping with my initial problem statement, I began my sketching and research in studying the Gait Cycle, to try and determine how best it could inform my final design.

I highlighted my main considerations for the final design and began breaking down the gait cycle into its separate stages.

Footwear solution

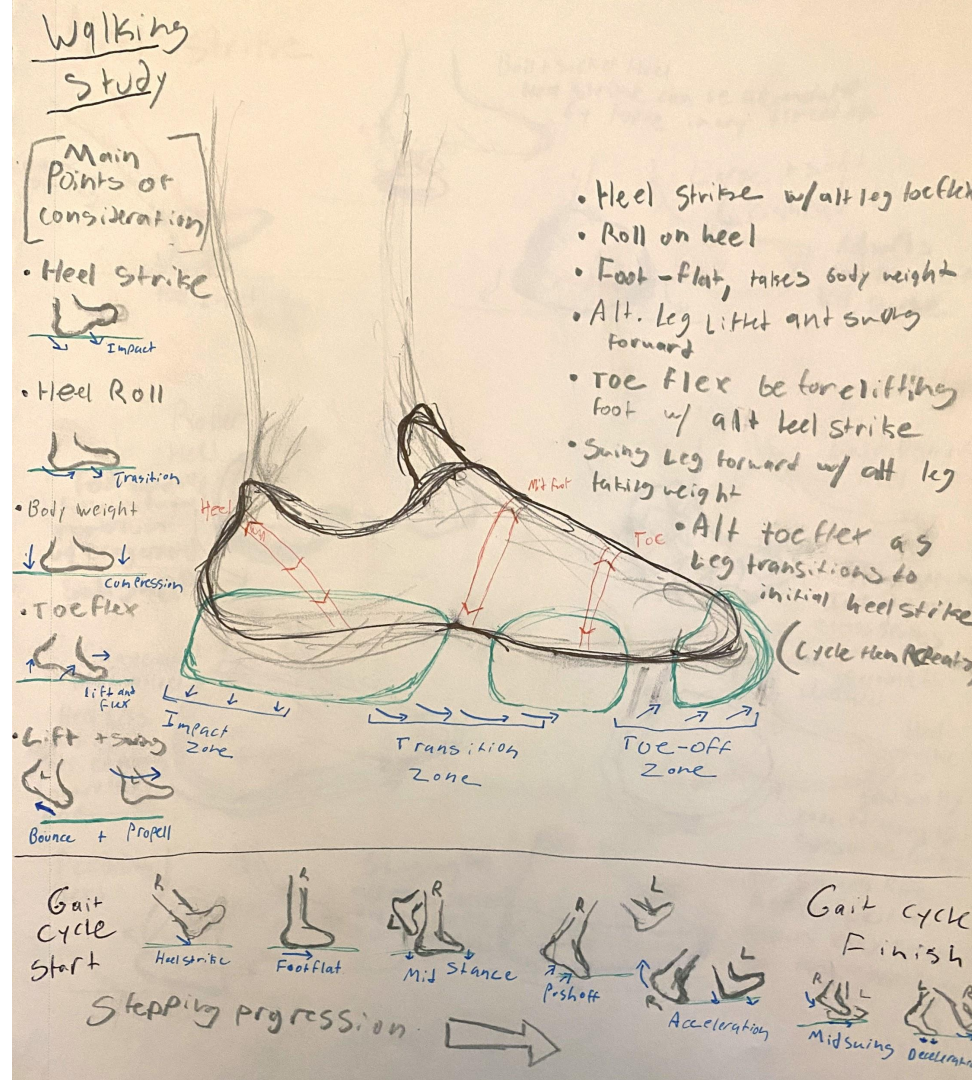
- Improved speed/distance + energy return with each step
- Modular system (can be used with other pairs of shoes)
- Minimal integration/interface (lack of "controls" + easy setup)



Concept Sketching

From there I was able to determine the various forces experienced by the feet during the walking cycle as well as create a narrative description of each of the stages involved in taking a step.

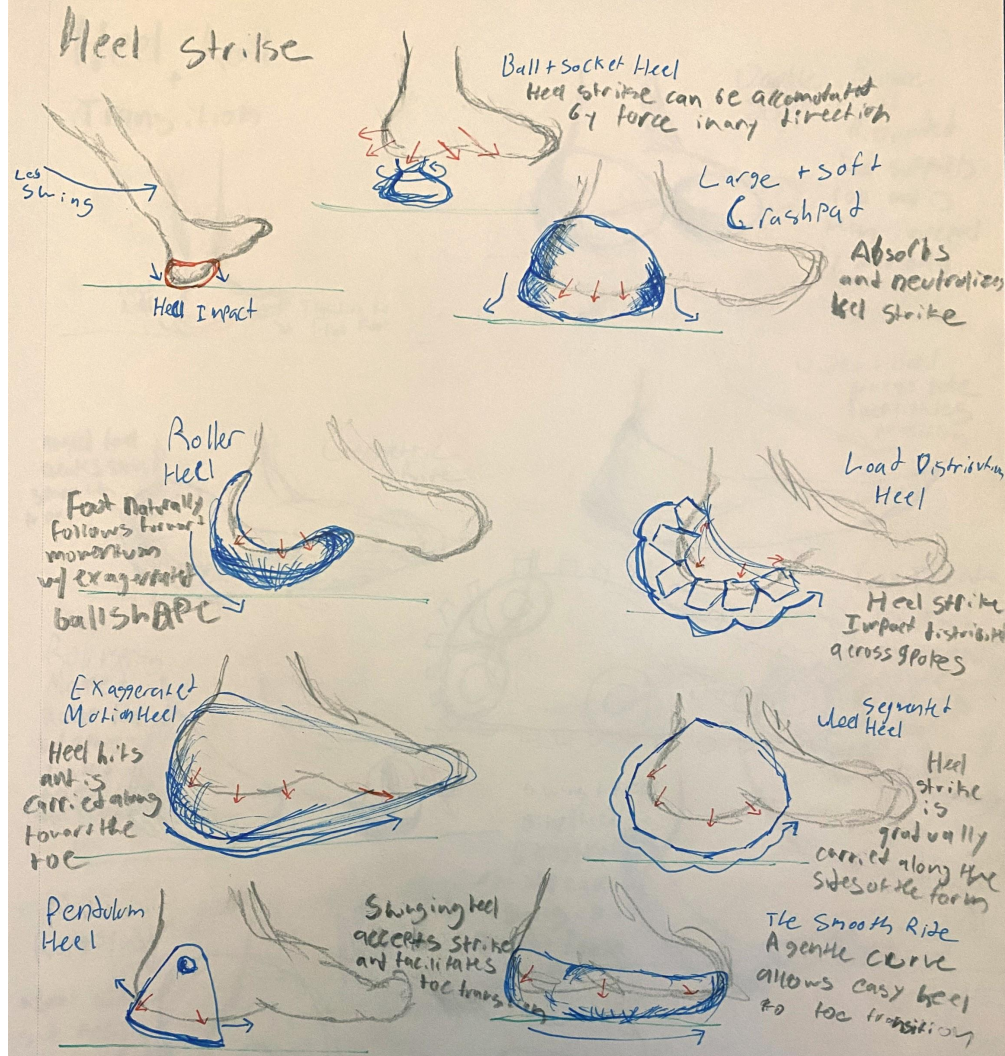
I broke down these forces into five main categories to focus on for iterative sketching.



Concept Sketching

The first force to contend with was the heel strike, which is considered to be the starting point for the gait cycle.

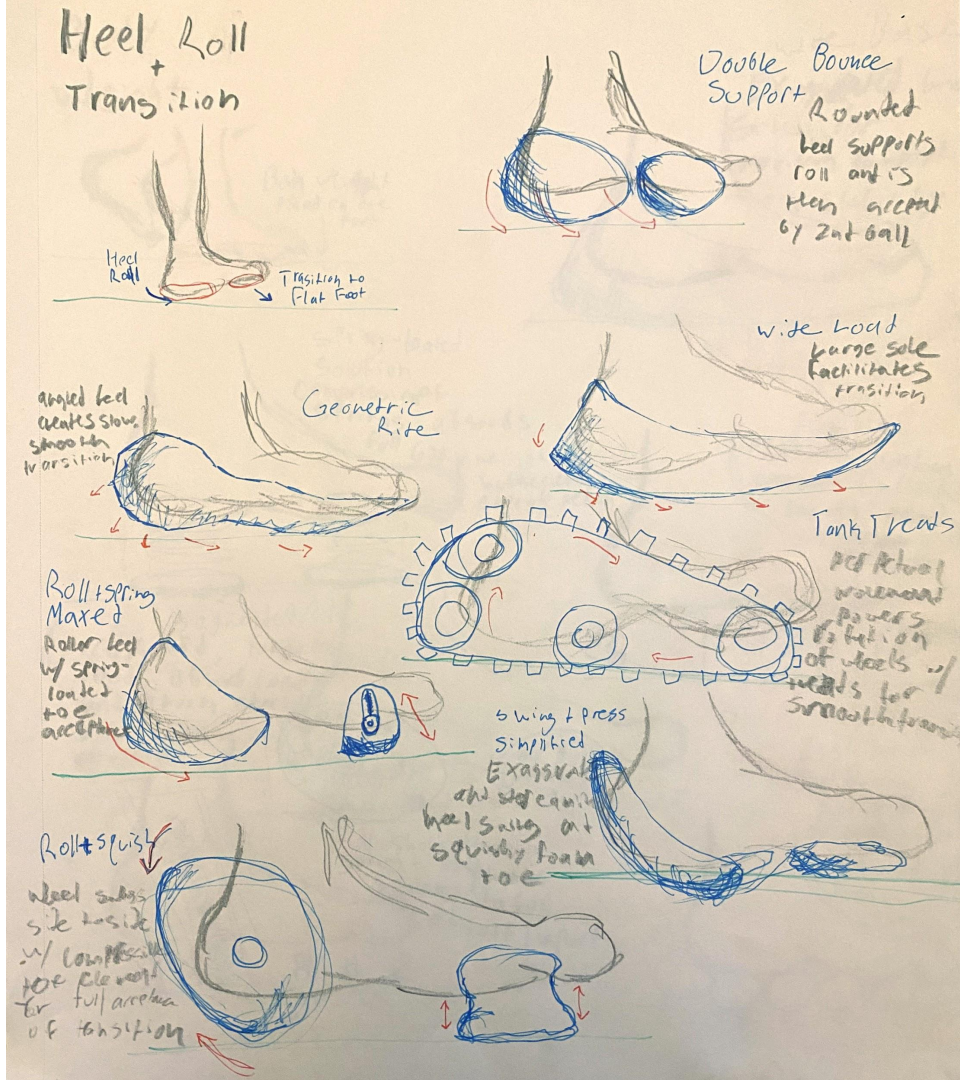
With these designs I was highlighting both impact protection and absorption, as well as utilization of forward momentum to help transition the user into a flat-footed position.



Concept Sketching

The next force to consider is that of the heel roll and transition to a flat-footed position.

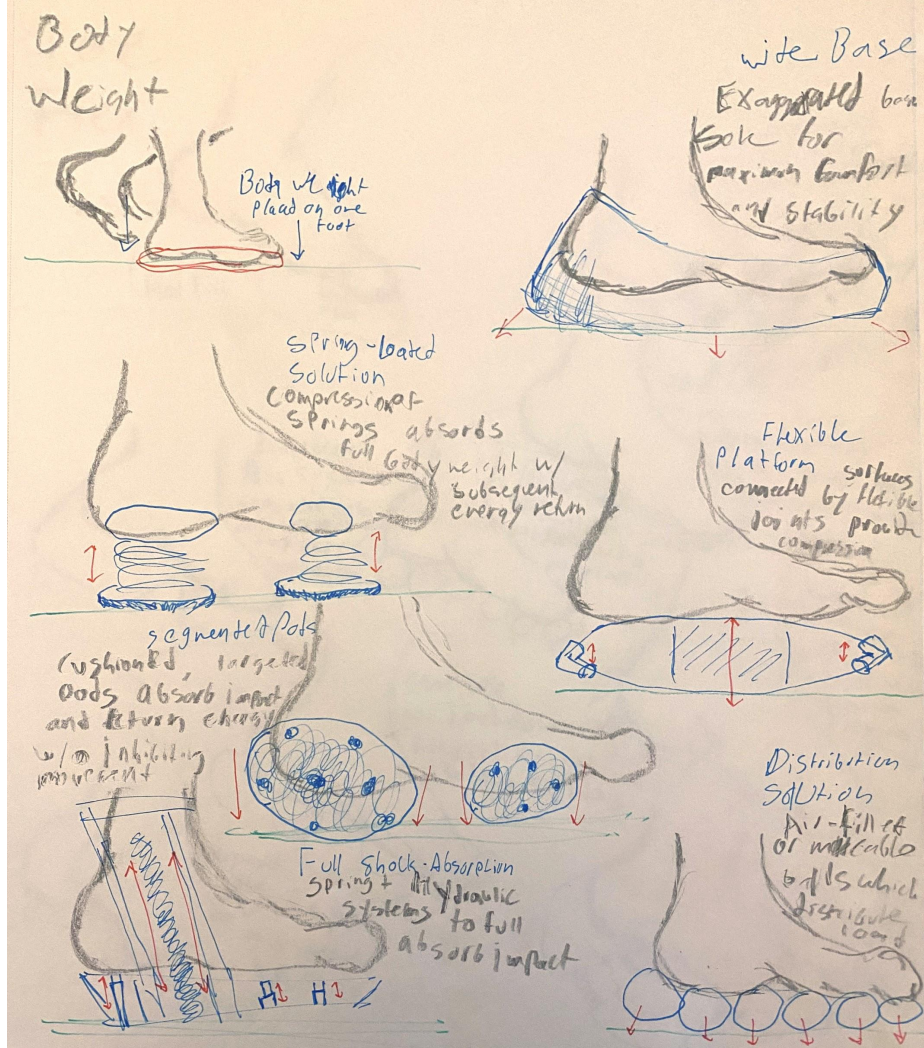
In these sketches I created designs focussed on absorbing the force from the heel-strike and redirecting it forward and into the ground, minimizing the impact felt by the feet.



Concept Sketching

After the foot is completely flat on the ground, the user needs to pick up their other leg, subsequently putting all their body weight onto one foot.

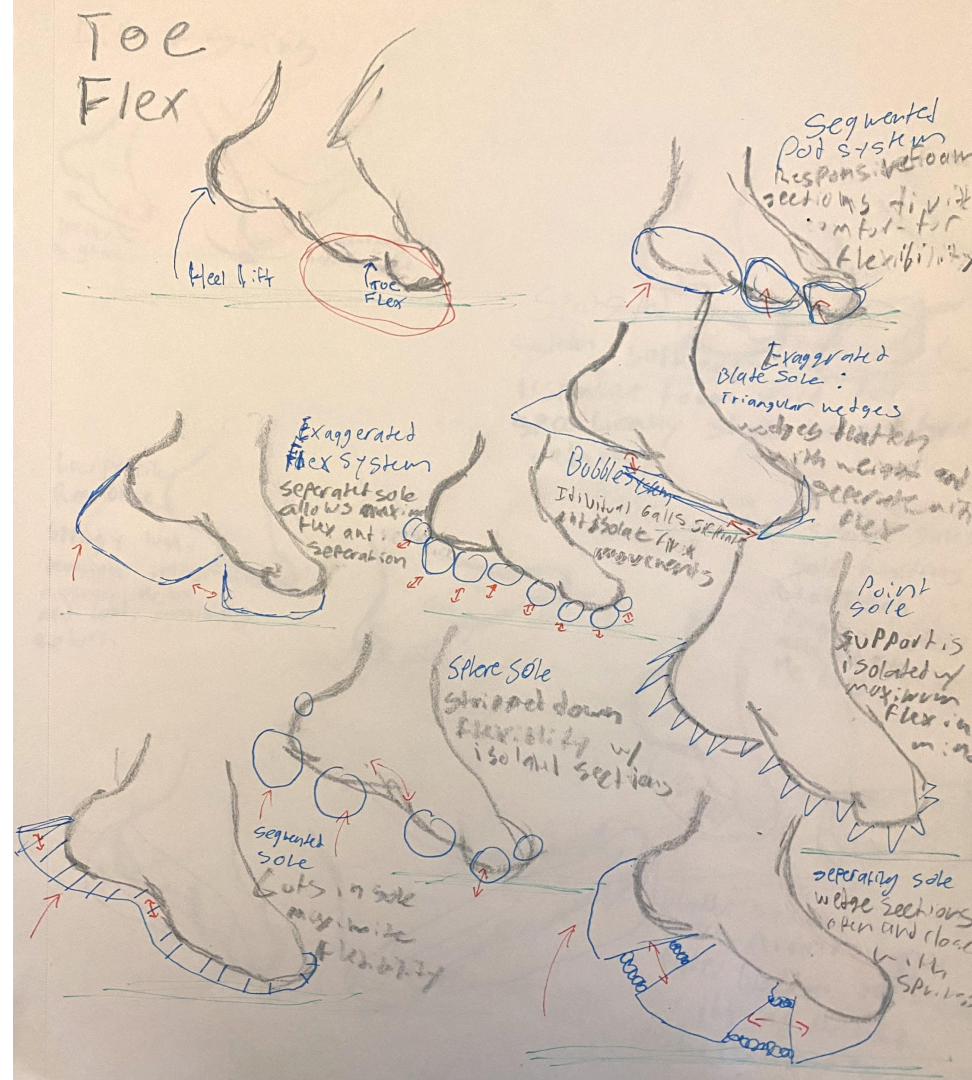
In thinking about these concepts, I wanted to maximize the cushion underneath the foot to reduce strain from the increase in top-down force.



Concept Sketching

In transitioning to the next step forward, the toe flexes as it remains in contact with the ground, with anticipated potential energy before push-off.

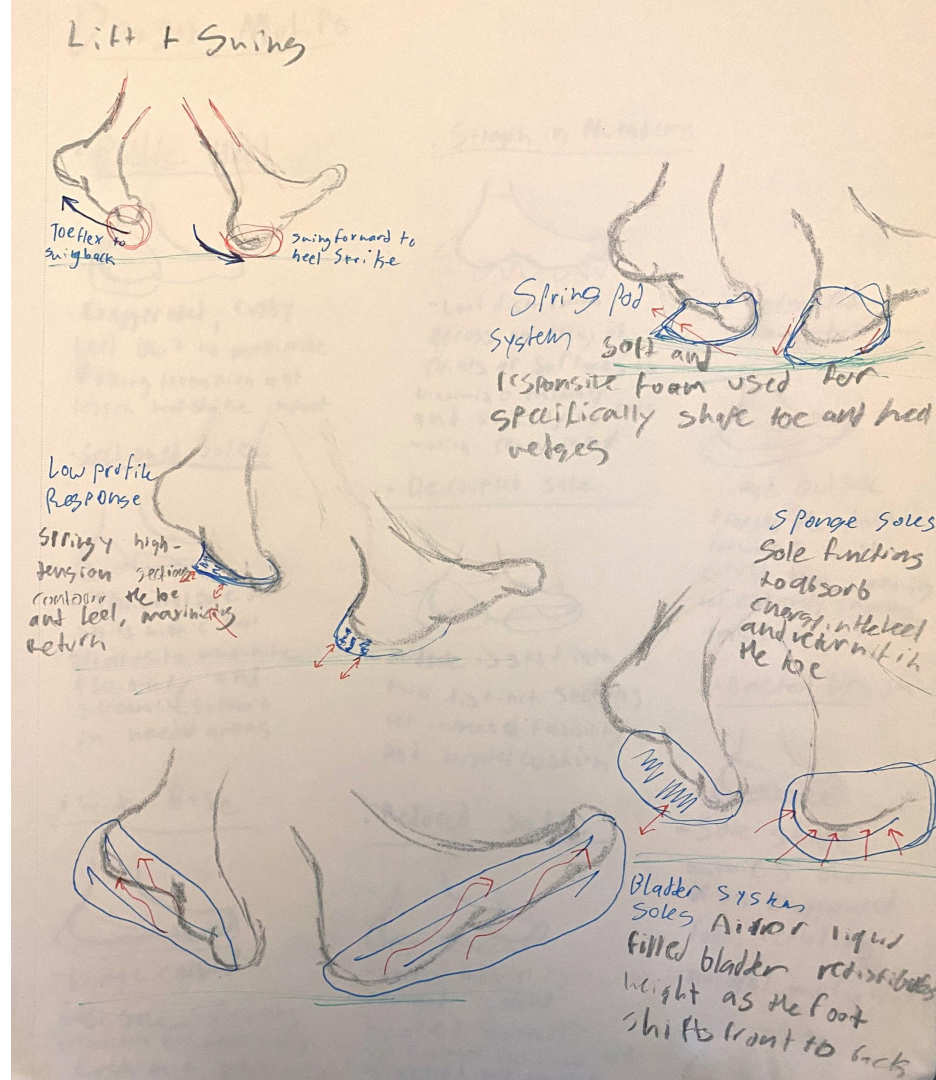
These designs focussed on facilitating free movement for the foot while undergoing this transitional step.



Concept Sketching

Despite the transitional nature of the toe-flex, the true transition of this process is the moment where the toe of one foot is lifted off the ground and the heel of the other foot strikes. This denotes the repeat of the gait cycle back to step one.

This series of ideas specifically highlighted the dual forces experienced as one foot leaves the ground surface and the other returns.



Concept Sketching

Based off of my iterative sketching series, I pulled out specific formal design elements that were consistent through each of the previous phases.

These motifs were either large, all-encompassing silhouettes or designs with a segmented and targeted cushion system.

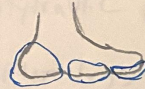
Design Motifs

Bubble Heel



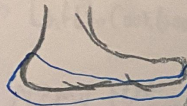
- Exaggerated, cushy heel unit to maximize rolling transition and lessen heel-strike impact

Segmented Sole



- Individual sole units mimic foot structure to maximize flexibility and streamline support in needed areas

Wide Base



- Large curved base sole facilitates transition and maximizes cushion + stability

Strength in Numbers



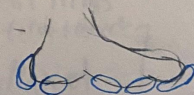
- Load distribution across an array of points or surfaces to maximize flexibility and stability w/ free motion maintained

Decoupled Sole



- midsole is split into two distinct sections for increased flexibility and targeted cushion

Reduced sole



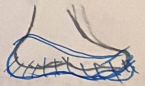
- Excess material is removed, isolated needed support for maximum flexibility and uninhibited foot movement

Forward Momentum



- large outsole propels the individual forward with curved base allowing for extremely smooth transition

Basefoot Design



- Sole shape mimics that of an exaggerated foot, replicating natural motion

Concept Sketching

Before I began working with physical prototypes, I experimented a bit with Photoshop; creating combinations of existing silhouettes I was inspired by, reimagined with adidas' Boost foam (thermoplastic polyurethane (TPU)), which I had sheets of to use for physical modeling and would end up being the foundational material for my final design, due to its extremely responsive properties.



Physical Prototyping

After moving past the two-dimensional phase of the design process, I began physical model-making based on my research.

I created a series of prototypes, each focussed on a different element of the final.

This first set highlighted variations in lacing structure and adhesion to the foot, utilizing a sandal as well as a performance sole on a last.



Physical Prototyping

For the second round of models, I worked with different types of foam, tensioning them around my feet with laces.

I used traditional upholstery foam as well as a Nike Lunarlon (combination of Ethylene Vinyl Acetate (EVA) and Nitrile Rubber (NBR)) drop-in midsole for more cushion-based explorations.



Physical Prototyping

I was able to purchase oversized sandals and overshoes to begin more specified works-like models.

In thinking about a final overshoe design, I needed to what worked (and didn't) in existing solutions.

I used Crocs, Merrell, Oshatoes, and Thorogood products to begin to define a working final model.



Final Model

Despite the range of studies I explored in my research process, I felt it was important to create a design which could be worn with any pair of shoes, maximizing its versatility.

Given the extremely responsive qualities of the Boost foam, I felt it would appropriate to use in my final design.

I utilized Thorogood's overshoes for their deep, bowl-like design and created my own Boost drop-in midsoles.



Final Renderings

With the test of the drop-in midsole a success, I created these renderings to depict what the final design would end up looking like.

The Thorogood overshoes do not feature heel straps, relying on a snug tension-fit to keep the foot secure. I tried using them and my shoes were prone to slipping out once the Boost sole was added, so containment in the back was necessary for optimal function.



Closed-Toe Overshoe

featuring a webbing strap
with buckle closure



Open-Toe Overshoe

featuring an elastic strap



Closing Thoughts

In my opinion this design represents a fusion of the two fundamental forces of good design; form and function.

Despite the encapsulating, exo-skeletal nature of the final model, the Boost foam midsole will improve comfort and energy-return when the overshoes are in use.

The design satisfies the initial problem statement, while also existing as fashion accessory, exaggerating the wearer's footwear silhouette and altering their overall perceived proportions when worn.

I learned a great deal from my research and iterative design process, and am pleased with the final outcome.