# Sweat Sucker 9000

## Sweat Management Vacuum Attachment for Transfemoral Prosthetics

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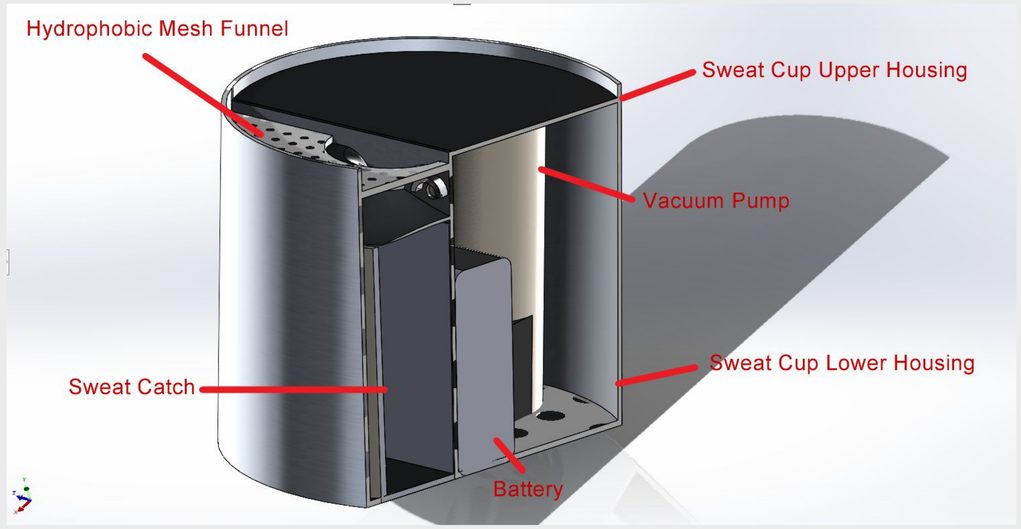
## The Problem

- Over 1.2 million people in the United States suffer from limb loss
- Over 18% of these people are transfemoral amputees
- 72% people have problems with heat and sweating inside their socket
- 57% of people are dissatisfied with the comfort of their prosthesis
- The current market for global prosthetics is $9.6 billion, estimated to project to $14.3 billion by 2030

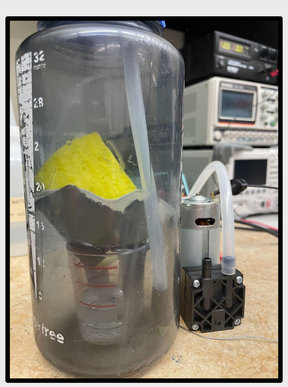
## Our Solution

- A vacuum pump attachment for transfemoral prosthetic sockets
- Through vacuum suspension, the vacuum pump will help create a tight and secure fit of the prosthetic socket to the residual limb
- A removable sweat evacuation chamber, allowing the user to periodically empty sweat without taking off the whole prosthesis



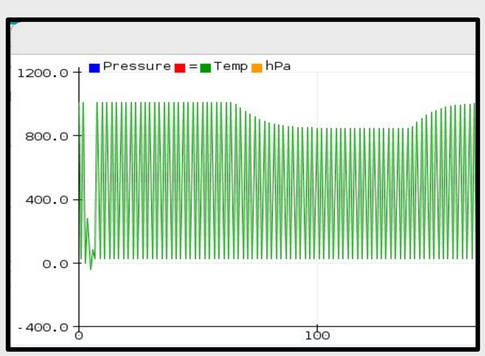

## Sweat Rate Collection

- To determine amount of liquid collected over time
- Difficult to quantify due to prototype setup
- Estimated 2.24x increase in water droplet rate with vacuum
- Approximate rate of 0.15 mL/sec



## Vacuum Pump Power

- To determine battery size
- Set to 12 V and 1 A
- During operation, amperage decreased to 0.7 A
- 9500 mAh capacity for 12 hours every 30 seconds




## Pressure Loss

- To determine duration of vacuum pump
- Arduino chip used to code for pressure sensor
- 80 kPa was the lowest achievable pressure
- Took ~50 seconds to reach minimum pressure
- Rapid pressure loss due to prototype design constraints

## Design

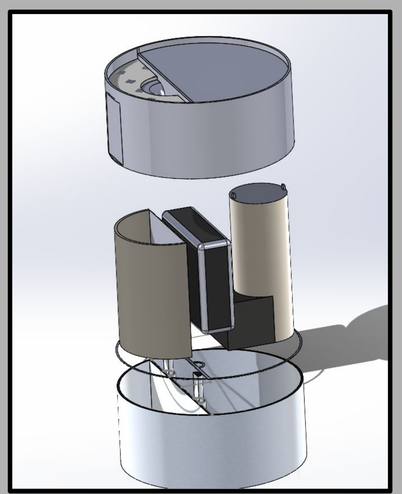
- Cylindrical housing divided in two parts
- One side houses the vacuum pump, battery, and sensor package
- The other side houses the removable sweat container
- Hydrophobic mesh is used to guide sweat into the sweat container

## Net Present Value

- $12.8 million
- 10,000 units per year
- Retail price at $1,600
- Production cost of $400

## Next Steps

- Capacitive liquid level sensor including RFID
- Antimicrobial protection
- Electrochemical sensor
- Hygroscopic material



## Acknowledgements

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