# Challenge #1
# Novel sieving device for separating microspheres

## presented by: THE SIEVING WONDERS

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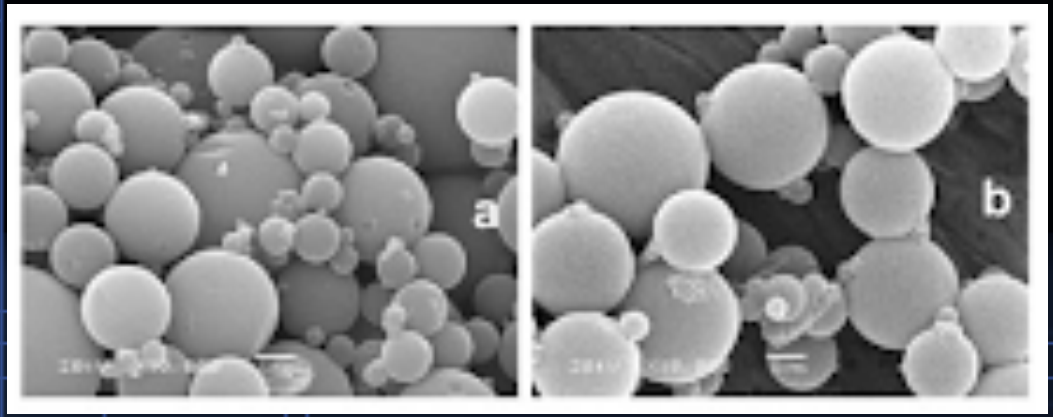
# Context: What are the Current Challenges?

- The starting point is a solution containing micro-spheres of up to 100 μm in diameter, which must be sorted.
- The current method is to pipet the solution through a small filter tube, yielding ~35 μm spheres.

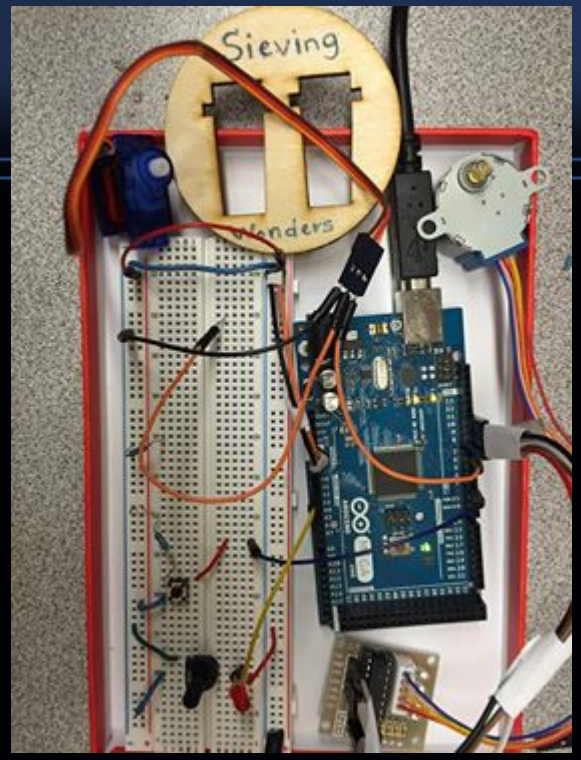



- The spheres aggregate quickly on the filter, blocking flow.

# Our Objectives

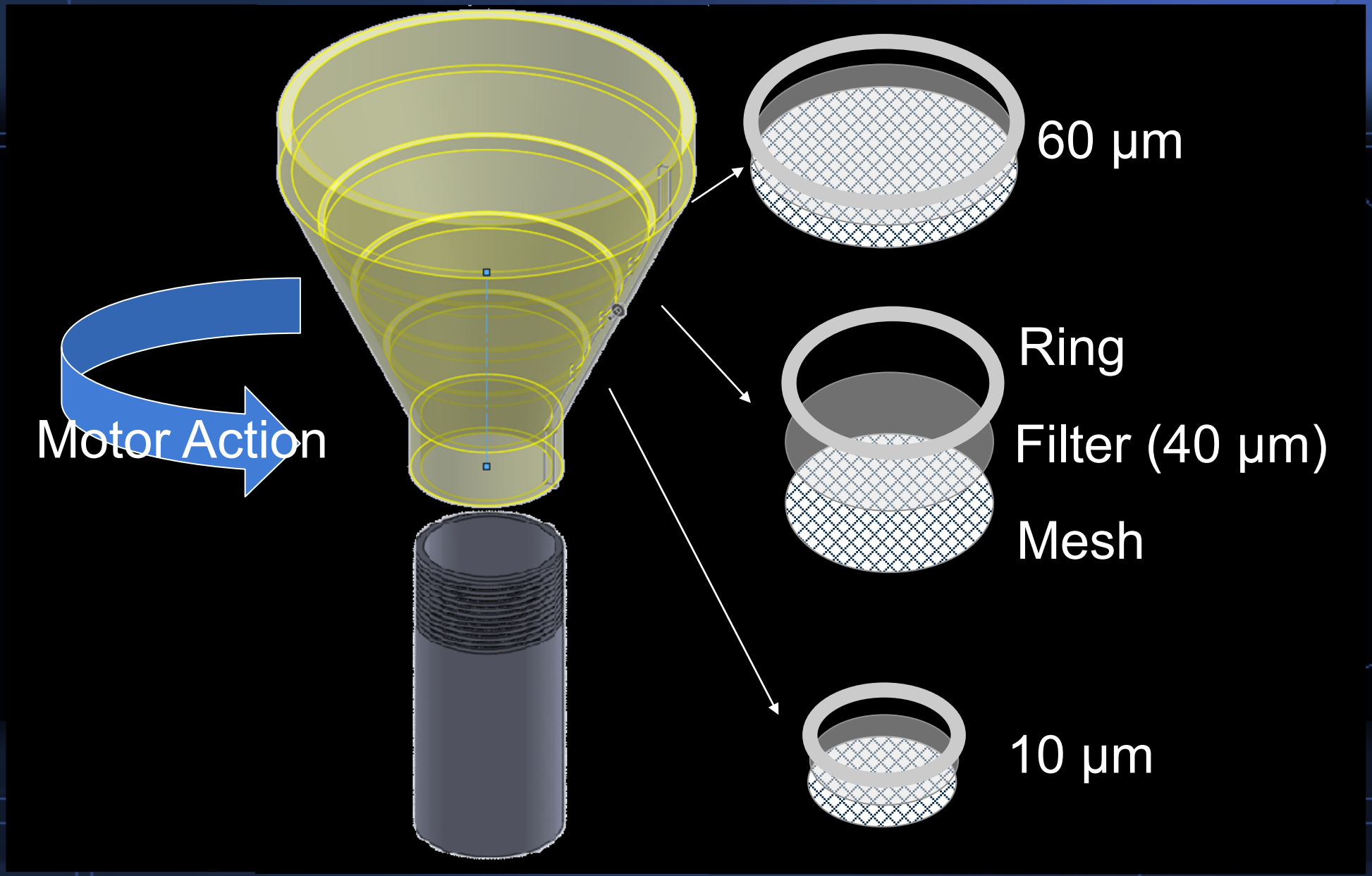
- The goal is to sort out even **smaller spheres of under 10 µm** in diameter, quickly and efficiently, with minimal aggregation.
- The lab needs a process and apparatus that are:

| | |
|---|---|
| **Fast**<br>**Reliable**<br>**Not labour-intensive** | **User-friendly**<br>**Adaptable**<br>**Cheap** |



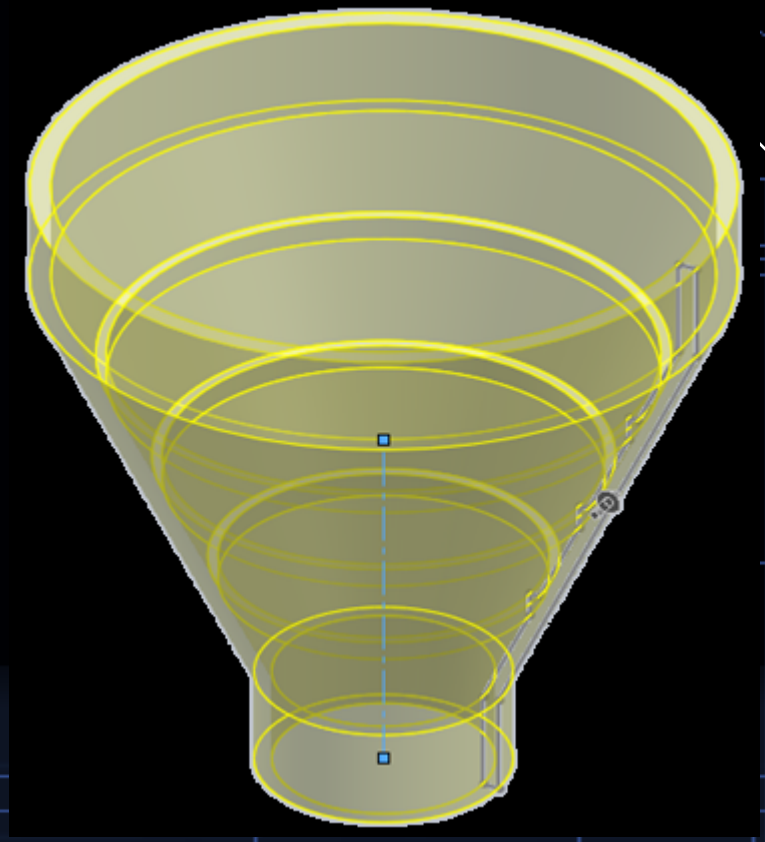

# Core Design Elements


| Shaker Design | Sieving Device |
| --- | --- |
| • Arduino<br>• Wires, buttons, boards, servo, battery | • 3D-printed funnel and tube (interlocking via threading)<br>• Stacked sieves with (gradient of fineness and surface area) |


Motor Action
60 µm
Ring
Filter (40 µm)
Mesh
10 µm

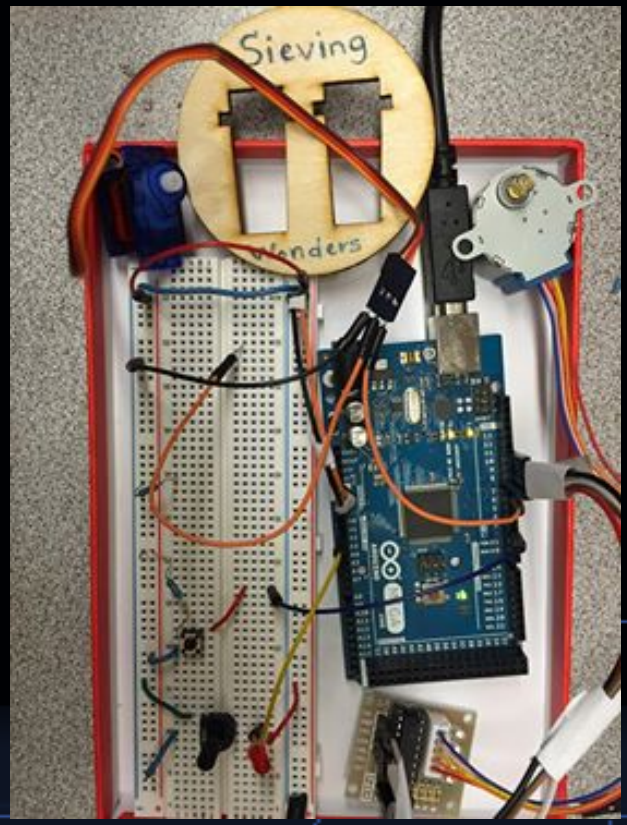
# Stacked Sieves in a 3D-Printed Funnel

- By stacking sieves in decreasing surface area and increasing fineness, we spread the risk of aggregation.
- 3D printing the funnel means that we can tailor the device to the specifications of the materials that are readily available in the lab.



# Rotational Motor (Arduino Board)

- A gentle, rotational motion will spread the solution across the maximum surface area of the sieve.
- Movement primarily on the horizontal plane enhances flow and minimizes aggregation, while decreasing the risk of damaging the microspheres.



# Addressing the Problem of Aggregation

Our project aimed to integrate existing approaches to minimize aggregation.

# End-User Considerations

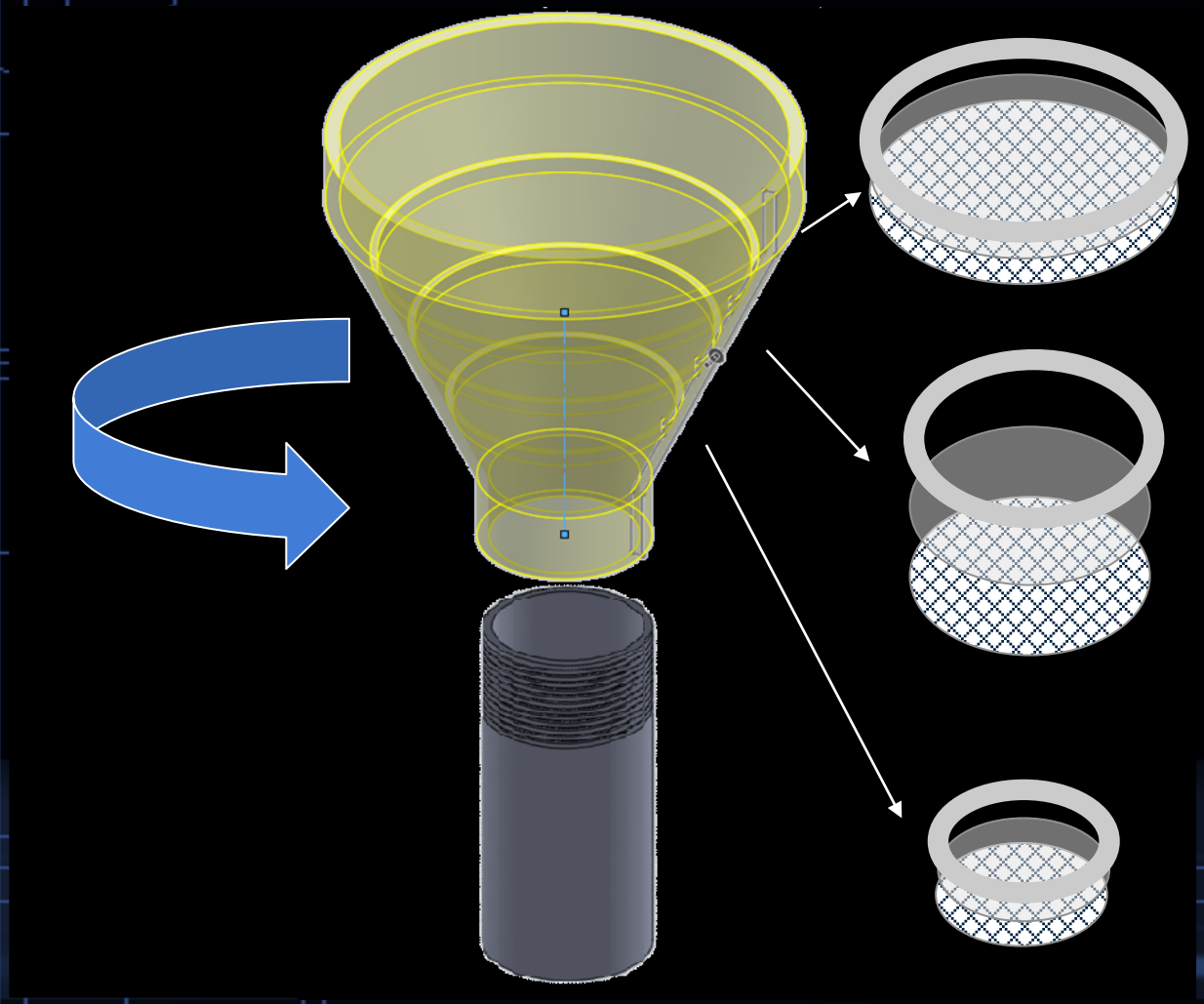
## User Experience

- After initial set-up, our device operates autonomously, allowing lab personnel to focus on other tasks.
- Simplicity and portability of the design make the device easy to handle.

## Scalability

- The parts are either readily available in the lab or cheap to procure, making the device easy to scale.
- The device is modular, enabling one-time customization and quick production.

# Summary



The following characteristics make our device a practical solution:

- Simple and portable
- Cheap and reusable
- Modular and adaptable
- Can have specifications tailored and built from scratch in less than 24 hours (as evidenced by this hackathon!)

# Acknowledgements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