

Opportunity and Needs

- 1 in 4 adults and 2 in 3 children experience needle anxiety
- EpiPen is \$700 without insurance
- 60% of autoinjector users fail to hold the autoinjector for the proper duration
- 16% of adults avoid vaccinations and is a loss of a consumer base for the market
- Single-use autoinjectors contribute to the 1.7 million tons of plastic produced by the healthcare industry
- Over 80% of counties in America have poor access to clinics and healthcare

How the SANI Pen Meets Patient Needs

- Key features that tackle the limitations in current auto-injectors
 - Needle insertion and retraction
 - Syringe actuation
 - Mounting and compatibility
- Linear actuation and motor administration were selected to alleviate mechanical challenges some patients may face while administering routine injections
- Device accommodates standard needles and syringes, enhancing accessibility and reliability
- An optional mounting feature was created to address the device being top-heavy, providing support during injections

Peer Surveying

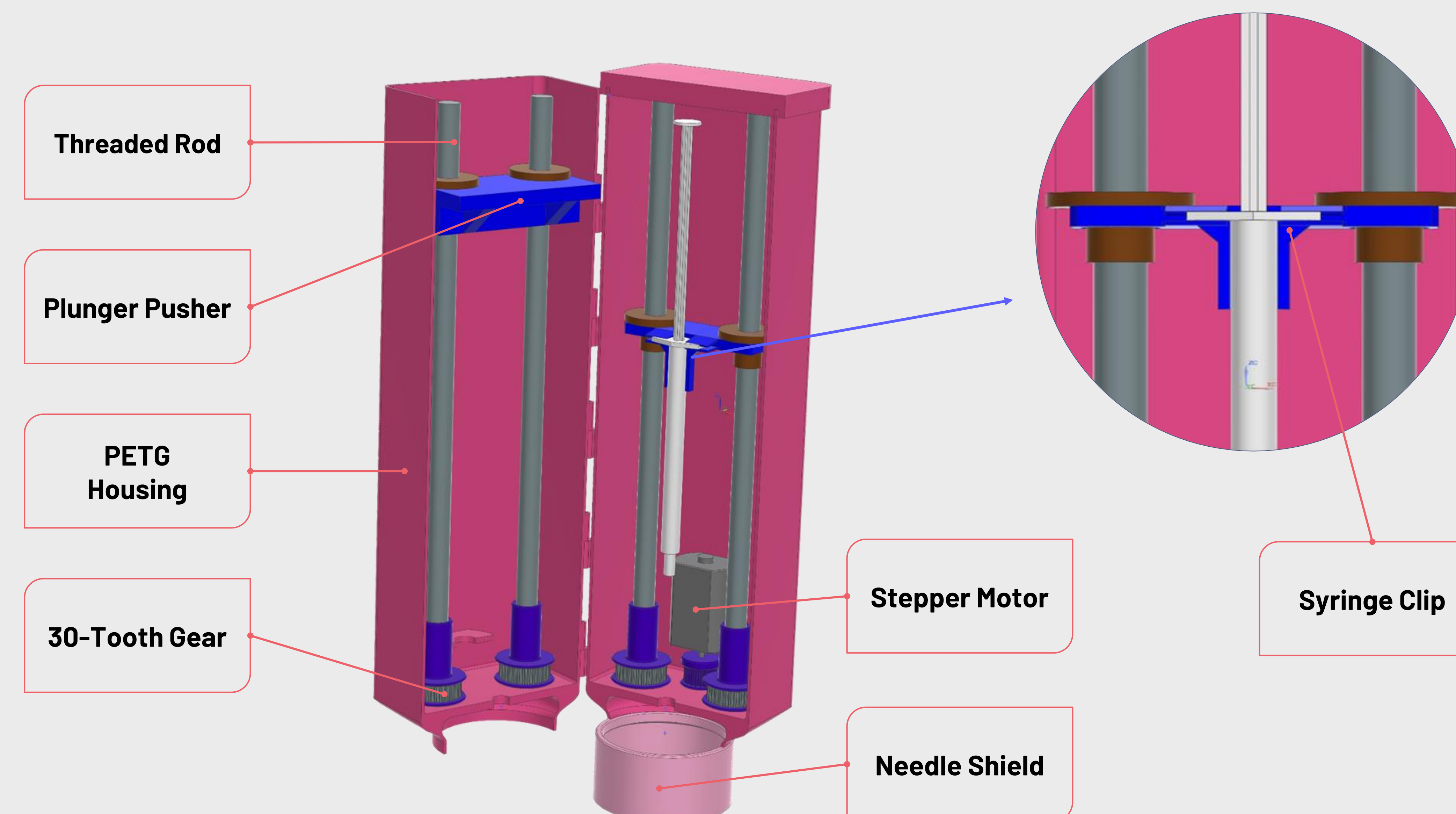
- To better understand the opportunity, SANI Pen conducted a quantitative and qualitative "Needle Anxiety Survey"
- Consisted of nine Likert questions and one written response question
- This preliminary data advised Team 7 on how to tactfully navigate needle anxiety and potential solutions



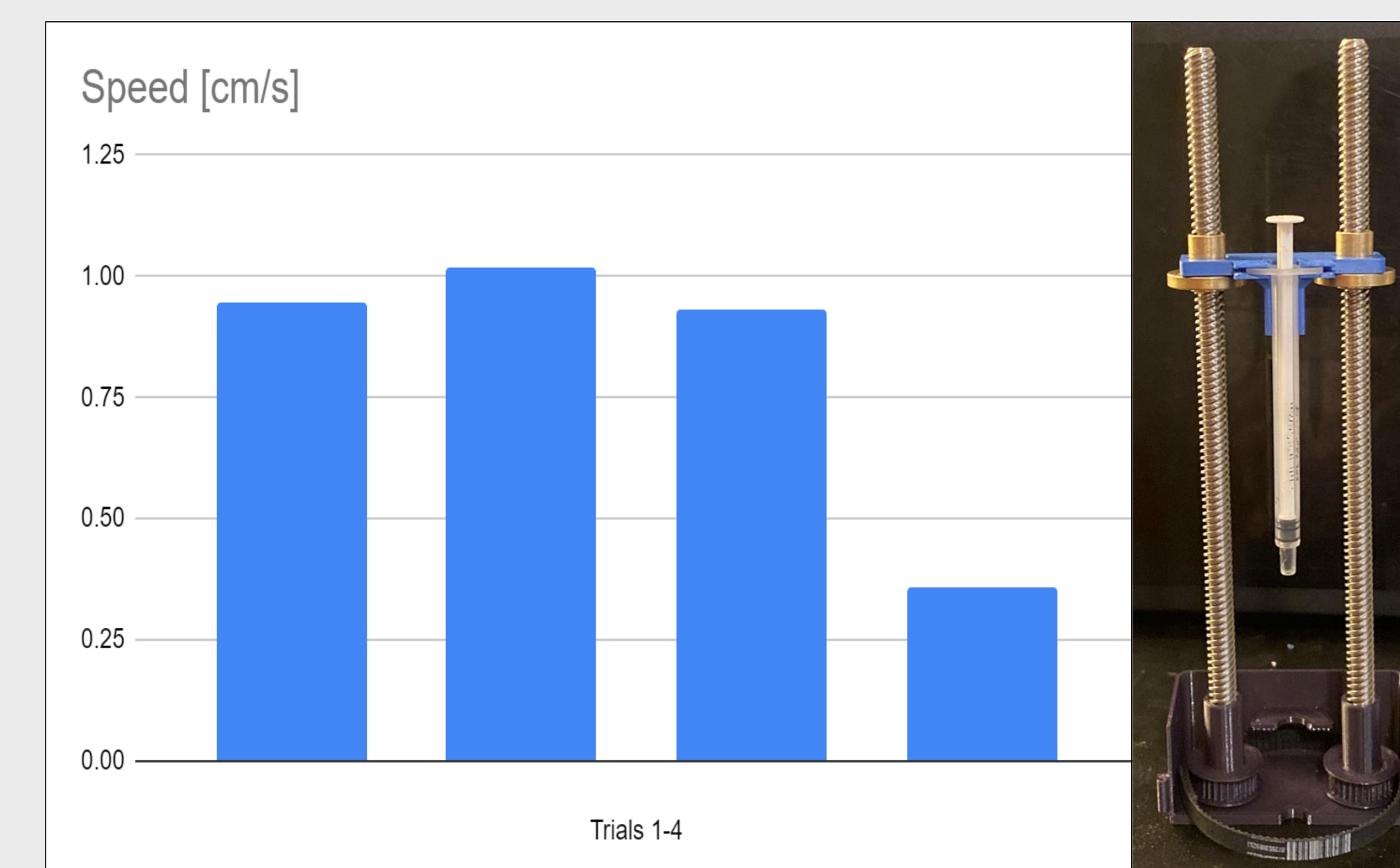
SANI Pen: The Sequentially Activated Needle Insertion Autoinjector

Comfort and Convenience: Introducing a Reusable At-Home Autoinjector for Stress-Free Injections

Victoria Gouw, Simon Pauken, Roxanne Bahn-Bales, Uriel Perez

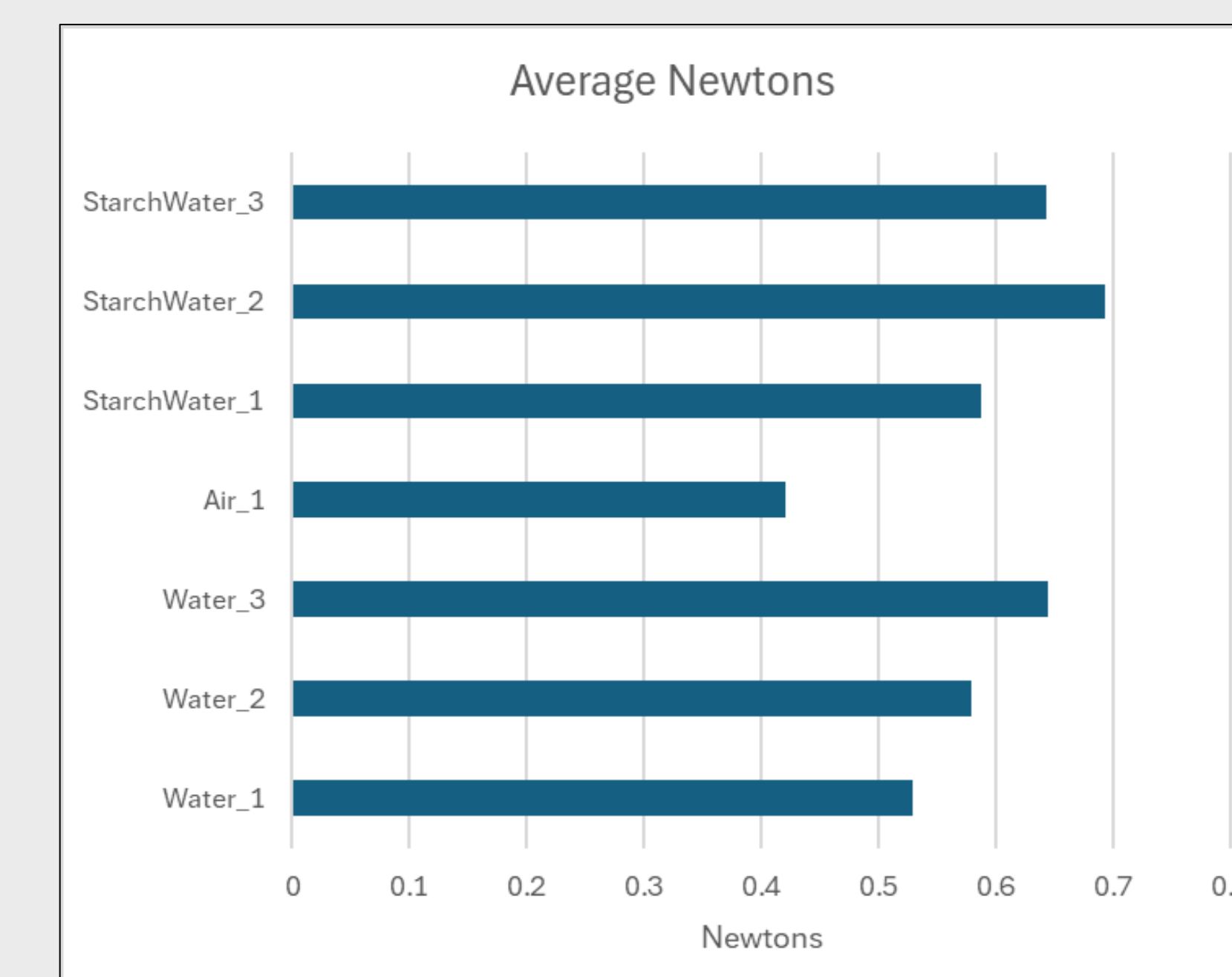


Needle Insertion & Retraction



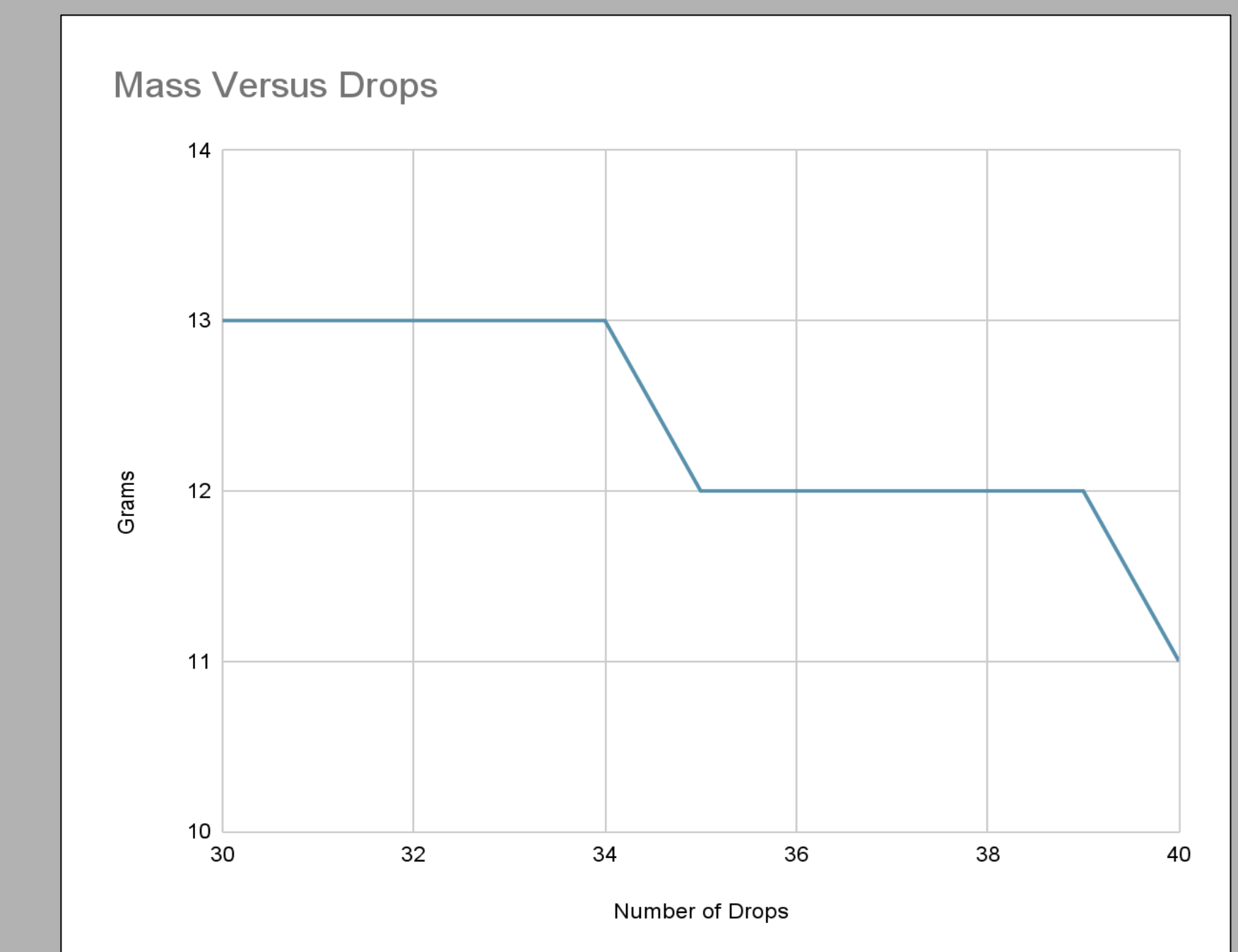
- Syringe actuation rate was quantified via four time trials
- Broad range of deviation likely due to timing threads being held manually

Syringe Actuation Force



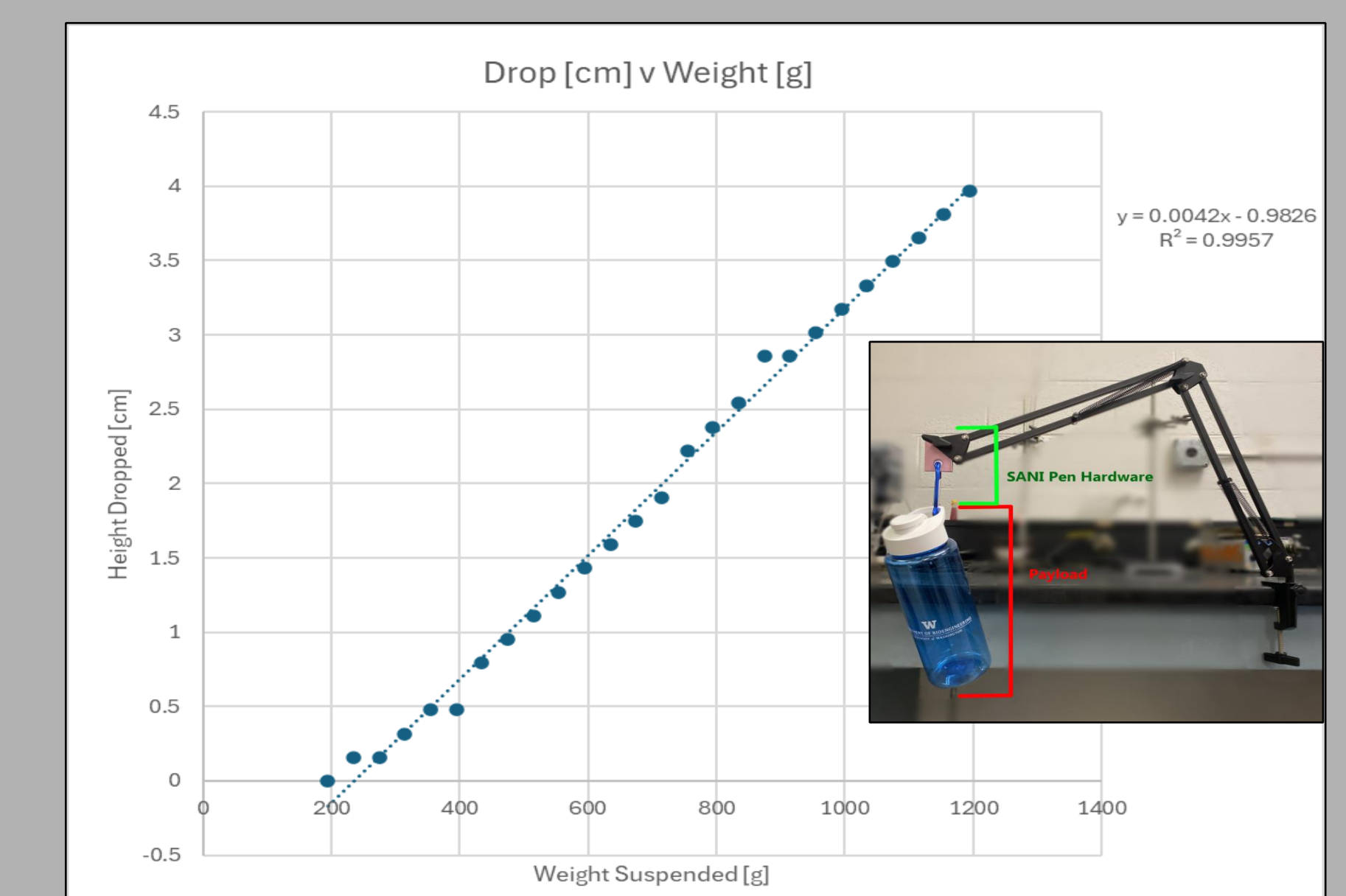
- Universal testing machine used to quantify force required to depress plunger
- Injection is not viscosity limited
- Required force predicted was less than the actual force
- Model did not account for fluid friction

Drop Tests



- Housing integrity was validated via drop tests
- Device was repeatedly dropped from 3 ft
- Drop forty was the threshold for functional damage

Mountable Arm



- Device is estimated to be 500 g, so the predicted arm droopage is around 1 cm
- Incremental increases in payload weight were used to quantify a weight:depletion relationship

Future Considerations

- Increase plunging motion trials
- Design housing to fit 2 motors
- Finalize code so that the device will run without laptop assistance
- Make the device battery compatible
- Evaluate needle shield comfort
- Prototype the door's hinges and cleanability
- Validate integrated prototype

Special Thanks To

Joe Baio, Onan Demirel, Christopher Hoyle