



DEPARTMENT OF
Biomedical Engineering
UNIVERSITY OF WISCONSIN-MADISON

Aligna-Painless IUD Placement

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Team Members

Team Leader: Kendra Ohde

Communicator: Carolyn Randolph

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Figure 1: Team Picture



Client Description

- Reshma, Emmanuel, ZiONay, and Ashley
 - Group of pharmacy students at the UW-Madison School of Pharmacy.
- Client proposed idea to ShaRx Tank
 - UW-Madison School of Pharmacy's annual entrepreneurship competition where PharmD students pitch innovative, market-ready solutions to real-world healthcare problems to a panel of alumni judges



Figure 2: Client Photos [1]



Background

- IUDs are among the most effective contraceptive options, providing long-term protection without requiring ongoing user action after placement [2].
- Current IUD placement involves:
 - Visualize cervix with speculum
 - Stabilize cervix with tenaculum
 - Uterine sound measures depth of uterus
 - Insertion of the IUD

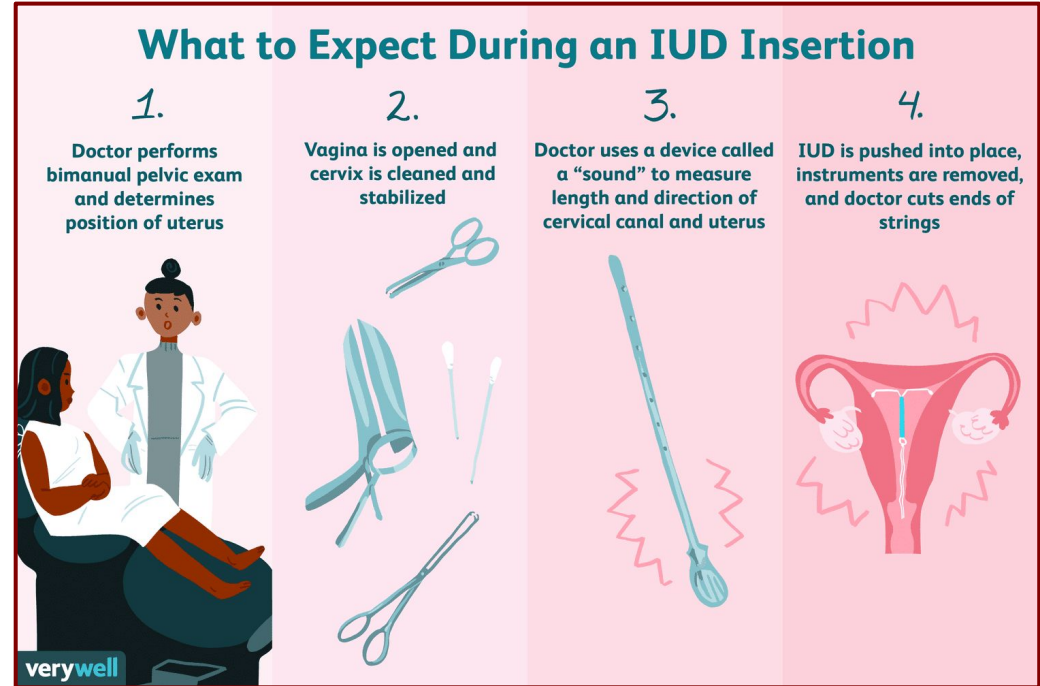


Figure 3: IUD Insertion Steps [3]



Problem Statement

- Among 252 adolescents without prior IUD experience, 25% reported disinterest in IUD placement due to fear of pain [4].
- Pain, anxiety, cervical manipulation with a tenaculum, uterine sounding, and variability in clinician technique can contribute to negative insertion experiences.
- The client requests a way to reduce anxiety and pain associated with the IUD insertion procedure
- This project aims to improve the insertion portion of the procedure, reduce avoidable discomfort, and make a highly effective, low-maintenance contraceptive option less intimidating for patients.



Competing Designs / Current Method

Speaker: Carolyn

- Traditional IUD Insertion
 - Speculum, tenaculum, uterine sound, then insertion of IUD device
- Carevix® suctioning cervical stabilizer
 - Half-moon around cervical os
- Bioceptive® Cervical Suction Retractor Wand
 - Twisting mechanism secures to ectocervix
 - Channel for inserter
- LidoSound
 - Dispenses Lidocaine through holes at distal end of uterine sound



Figure 4: IUD Insertion Steps [5]



Product Design Specification

- Distal outer diameter: ≤ 4 mm
- Operable using ≤ 2 hands
 - Handpiece weight: ≤ 1.0 kg **IEC 60601-1**
- Place IUD ≤ 20 mm from the uterine fundus **21 CFR 884.5360**
 - $\geq 95\%$ success rate
- Withstand ≥ 100 autoclave cycles at $121-134^{\circ}\text{C}$ **ISO 17665-1**
- ≤ 5 minute procedure time
 - The cervical stabilization must be held for ≥ 3 minutes
- Redesign painful steps in the IUD insertion procedure **ISO 10993-1**



Design 1: CerviPump

Speaker: Kendra Ohde

Components:

- Ribbed handle
- Telescoping slightly curved tip with pressure sensor
- Indicator light, depth slider, IUD deployment slider
- Electric vacuum pump with binary on/off switch

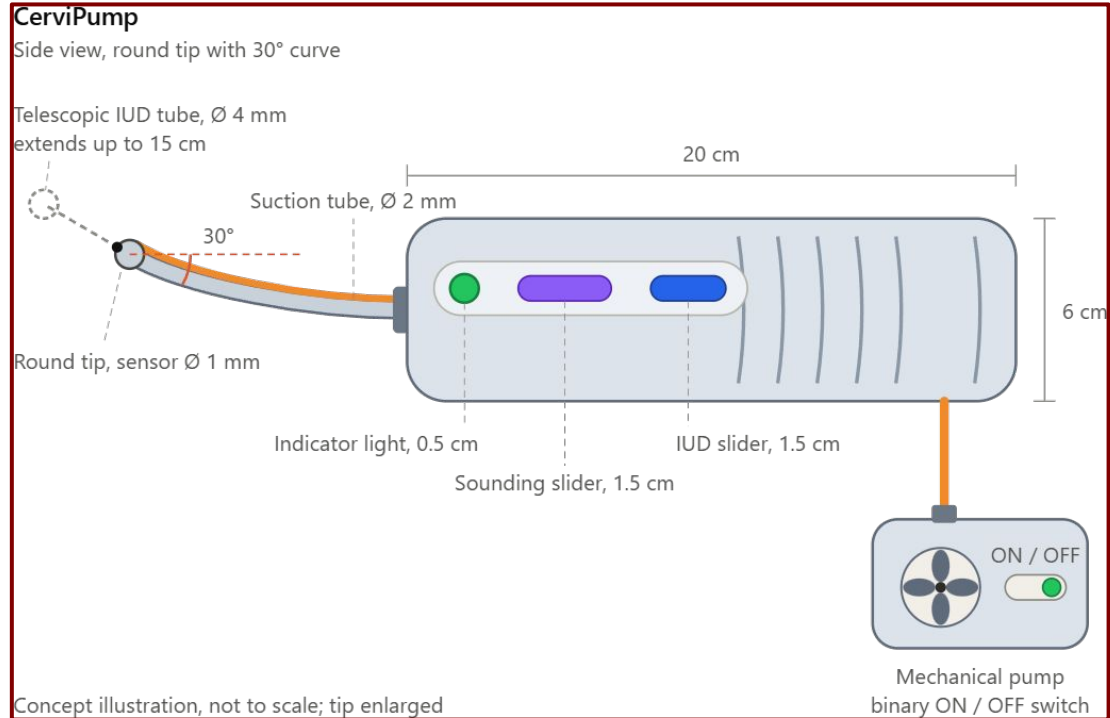


Figure 5: CerviPump Design Drawing generated with Claude [6]



Design 2: Soundless Suction Assist

Components:

- Medical grade silicone suction head
- Hand pump
- Used alongside existing IUD inserter

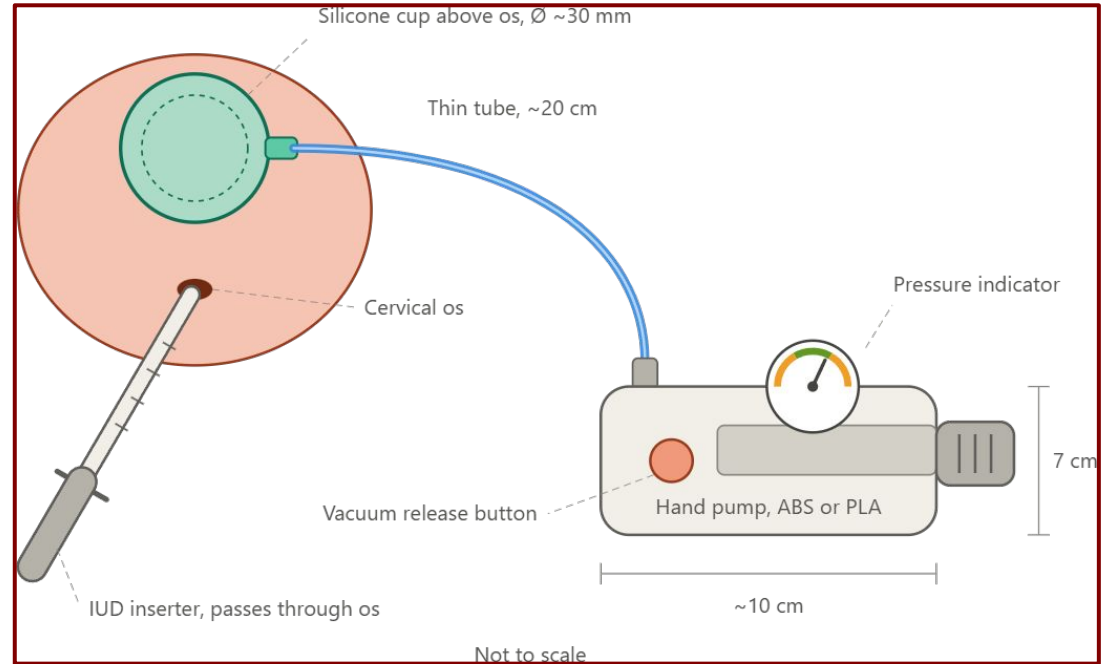


Figure 6: Soundless Suction Assist Design Drawing [7]

Rendered by Claude AI



Design 3: Articusound

Components:

- Double silicone suction ring
- Syringe-Style vacuum with a twist-lock mechanism
- Rotatable uterine sounding component
- Transparent guide tube to view depth

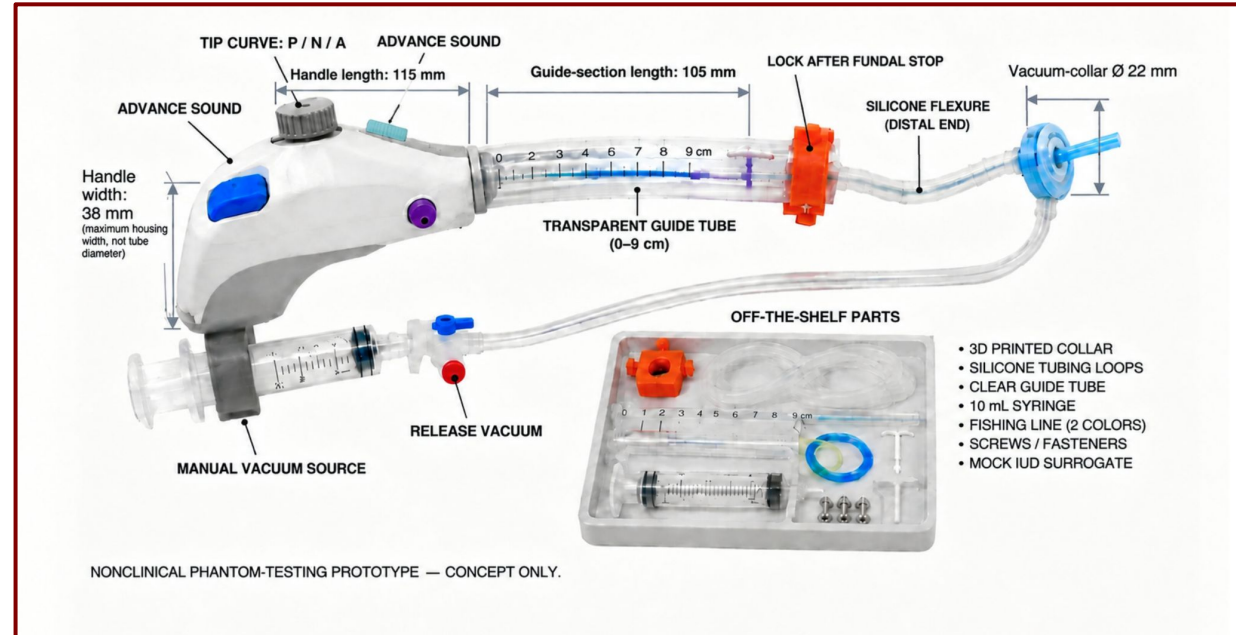


Figure 7: Articusound Design Drawing [8]. Rendered by Perplexity



Design Matrix

Criteria	Weight	CerviPump		Soundless Suction Assist		Articusound	
Safety	25	3/5	15	3/5	15	4/5	20
Universality	20	3/5	12	2/5	8	5/5	20
Ease of Use	20	4/5	16	5/5	20	3/5	12
Feasibility	15	3/5	9	5/5	15	2/5	6
Cost	10	3/5	6	4/5	8	5/5	10
Originality	10	4/5	8	3/5	6	4/5	8
Total	100	66		72		76	



Final Design Selection

- Locking slider
- Fixed stop shoulder
- Sliding IUD deploy through the sounding tube

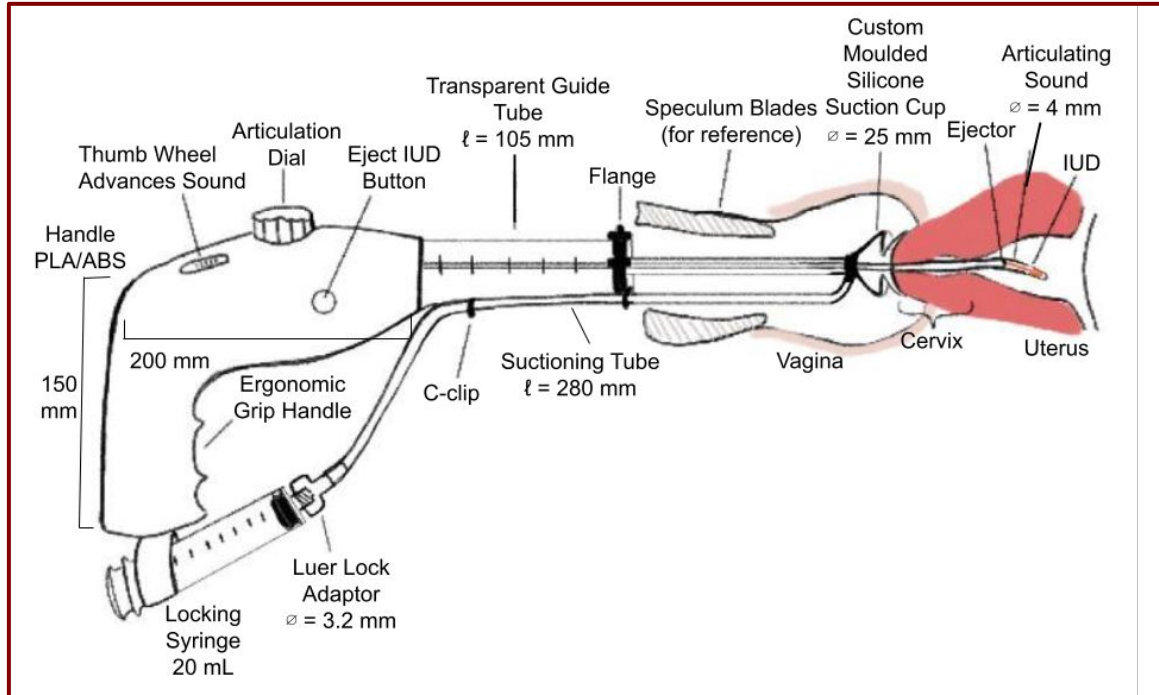


Figure 8: Drawing of Articusound, Our Winning Final Design



Testing

- Pass/Fail Tests
 - Suction Component
 - Successful adjustability of the sounding
 - Deployment of IUD
- Suction Component
 - Measure pressure values
 - Consistency of suction
- Cervical model, pressure gage, IUD



Figure 9: Testing IUD Insertion Model [9]



Future Work

- Interchangeable suction cups
- Determine feasibility of micro/nano cameras and autoclavability
- Factor in IUD types
- Integrate topical pain relief (i.e lidocaine)
- Address pain due to speculum

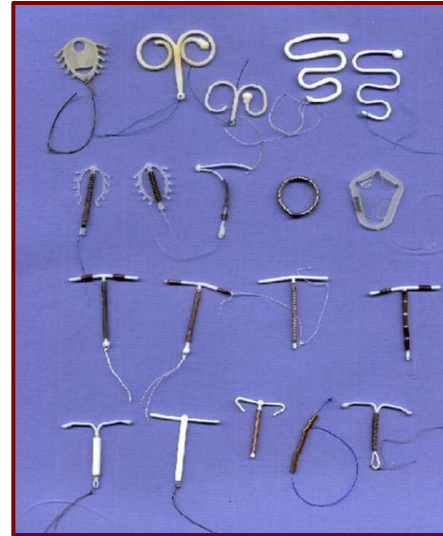


Figure 10: Different Types of IUDs [10]



Figure 11: Micro Camera [12]



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Supporting Organizations:

Department of Biomedical Engineering
University of Wisconsin-Madison School of Pharmacy



References

- [1] Team Photo
- [2] Centers for Disease Control and Prevention, "Intrauterine contraception," Contraception, Nov. 19, 2024.
- [3] "IUD insertion steps" Hotspot [Online]. Available: https://hotcore.info/act/kareff-092024p.html#goog_rewarded. [Accesses: Sep 29, 2026].
- [4] D. G. Callahan et al., "Will it hurt? The intrauterine device insertion experience and long-term
- [5] "CerviPump" Original design and hand-drawn sketch by Kendra Ohde digitally rendered with assistance from Anthropic, "Claude Sonnet 5.5," Large language model, Anthropic, San Francisco, CA, USA, 2026. [Online]. Available: <https://claude.ai>.
- [6] "Soundless Suction Assist" Original design and hand-drawn sketch by Carolyn Randolph; digitally rendered with assistance from Anthropic, "Claude Sonnet 5.5," Large language model, Anthropic, San Francisco, CA, USA, 2026. [Online]. Available: <https://claude.ai>.
- [7] "Ectocervic Vacuum and Articusound" Original design and hand-drawn sketch by Francesca Angiulli; digitally rendered with assistance from ChatGPT OpenAI, ChatGPT. [Online]. Available: <https://chatgpt.com/>
- [8] "SimCoach Intrauterine Device (IUD) Training Kit with 3D Uterus Model and IUD Inserter", Sim Coach Net [Online]. Available: https://simcoach.net/products/intrauterine-device-training-kit?sku=18069505305992253979603510&country=US&utm_medium=shopline-feed&utm_source=google&srtid=AU7gw4WUtDrJORDk6C_IQRznSoBezqOO1ltfeRvx-PuDgol0sDtMXRnlc
- [9] UFO Themes, "The intrauterine device and the intrauterine system," *Obgyn Key*, Nov. 08, 2017. <https://obgynkey.com/the-intrauterine-device-and-the-intrauterine-system/> (accessed Oct. 01, 2026).
- [10] "ams NanEyeM Miniature Camera Modules," ams-osram, 2024. <https://ams-osram.com/products/sensor-solutions/cmos-image-sensors/ams-naneyem-miniature-camera-modules> (accessed Sept. 29, 2026).



Questions?

