Baskin Engineering
UC SANTA CRUZ

Medical SAWbots

Saving Lives by Revolutionizing Surgical Technology

Limited Accessibility to Life Saving MIP Tools

Minimally Invasive Procedure (MIP) medical technology:

Da Vinci Surgical Machine

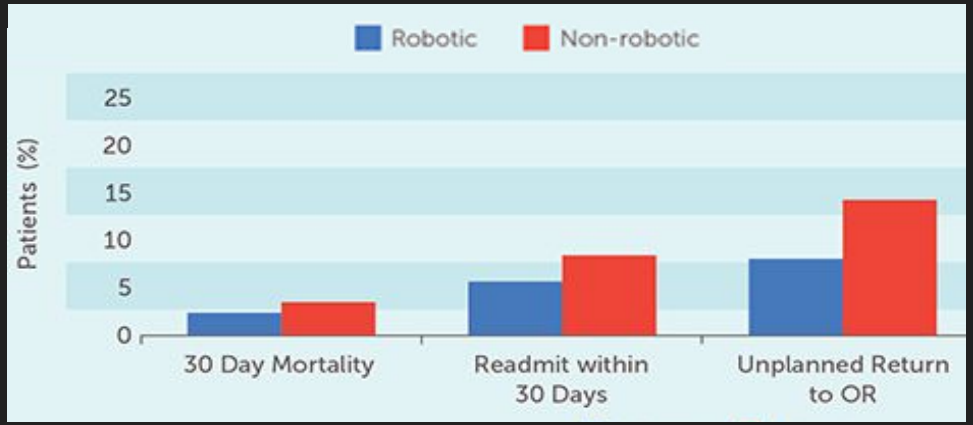
Average installed cost is $2 million

- Procedures using tiny surgical instruments
- Existing MIP machines are expensive and bulky

MIP Improves Patient Outcomes

Conventional surgery is associated with inferior results

- Decreased risk of infection
- Improved recovery time
- Shorter hospital stays



Graph depicting patient outcomes for MIP vs. non-MIP procedures

Source: University HealthSystem Clinical Database

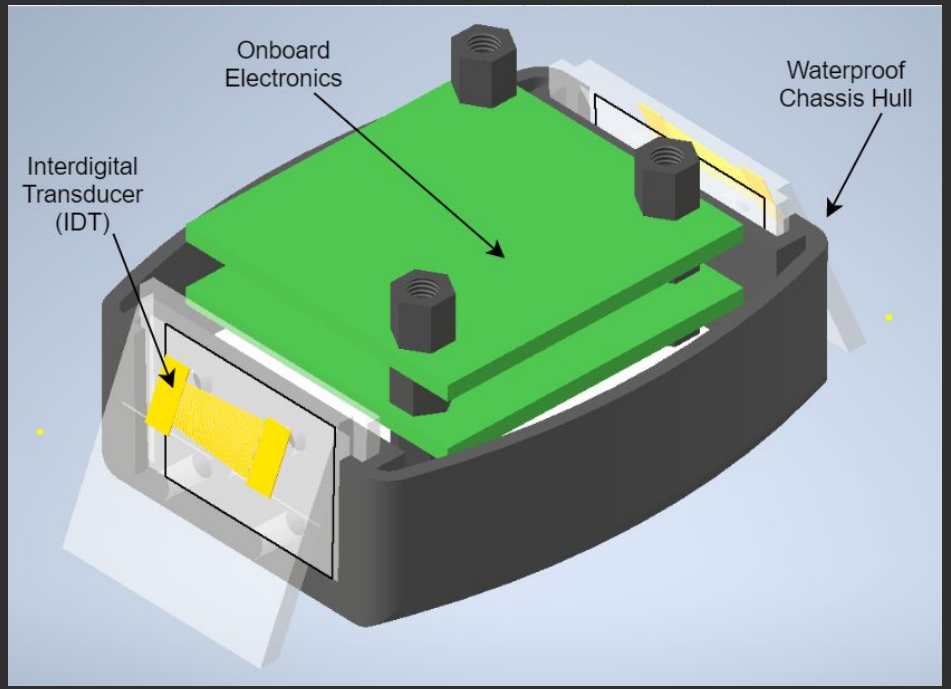
Our Solution: SAWbots

Propulsion: Safe for use en vivo

Wireless: No external wires or battery

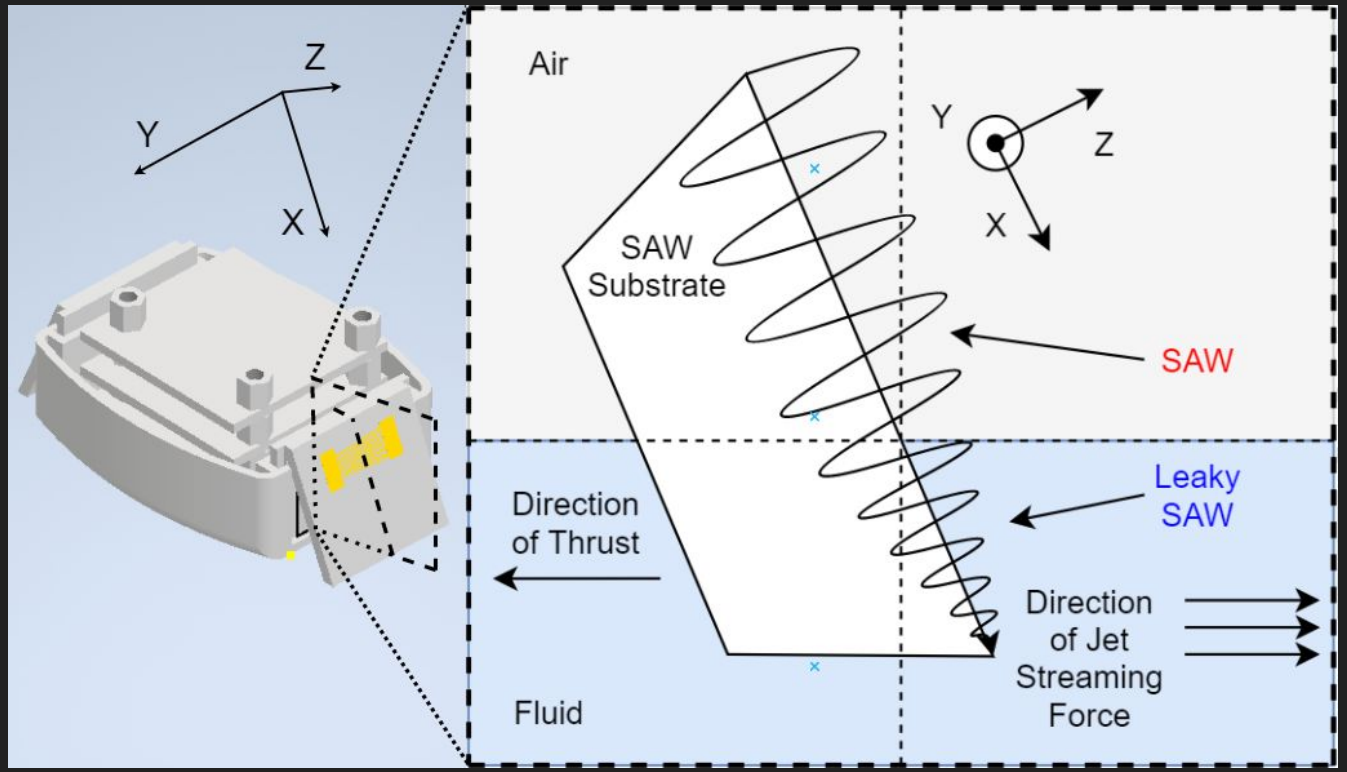
Affordable: Cost of materials is $200

Modular: Multiple PCBs and IDT mounting blocks



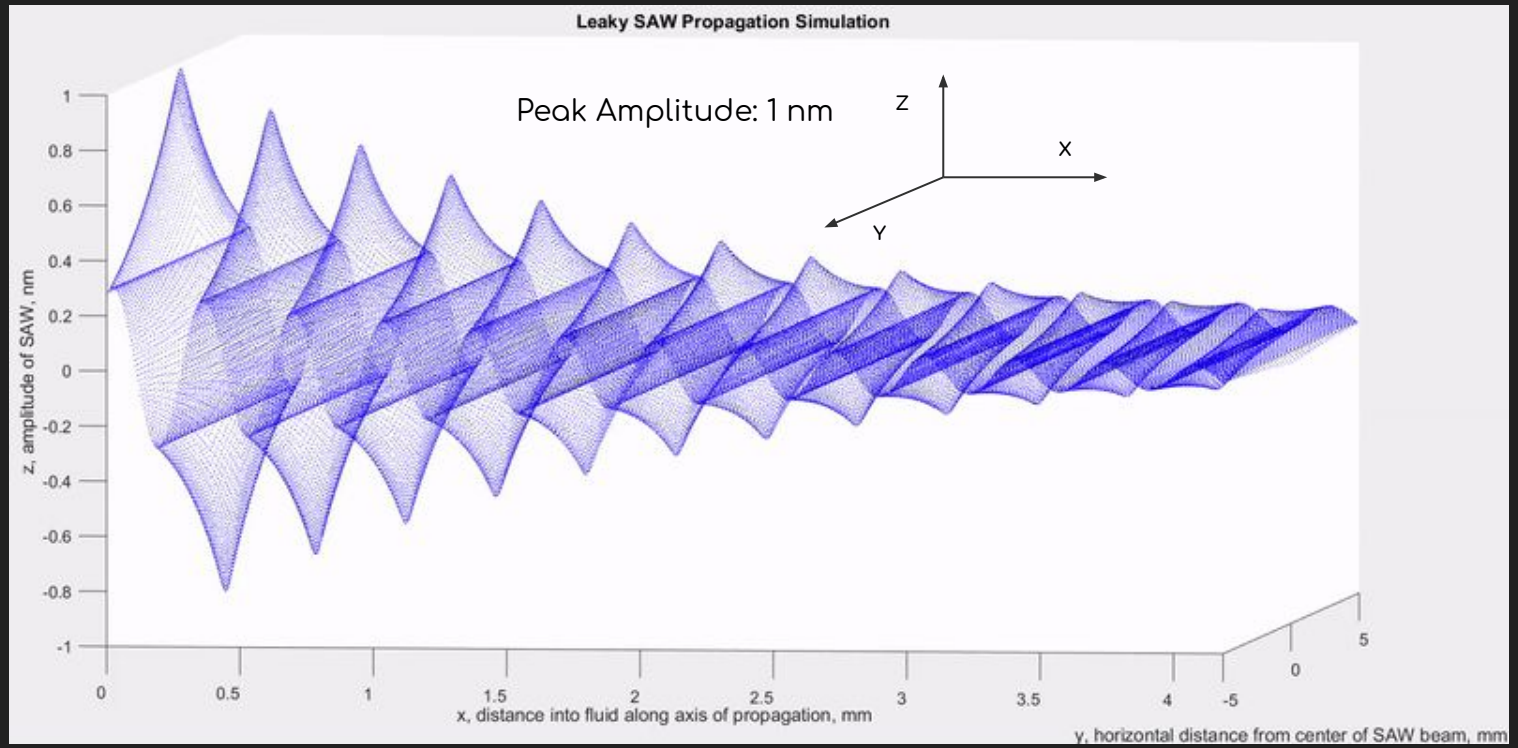
3D Assembly Model of SAWbot

Theory of SAW Propulsion



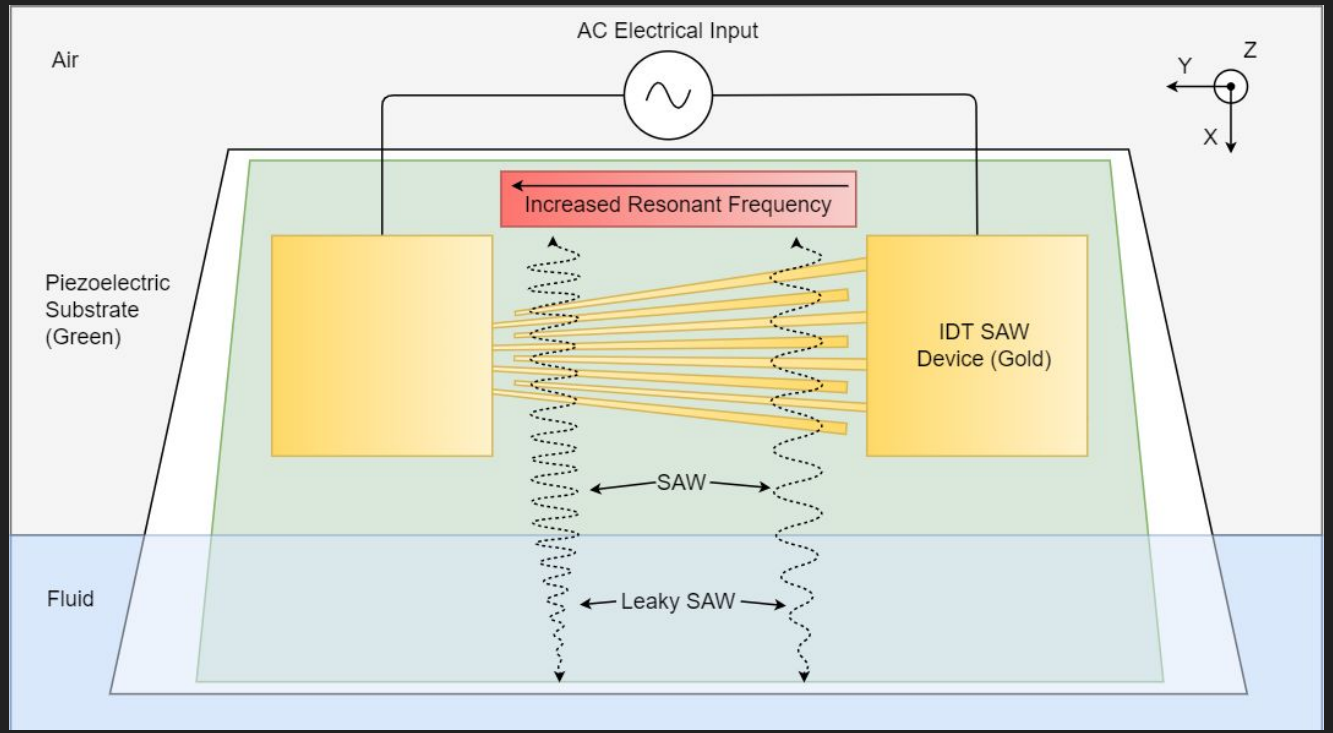
When a SAW enters a fluid, it Leaks energy into the fluid

Simulation Verifies Leaky SAW Behavior



3D MATLAB Animated Line Plot of Leaky SAW Propagation

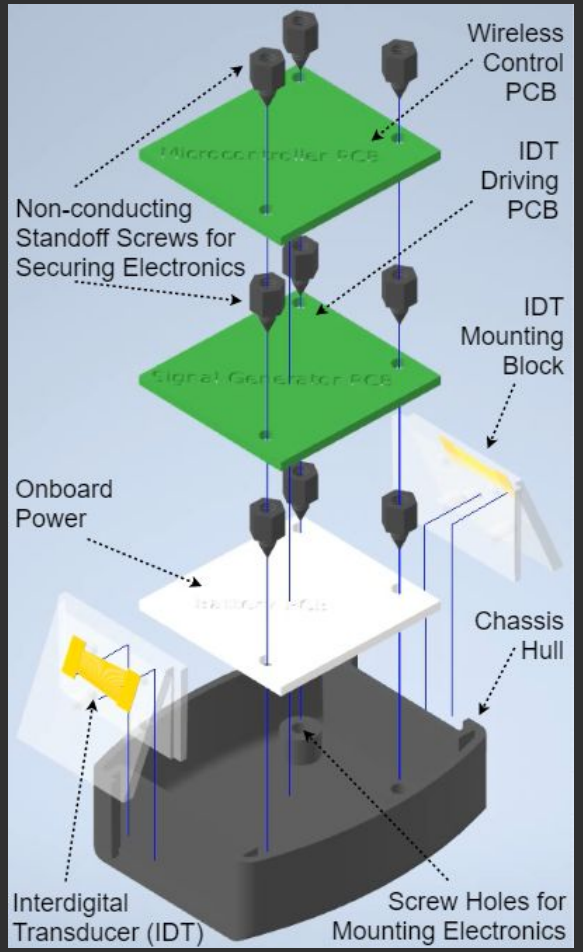
Interdigital Transducer (IDT) - SAW Motor



IDTs consist of a pair of interlocked electrodes atop a piezoelectric substrate that convert AC electrical power into SAW power

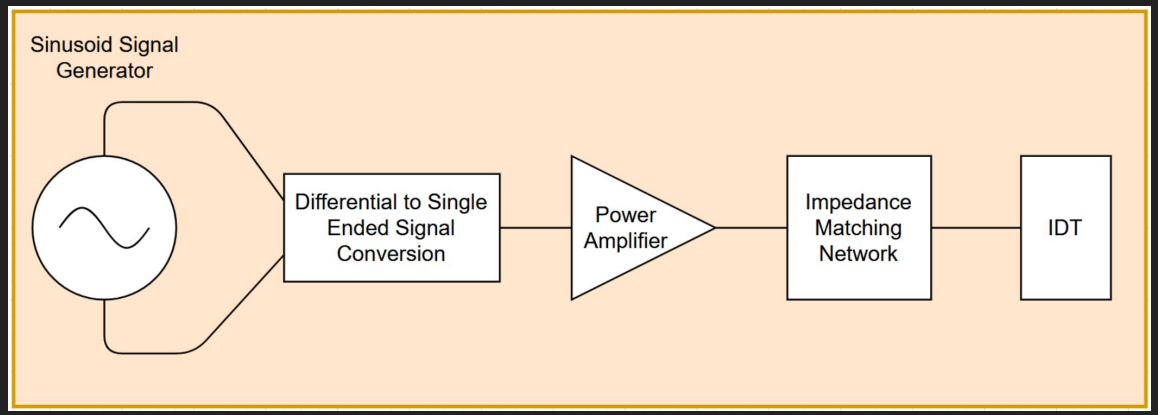
System Overview of SAWbot

- Wireless Control Board
- Wireless Power Board
- IDT Driving Board

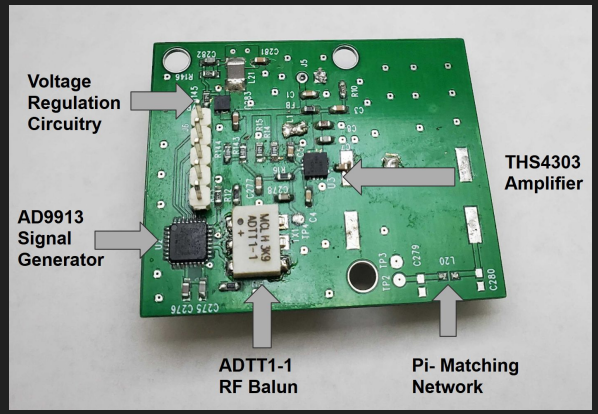


Expanded 3D Assembly Model SAWbot Components featuring the PCB Stackup and IDTs mounted to the Chassis

Accomplishing Onboard Signal Generation
Resulting in 1mN of Thrust

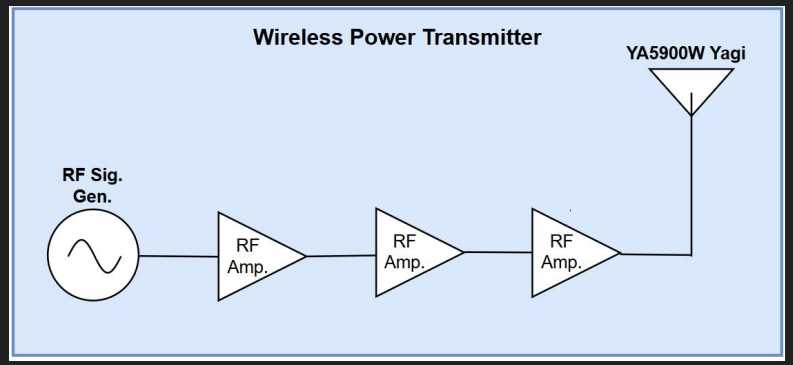


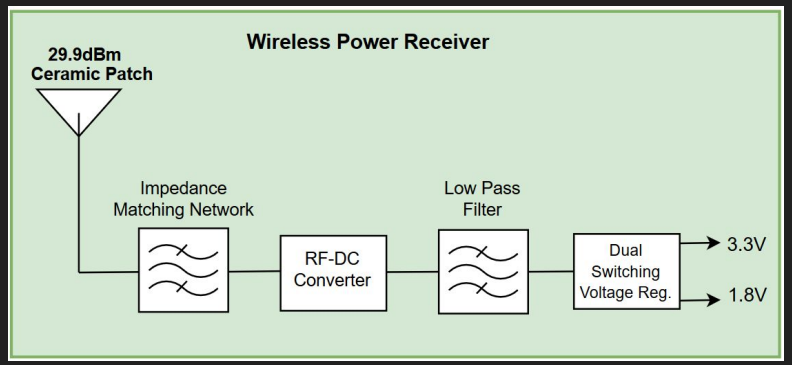
IDT Propulsion Module Block Diagram



Propulsion Board Top Layer View

RF Wireless Power Simulation Verified





- Simulation exceeds power requirements
- Verified using AWR RF Simulation
- Stays within FCC Regulations

SAWbots will Revolutionize Medicine

- Project Achievements
  - Simulated Wireless Power
  - Simulated SAW Propulsion
  - Physical Assembly of Bot
- Platform for novel form of treatments
- Reduced healthcare cost

UCSC NANOENGINEERING GROUP

Baskin Engineering
UC SANTA CRUZ

Dr. Yanik

Summer

Allie

Phil

Alex

Nic

SAWbots!
Q&A