

Pickle Pressure

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Professor Starling MW3 11-12:15

Client Problem Definition / Overview and Background

- Pickleball is one of the fastest-growing sports in America (Ready to Play, 2025). Over time, pickleball paddles degrade, but it's difficult to determine their condition because the internal structure is hidden beneath the outer layer. The client explained that this becomes a problem when a paddle breaks or underperforms during use, forcing the player to replace it at an unexpected and maybe inconvenient time.
- Our task was to develop a solution to this issue by creating a product that can tell a user how much their paddle has degraded and indicate when they should get a new one.

Recommendations and Future Work

- Include an on and off button so battery doesn't drain
- Building our own clamp
 - Allows us to use more sustainable materials
 - Brings down cost of production
 - Increases social, environmental, and economical sustainability
- Include expected healthy values for greater range of paddles
 - Allows everyone with any kind of paddle to use our product
 - increases social sustainability of product
- Do this by testing more paddles and gathering the data

Limitations

- Budget constraint = \$500
- Dimensional constraint = Able to fit inside a backpack, so max of 17"-18"(height) and 12"-14"(depth)
- Time constraint = Able to be used in under 5 minutes
- Where can the product be used, who can use it
- Materials = Only materials that can be ordered on the Bill of Materials
- Make product so that it can be used by a wide age range
- Type of paddle that this product can be used for: Carbon Fiber Face; Polymer Core

Success Criteria

- "Being able to make the best product at the most efficient cost, the cheaper the better." A successful product will be a product that solves the problem and does it at an efficient cost of both producing and selling. We wanted to make a product that would give consistent results and be able to be used by anyone.

Works Cited

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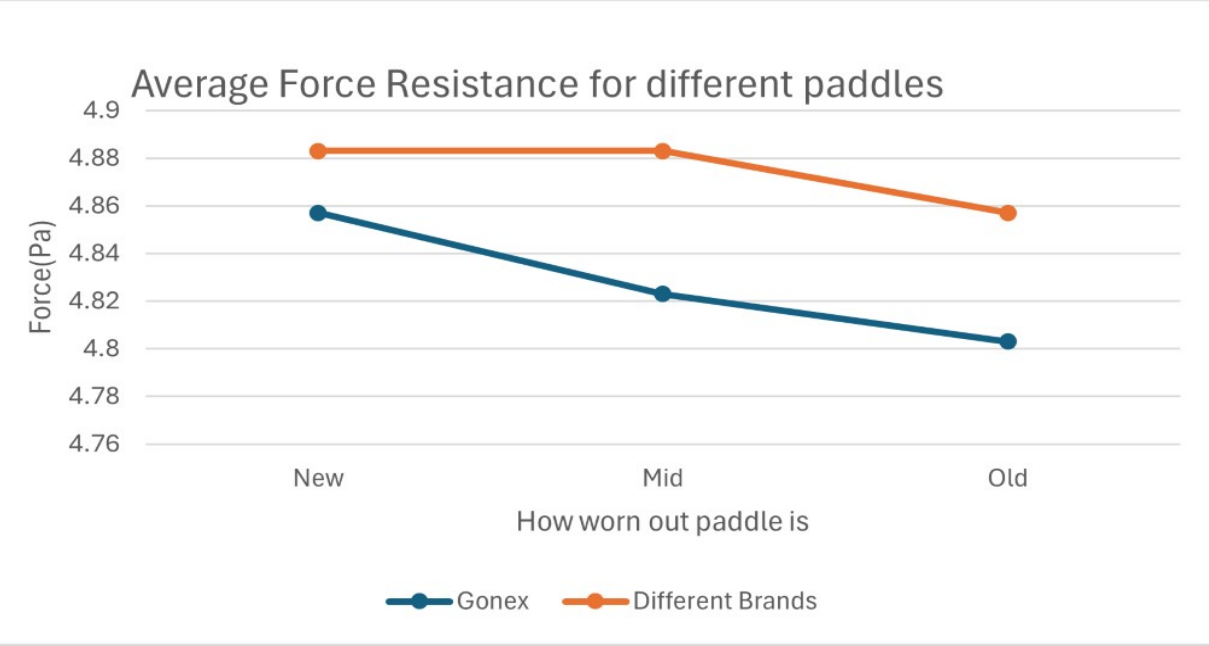
Solution Description

- Our solution is a pressure gauge that measures the force of resistance of the paddle when clamped at different points.
- We coded and wired so that the force of resistance would display in units of pascal on a screen.
- To make the system portable and user-friendly, we modified a clamp by designing and 3D printing models that house the battery, Arduino board, and wiring setup.
- Our device solves the common problem of not knowing when a paddle has worn down. It gives users a simple, consistent test for users to evaluate their paddles condition and make informed decisions about replacement.

Considerations in Design Process

- We used a 3D recyclable print material.
- We changed our CAD model design as seen in the image from the design on the left to the design on the right. This reduced the amount of material used.
- These two considerations made our product more environmentally and economically sustainable.

Testing, Analysis, and Conclusions



	Trial 1	Trial 2	Trial 3	Average
New #1 Gonex paddle	4.85	4.85	4.87	4.857
New #2	4.88	4.88	4.89	4.883
Mid #1 Gonex paddle	4.84	4.81	4.82	4.823
Mid #2 (Somewhat new)	4.87	4.90	4.88	4.883
Old #1 Gonex paddle	4.82	4.79	4.80	4.803
Old #2	4.85	4.86	4.86	4.857

- To conduct the test, we placed the paddle so that its center, the "sweet spot" was in contact with the pressure sensor. We tested a new, used and worn out Gonex paddle. Along with different brands of new, used and worn-out paddles.
- The data shows that the paddles which are more worn out don't apply as much force to the pressure sensor. This means our product can help users determine if their paddle needs replacing based on the force of resistance of the paddle. For the Gonex paddle we determined the healthy range to be above 4.82.
- Something else we noticed was that the force of resistance is not consistent across different kinds of paddles. This means that for our product to be used by everyone, not just people with Gonex paddles, we would need to test and collect data from new, used and worn-out versions of many kinds of paddles. This insight could inform a future version of the device that includes preset thresholds for different paddle types, or a database feature that users can calibrate against.

