Who is Babe Zaharias?
Mildred “Babe” Didrikson Zaharias was a remarkable woman athlete in the 20th Century known for her achievements in a multitude of sports. But this might just be an understatement…
• Born 1911
• Grew up in Beaumont Texas developing a talent for sports
• Recruited by travelling basketball team in high school
• Later competed in Amateur Athletic Union
• Won the whole tournament singlehandedly
• Qualified for Olympics
• Won 2 Gold and 1 Silver
• Dedicated herself to golf later
• Won 5+ tournaments

However, Babe was not without criticism…
“It would be much better if she and her ilk stayed at home, got themselves prettied up and waited for the phone to ring,”
– Joe Williams,
New York World Telegram

Despite the likes of commentaries such as those, Babe persisted in her love of sports being ultimately voted Female Athlete of the Half Century.

Why do we Want to Replicate Babe’s Medals?
Through this research, we aim to replicate Babe’s life through her achievements to inspire future generations

• A.A.U Medal (left)
• Medal of Freedom (right)

However,…

The medals cannot directly come into contact with mold-making materials due to potential damage

Therefore, a replication method must be identified where minimal/no contact is made with original medals

Four non-contact replication methods were explored:

Hand Crafting
Approach
Use taken measurements and create medal by hand-sculpting using polymer clay and available tools

Benefits
• Model is being created in a directly physical manner. Thus, the physical product will be readily available when model is finished, unlike digital which need to be 3D printed.
• Oven bake clay is inexpensive and readily available

Limitations
• Model is limited by creator’s sculpting ability
• Lack of precision in geometric shapes may result from human error or warping of clay when baked
• Inability to recreate fine detail due to size of detail within both the medal (within eagles of medal of freedom)

Photogrammetry
Approach
A series of photographs taken from sequential angles were uploaded in the Photogrammetry program Meshroom. The program then interpreted and composed the two-dimensional photographic data into a three-dimensional model.

Benefits
• Many photogrammetry programs are either inexpensive or free and are readily available for the general public
• Hand labor is reduced significantly in constructing base of model
• Fine detail can be made larger and thus can be dealt with at a manageable scale

Limitations
• Resulting model needs minimal cleanup
• Detailed scan is not readily available to the public
• Surface of medals designed to reflect light may hinder ability for photogrammetry program to capture details

Digital Sculpting
Approach
Use available digital sculpting and modeling software to create the geometric base of the medals and add subsequent details with made digital stamp of the design

Benefits
• Geometric shapes are premade
• Specific shapes can be made within an illustration program readily imported into the 3D program
• Hand labor is reduced significantly in constructing base of model
• Resulting model needs minimal cleanup
• Fine detail can be made larger and thus can be dealt with at a manageable scale

Limitations
• Digital sculpting and modeling programs used are free and publicly available
• Geometry required to scan and imprint medals

Profilometry
Approach
Use the information of reflected light to accurately profile the surface of the medals

Benefits
• High detail scan of what could be rendered

Limitations
• Highly expensive
• Not readily available to the public
• Steep learning curve for new users
• Surface quality of object may interfere with the profilometry ability to scan it
• Exported information resulted in raw data points instead of perceived rendered model
• Rough scan quality needing extensive cleanup
• Prolonged scanning time on items longer than a few centimeters
• Weather may hinder ability for coordinating parties to travel to facility

Next Steps
So, to minimize risk of damage to the historic pieces, and create an accurate replication, the following non-contact replication method is proposed:
1. Recreate the geometric base through digital modeling
2. In digital sculpting programs create a digital stamp of the detail
3. Stamp detail were needed
4. Layer on profilometry scans to guide detail refinement
5. 3D print the recreation
6. Use 3D printed model to create the mold
7. Cast the resin within the molds
8. Hand paint resin castings

Ultimate Importance
By exploring non-contact replication, we not only are one step closer to echoing Babe’s achievements to the public but may also contribute to expand the use for other impactful historical pieces.

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The Babe Zaharias Medals:
Exploring Methods of Replication for a Promising Non-Contact Based Approach
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