

INTRODUCTION

Thousands of Burmese refugees, displaced by the civil war and impacted by the COVID-19 pandemic, struggle to access healthcare in Thailand due to their lack of immigration status. The Burma Children Medical Fund (BCMF) [1], based in Mae Sot, Tak, Thailand provides medical support to these communities, focusing on funding medical treatment and providing support services for underserved Burmese communities.

What BCMF does:

- The BCMF prosthetics project makes custom-fitted, low-cost, body-powered, and 3D-printed prosthetics that work best in low-resource settings using open-source designs (fig. 1).

Recipient preferences:

- The usage of prosthetic arms, however, depends heavily on their functionality and comfort, with patients more likely to use them if they help them return to normalcy and reduce family burdens.

Problem with the current BCMF prosthetics:

- The current open-sourced, body-powered prosthetics are passive and only allow for fixed hand positions, which limits their functionality.

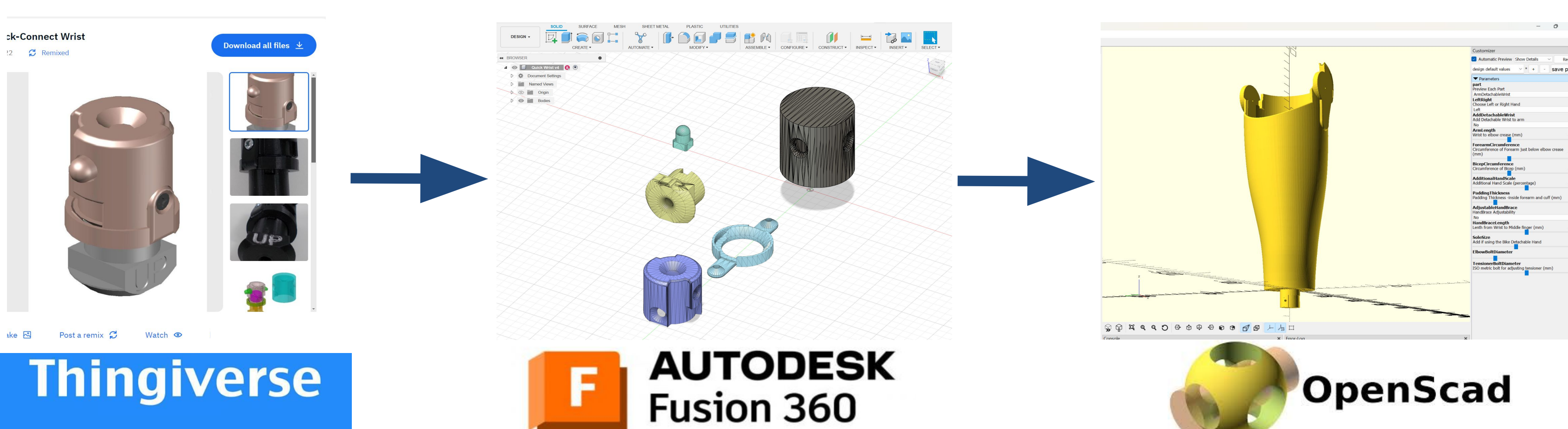
Our objective was to **design an interchangeable hand** to assist with various daily tasks and **enable critical rotational movement**, improving functionality and comfort for users.



Fig. 1: BCMF patients using the existing open-sourced 3D-printed prosthetic arm.

METHODS

The open-source model from Thingiverse is the Kwawu Arm 2.0 [2] which provides an OpenSCAD [4] file for adjusting the model to the recipient's measurements. The interchangeable wrist model was created using designs from NIOP v1 and v2 Quick-Connect Wrist [3], and the 3D design software, Autodesk Fusion 360. Without changing BCMF's workflow, the wrist was merged onto the Kwawu Arm and the model is then 3D-printed, assembled, and tested. This was an iterative process where patient feedback ensures the prosthetics cater to the diverse needs of the recipients.



RESULTS

Since the launch of the prosthetics project in 2019, BCMF has provided 3D-printed prosthetics to 76 patients. The new interchangeable hand provides a solution to many patients' everyday activities and can rotate 360 degrees. Figure 2 shows the rotation of the gripper hand attachment and Figure 3 shows some of the different hand attachments that are suitable for the arm.



Fig. 2: 360 degrees rotation of the gripper hand attachment (90 degrees shown).



Fig. 3: Different hand attachments that are suitable for the arm.

CONCLUSIONS

This project provides a **low-cost solution to healthcare challenges** in the context of **poly-crisis** experienced in Myanmar, enhancing the resilience and adaptability of affected refugee communities.

Our work highlights the importance of affordable and accessible prostheses in conflict-afflicted regions. The collaboration between BCMF and Queen's University demonstrates the potential for future partnerships between educational institutions and NGOs to address health care access disparities.

Future work includes:

- Continuing to fill the gap between open-sourced models and patient needs to refine the 3D-printing workflow by creating customizable, generalized designs to promote a more equitable future for those affected by limb loss.

REFERENCES

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