

UNiV: Universal Footwear for All

University of Michigan  
Honors Capstone Project  
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## General Background

Honduras is a Central American country bordered by Guatemala, El Salvador, and Nicaragua. There are approximately 9.5 million inhabitants and the capital of the country is Tegucigalpa [1]. Similarly, San Pedro Sula, which is a city located in the north coast of Honduras, is also considered an important city in the country as there are a lot of commercial and industrial contributions to the country in that area. According to the Encyclopedia Britannica, about 90% of the population are mestizos, which is a mixture of Spanish and Indian. The official language of Honduras is Spanish, and the majority of the people live in rural areas. [1]

Ethnic composition (2000)

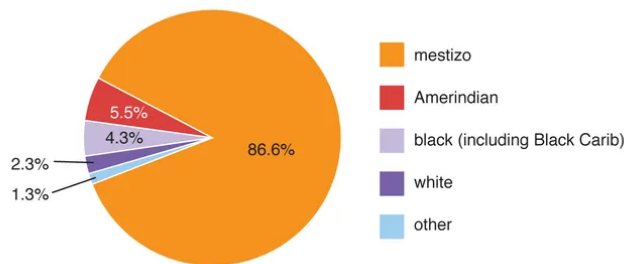


Figure 1: Ethnic composition in Honduras (2000) [1]

Honduras urban-rural (2018)

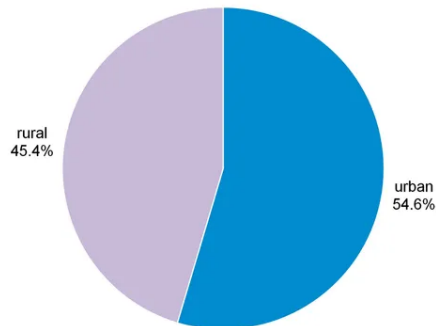
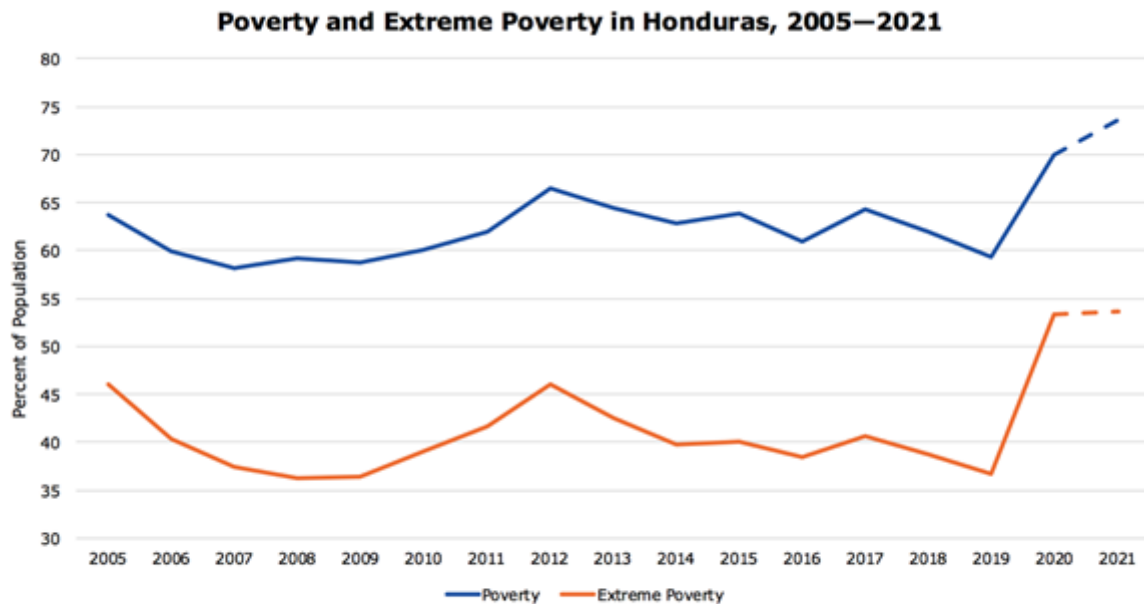


Figure 2: Population distribution in rural and urban areas in Honduras (2018) [1]

## Poverty in Honduras

For more than 20 years, Honduras has been struggling against poverty. According to the Borgen Project, the main root cause of the poverty in Honduras is due to the wealth distribution and low income. Additionally, about 48.2% of the population live below the poverty line and about 40% of the population is unemployed or underemployed. [2]



**Source and notes:** Instituto Nacional de Estadística (INE) & Universidad Nacional de Honduras (UNAH). The Honduran government does not have available poverty figures for 2020; 2020 figures are UNAH estimates. The 2021 figures are INE estimates through July, 2021.

Figure 3: Poverty and Extreme Poverty in Honduras from 2005-2021 [3]

Another factor that has been affecting the economy and the wellbeing of the country is violence. The violence, especially between the gangs, has been an ongoing problem in the country that almost 200,000 children stopped attending school between 2014 and 2017 [2]. With this in mind, it is difficult for children to attend school and even enjoy their everyday life. Not only children, but adults also struggle to oblige with their daily duties, such as going to work. Unfortunately, the gangs are still expanding thus the crime rate and poverty rate are increasing as well.

Adding on to the problem, political instability has been a huge cause of poverty as well [2]. The country’s system of holding elections has been poorly executed and there has been a lot of doubts of fraud and manipulation behind the election process. For example, in 2017, the elections got delayed due to a “power outage”, and there was a controversial outcome where the candidate Juan Orlando Hernandez managed to win the elections after being behind Salvador Nasralla before the “power outage”. This issue caused a huge protest and a national strike throughout the country, where many people died and got injured.

### Temperature in Honduras

Honduras is located near the equator, therefore the country is generally hot most of the year. According to Tripsavvy, the average temperatures in Honduras range from 82 degrees Fahrenheit to 87 degrees Fahrenheit [4]. Additionally, hurricane season starts from June to November and

they usually start from the Caribbean Sea [4]. Although the spring in Honduras can be dry and warm, there are occasional thunderstorms and heavy rain during the summer as well.

Average Monthly Temperature, Rainfall, and Daylight Hours			
Month	Avg. Temp.	Rainfall	Daylight Hours
January	78 F	0.2 inches	11 hours
February	81 F	0.2 inches	12 hours
March	85 F	0.4 inches	12 hours
April	86 F	1.7 inches	13 hours
May	86 F	5.7 inches	13 hours
June	84 F	6.3 inches	13 hours
July	82 F	3.2 inches	13 hours
August	83 F	3.5 inches	13 hours
September	83 F	7.0 inches	12 hours
October	81 F	4.3 inches	12 hours
November	79 F	1.6 inches	12 hours
December	78 F	0.4 inches	11 hours

Table 1: Average Monthly Temperature, Rainfall and Daylight Hours in Honduras [4]

**Problem and Motivation**

As mentioned above, Honduras faces many challenges, such as poverty, violence, and even extreme temperatures. Due to these hardships, many people don't have access to basic necessities such as water, food, electricity, clothing, and more. From my personal experience, I have witnessed many people living on the streets, walking barefooted in extreme temperatures, and begging for money. It has been difficult to witness this, as I have always believed that we all deserve to have access to basic necessities and opportunities in life.

At an early age, I have always wanted to help the country recover by giving back to the community. I have participated in numerous charitable organizations and attended multiple brigades in rural areas. I am passionate about giving back to the community and helping the people in need, and my dream has always been to create a product that could help the country, even if it is in a tiny bit.

## Initial Brainstorming

In order to come up with the best idea, I brainstormed some ideas that could potentially help the people in need in Honduras. The 4 potential areas that I believed it would help the Honduran society improve were: providing the people in need with shoes, clothing, access to education, or transportation. With the help of my local high school, I could collect 82 responses from Honduran students. As seen from Figure 4, 31.70% of the students thought that providing the Hondurans with shoes would have a greater impact. Equally, 31.70% of the students also believed that providing them with clothing would have a positive impact in their lives. Additionally, 30.50% of the students voted for providing Hondurans access to education. Last but not least, a small percentage of them voted for transportation.

Although I strongly believe that these are 4 potential products and ideas that could help the people in need in Honduras, clothing and shoes were the top choices from the survey. However, I decided that I will choose the idea of designing a shoe that will help the people conduct their daily activities and ensure their comfortability and safety. The main reason that I chose shoes over clothing is because there are many charitable organizations in Honduras that collect unused shirts to donate. Although many shoes are donated as well, they tend to be in a poor condition that doesn't last too long.

Which product/innovation/idea do you think will have a greater impact to the people living in poverty in Honduras?

82 responses

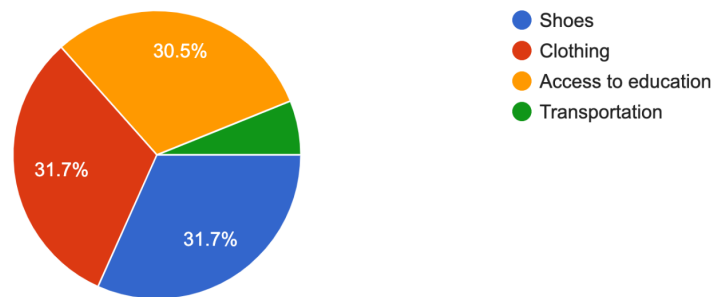


Figure 4: Initial Survey Results

## **Purpose**

UNiV (Universal Footwear for All) is a shoe made with sustainable and durable materials that is specifically designed to withstand extreme temperatures, surfaces, and conditions. Its purpose is to help the people in need in Honduras and provide them with footwear that ensures comfortability, durability, and safety. My main goal is to distribute UNiV throughout the rural areas in Honduras to the children and adults that don't have access to footwear.

## **Design and Methods**

### ***Materials***

According to Earth Friendly Shoes, sustainable products help the Earth produce less waste and pollution and additionally works towards ending poverty and world hunger [5]. With this in mind, UNiV will be made of 100% recyclable materials where almost 70% of the shoe is made of recycled car tires, butadiene rubber and styrene butadiene rubber, and recycled rubber. Most of the rubber will be obtained from junkyards, car repairing shops, and donations. Additional rubber will be obtained from superstores and retail shops.

According to BassTech International, styrene butadiene styrene is an excellent choice for footwear because it is strong, flexible, and even waterproof [6]. Throughout the territory of Honduras, there are a lot of unused tires that are thrown away across the junkyards and car repairing shops. Unused tires can damage the environment as a whole because it can catch fire and release harmful chemicals into the soil as they break down [7]. However, these unused tires can be recycled and used for a greater purpose. Some well known shoe brands that use recycled tires are Timberland, soleRebels, and Brave Soles [7]. Generally, rubber serves as a great sole for shoes. It is proven to be flexible, offers cushioning effects, has a good abrasion resistance, and allows the shoe to have versatile designs [8].

Some other benefits of rubber shoes include [9]:

- Protection from falling objects
- Prevents slipping and falling
- Protection from high temperatures



Figure 5: Junkyard in Honduras near Valle de Ángeles in Tegucigalpa [10]

### *Design Details*

I used SolidWorks in order to create the first prototype of the shoe. As seen from Figure 6 and Figure 7, the upper part of the shoe consists of a mix of recycled rubber, recycled tires, butadiene rubber, and styrene butadiene rubber. This will ensure the protection, flexibility, and durability of the shoe. The outsole of the heel is made of natural rubber, which will ensure a stronger grip on slippery surfaces and protect the user from burns and exposure to high temperatures. The outsole of the tip of the shoe is made of natural rubber as well in order to protect the user from falling objects and for shock resistance. Both the insole and the midsole consist of both natural rubber and recycled tires in order to absorb impact forces and provide comfortable cushioning to avoid injuries and pain.

In addition, there are three main reasons that UNiV is a laceless shoe. First of all, it is less dangerous and hazardous. For example, many children and teenagers enjoy doing outdoor activities, and if the shoe is not properly laced, they can get tangled and fall, which can lead to injuries. Second, it helps the user save time, as they will not worry about tying up laces or constantly being worried if the laces are tied correctly. Last but not least, laceless shoes tend to be more comfortable than laced shoes. As long as it fits the user perfectly, one can easily slip it in or out without doing much effort.



Figure 6: Top View of UNiV

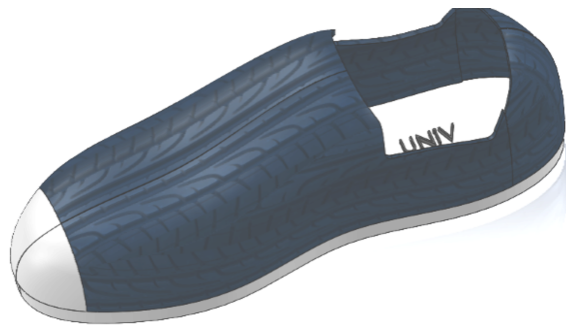


Figure 7: Side view of UNiV

### ***Partnership***

In order to launch UNiV, I have communicated with Dubear, which is an Honduran activewear brand. After presenting the idea and purpose of UNiV, the design and concept of the shoe was approved by the owner in March 2022 and it is planned to launch the first UNiV in June 2022. This partnership is crucial, as Dubear will be in charge of the production process. Both parties agreed that some materials and funding will be needed from my end in order to initialize the production process as well. The cost of production will vary depending on the amount desired and the shoe sizes. The average cost of one shoe is about \$15.50, assuming that all materials are bought. However, the production cost can be cut in half if the materials are acquired through donations and junkyards.



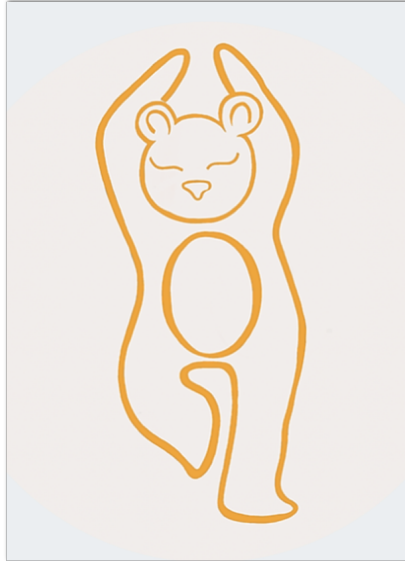


Figure 8: Dubear Logo

### ***Funds***

Three main sources will be used in order to receive additional funding for the production process:

- 1) Gofundme page
- 2) Local charitable organizations + local high school organizations
  - Contacted five local charitable organizations and gained approval from two of them
  - Contacted my local high school and gained approval from the senior class for funding
- 3) Donations
  - Additional donations received from friends and family members

### **Future Work**

Although a lot of progress has been made, there are still some pending tasks that need to be done.

- 1) Visit Honduras on May 24th to launch and finalize production details with Dubear
- 2) Scheduled to meet with 2 local charitable organizations in June to distribute the product and get funding/donations
- 3) Attend meeting with a professional designer on July 1st for recommendations, improvements, and new design ideas
- 4) Attend and volunteer in medical brigades in Honduras throughout May to June to distribute UNiV

## **Conclusion**

Throughout the project, there were multiple times that I struggled with communicating with Honduran organizations. The project was planned and done in the US, so the main source of communicating with them was through phone calls or emails. Most of the charitable organizations did not answer or were hesitant about discussing details through email or phone. I understood the challenges of communicating overseas and coming to an agreement through a virtual environment and I was able to overcome this challenge by contacting local Honduran connections that could boost my credibility and trust to the organizations.

Additionally, I learned how to merge my industrial engineering skills and entrepreneurship skills to create a product that can potentially change someone's life in Honduras in a positive way. Although this project isn't fully done, I am fully confident that my effort and hard work will pay off and will raise awareness of the situation in Honduras.

As a final note, I want to thank Professor Yili Liu, my faculty advisor, for all the help and tips received throughout the process. I want to also thank Rachel Armstrong and the Engineering Honors Program for giving me the opportunity to reach my dream of giving back to the community.

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