Peru Project
IPRO 325B
Developing Affordable & Sustainable solutions for the world’s rural poor
TEAMS

August Sylvain 4th yr biology
Luis Adrianzen 3rd yr electrical engineering
Guadalupe Cortes 3rd yr architectural engineering
Steven Kwon 3rd yr architectural engineering
Livia Lay 4th yr architecture
Justin Lim 4th yr architecture
Katrina Ongchangco 4th yr architecture
Jacob Williams 4th yr architecture
STATEMENT OF PROBLEM

Inhabitants of the southern Andes regions in high altitudes suffer from a common phenomenon known as friaje which affects the livelihood of the people, their animals, and their crops.

*friaje*: when polar winds blow from the mountainous south.

In 2003, when temperatures dropped to -35 degrees centigrade, fifty children died, and as many as 13,000 people suffered severe hypothermia, bronchitis and pneumonia.
Objective
Create an affordable and sustainable home design for regions in the Andes affected by *friaje* using locally available materials and passive design strategies.
IPRO 325 HISTORY

- evaporative cooler
- barrel rocket stove
- water pre-filtration system

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weather conditions
percepción

local materials

Adobe
Bamboo
Animal skin
Straw bale
Corrugated metal

Passive design

Location
Orientation
Radiant heating
Cavity wall

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CURRENT CONTACTS

• Marisela Perez
  – IIT-Sincape coordinator

• Professor Duffy
  UMass Lowell Professor
  Expertise: Mechanical engineering, control systems science, solar engineering, environmental engineering, education, statistics and manufacturing systems

• Manuel Heredia
  UMass Lowell Student
  PhD candidate in mechanical engineering

• Ursula Harman
  – GRUPO (Grupo de Apoyo al Sector Rural) at the Catholic University of Peru in Lima
  – Her Students Participate in rural community relief programs

• Lupita Montoya
  – Professor of engineering in Troy, NY
  – She and her student do work in Languí Peru an Andean Town
DESIGN CONSIDERATIONS

Improve current living conditions

Produce & maintain heat within the home

AFFORDABLE

Locally available materials, simple construction

SUSTAINABLE

Familiar construction methods, available materials

User-centered design

Needs of the user come first, culturally sensitive, understand rituals and habits of user

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**DESIGN**

**IMPROVE CURRENT LIVING CONDITIONS**

Provided an increase of over **1000%** R-value in the exterior walls

Current home: **4.35**  New design: **57.85**

*R value insulation ratings are used to measure insulations ability to resist heat flow.

**AFFORDABLE**

Current home: **$1,470**  New design: **$2,475**

*Other groups concerned with the same project have spent upwards of $7,000

**SUSTAINABLE**

Typical adobe construction using familiar materials such as; adobe, straw bale, bamboo, corrugated metal, etc.

**USER-CENTERED DESIGN**

Incorporated use of cooking stove with radiant heating, enabling a typical daily event to contribute to radiant heating.
Design cont.

Wall section:
- Lined Bamboo
- Straw Bale
- Adobe Bricks
- Sand and Stone Foundation
- Ground Level

Floor plan:
- Bedroom
- Kitchen
- Living Room
- Dining Room

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sun exposure from the north

winds from the south

intake

N

Design cont.
Obstacles

Obtaining information on materials and their cost.

Contacting informants in Peru

Finding a target site

First semester to begin this project
WHAT’S NEXT?

Test design in similar weather conditions
Modify design as needed
Create manuals for construction of design
Build prototype in Peru
Observe, receive input, and modify as needed
A SPECIAL THANKS TO...

OUR CONTACTS
Marisela Perez
Professor Duffy
Manuel Heredia
Ursula Harman
Lupita Montoya

OUR PROFESSORS
Dr. Kenneth Schug
Dr. Margaret Huyck
Prof. Linda Pulik

THE IPRO OFFICE

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QUESTIONS