Deutsche Bank Challenge II UTEC Student Proposals

Group 1

Title of the project: Slippery calamines

Summary of the project: The issue: Now a day, in the Highlands, most of the houses roofs are made of calamines. The problem there is this: when it rains, the calamines rust and then they break up (finally it rains inside the house because the calamine is broken). Even if the calamines are laid in a position that facilitate the fall of the raindrops, not all of the drops fall (we have tested that)

Our idea: We want to create a substance which, when you apply it to the calamine, it repels the water, so when it rains, the raindrops are repeled automatically and then the calamine doesn't break.

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Group 2

Title of the project: Thermal insulation system for protection of animals during frost season.

Summary of the project: Exist a big problem in Peru because every year the phenomenon of frost affects animals, causing diseases even death. As we know, these animals (camelids) are the main source of income for villagers in Peruvian highlands (fur and meat) then if these animals die, the population will not get any profit now and after a long time. In other side, we know that there exist a material in these regions called Ichu, it's a grass that abundant in the Andes of Peru. Also some roofs of highland's houses were built with this material but this material can be improved in terms of durability. In fact, exists recent investigation about its properties like an insulating material. On this basis we propose to create a low cost housing using ichu, recycled materials for the protection of animals in the season from April to December.

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Group 3

Title of the project: Transformation of methane gas into energy using biodigesters.

Summary of the project (a few lines): Farmers all around the country do not use the excrement from the animals at all and they are just thrown away. Many farmers do not live in good conditions so using biodigesters would help them solve heat problems in cold areas, or using
the energy in any form so they can have good living conditions. Biodigesters materials, installation and maintenance is relatively cheap so the viability of the project is really good.

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Group 4

Title of the project: Solar Cooker for Low Income Andean Highlands

Summary of the project: At Andean low income towns, most people don't have a good quality of life. This is caused by many reasons, some of them are the health problems (such as respiratory and ocular ones) they suffer and the pollution of the environment where they live. There are many conditions that generates this problem, but the one we are focus on is the traditional way of cooking, the use biomass as fuel in closed rooms. In order to propose a solution, we analyze the resources of the region. According to SENAMHI 1 “Andean region register extreme index of solar radiation”. This is a resource could be exploited but nowadays isn’t. The Andean region is also rich in other natural resources such as livestock and plants like ichu. In the other hand, the alimentary industries use an alloy of aluminum in the material form which snack 2 bags are made, it is named metallized mylar. According to the peruvian rules, the snack bags must have as minimum a reflection index of 88%. The snack bags are currently classify as non recyclable material, but this is a good opportunity to start recycling them. In order to solve this problem and to start reusing the snack bags, we proposed the development of a solar cooker made of recycled and local materials, that works better than the traditional cooker from the Andes and that can be easily detachable. The objective of this project is to implement it and replace the traditional cooker in the Andean low income towns with high solar radiation; in collaboration with regional governments and alimentary industries that use brightness aluminium foil for snack bags. Last year, we worked on a solar cooker with three main parts: the Scheffler reflector, a support for the Scheffler, and a base for the pots. After designing it, we built four prototypes of the Scheffler reflector and one of its support. Tests on many different recycled and reflectant materials were made and the conclusion was that, among all the ones tested, the snack bags’ material is the one which best fits for this situation. Also, the prototypes helped determined the best materials for the Scheffler in order to resist the atmosphere conditions of the region. Now, based on the prototypes realized, the following steps in this phase are:

- Redesign the solar cooker based on the tests’ results.
- Optimize the time of cooking of a solar cooker in comparison of the cooker that use manure and stubble or other biomass as fuels.
- Decrease its size.
- Look for local materials that could be use on the solar cooker.
- Do a manual for the user which explains the fabrication and use of the cooker.
- Implement the solar cooker in Quehue (Cuzco) and later in another Andean regions.
- Improve the design according to the feedback we received from Quehue.

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Group 5
Title of the project: Interactive toy for non-native english speakers

Summary of the project: There is no denying that many people debate on such controversial issue as the poor quality of education that Peruvian children receive in rural zones, especially at the time of learning a new language. Many people reckon that this problem should be addressed by investing more funding in teachers and sending them to those regions. However, we strongly feel that by creating interactive toys, the learning of a language will be easier and faster for kids.

First and foremost dealing with the issues surrounding the poor quality of education at the time of learning a new language is best solved by building an interactive toy that could make kids listen and speak. For instance, linguists seem to be in agreement that a language is best learned if you first listen to it and then speak it. To give a clear example, Pimsleur is arguably one of the best ways to learn a language. Its simplicity really appeals to us. Nevertheless, just listening to an audio could be very boring for children. Therefore we want to create an interactive toy that would make kids learn a new language by playing at the same time.

The toy will be very simple with a mini computer inside such as an Arduino or Raspberry. The toy needs to be cheap but efficient. The toy must speak both English and Spanish since in Spanish it will give the instructions and in English it will give the sentences that the child needs to repeat. It is also of utmost importance that the toy has accessories in order to make it more fun for the children to play with it.

I hope that someone will be interested in this project since this issue of learning a second language is important in both countries Peru and the USA. I must also say that both my partner and I are in the top tenth of the entire mechanical engineering program and we use English at an advanced level. We are also highly-motivated in solving issues in education given that we believe that the only way to be a first-world country is by fostering education in our children since they represent our future. We are looking for people who are highly-knowledgeable in programming languages and in electronics. Looking forward to hearing from you.

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Group 6

Title of the project: Save energy and resources when boiling water.

Summary of the project: Save energy and supplies (gas ) when you want to boil water, use of new methods for boiling ( A new boiler design) or purified ( filters ) water and make it drinkable for people.

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Group 7

Title of the project: Refrigerant Walls to solve the problem of thermal comfort in low-income homes on the coast
**Summary of the project:** Faced with increasing temperature due to wing pollution, greenhouse and other, the need to use cooling systems, including systems that consume a lot of energy to lower the temperature of a room, there are similar systems for Unfortunately emit pollutants into the environment, posing a problem in both cases because the increased energy consumption from the mains involves CO2 emissions, and added to this harmful substances consigned simply worsen the situation of environmental pollution has an effect Direct increase in temperature.

To solve this problem it is proposed to develop a system that reduces energy consumption aimed at cooling indoor, and prevent the emission of polluting substances into the environment. The system consists of an array of materials, outside a material which allows the thermal insulation is used, such as rigid polyurethane foam, an inner wall that is a good conductor of heat, between the two walls a system that was implemented let cool the inner wall by forced convection (through a system of internal irrigation), using water from the network, in a closed cycle to prevent loss of the same, thus can dissipate more heat than convection using natural, and using a water pump ½ HP.

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**Group 8**

**Title of the project:** Floating Malaria Health Center (the title can change)

**Summary of the project:** Our project consists of developing a floating health center for diagnosis and treatment of malaria using local low cost materials. It would be located on the bank of rivers because people from the jungle consider them a water source and need to be near to them. The station, whose dimensions would not be over than a LPG cylinder’s ones, would include a system for automatized blood sampling and would diagnose using Rapid Diagnosis Test or Lab on a Chip technology. New cases would be informed to a nearby health facility and a first dose of the medicine (e.g. chloroquine) would be handed to the patient. Our idea would provide a point-of-care service to those who do not have access to health centers. About logistical topics, Instituto de Enfermedades Tropicales Alexander Von Humboldt can help us about making contact with some village which the prototype would be tested in.

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Members Fabricio Espinoza, student at Energy Engineering (UITEC) Marco Malaga, student at Medicine (USMP) *Mentor: Julio Valdivia-Silva, PhD, researcher at Bioengineering (UITEC)*

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**Group 9**

**Title of the project:** Mechanical water Pump

**Summary of the project:** According to the ministry of health there are 179, 852 episodes of DDA (diseases diarrheic acute) in Peru (2015). The project have the goal to improve the quality of life of the Peruvian communities without piped potable water through the design and manufacturing of a mechanical water pump. It will transport the water
between closed containers to the places where people usually use water inside their shacks (kitchen and laundry) to prevent diseases produced by pollution and the mosquito “Aedes Egypti” (illnesses like dengue, chikungunya and zika).

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