STEAM Punks
Michael Kalil Award Application
February 15, 2014

Statement of Interest: *description of issues and applicant's interests relevant to the design intersection of natural and technological systems and their general relevance to the Project Proposal.*

Afghanistan is within a period of rebuilding after over three decades of war. 63% of Afghans are under the age of 24. 42% of them are between the ages of 0-14 (Factbook, 2013). Many positive changes have occurred since the 2004 presidential elections. "Today there are 10 million Afghans enrolled in school, 40% percent of them are female"(NPR 2013). However the pedagogical approach in Afghan schools is to teach through route memorization. This approach does not support the exploration and observation of the natural world or that of design and technology. Based on this knowledge Shabana Basij-Rasikb the creator of the School for Leadership Afghanistan (SOLA) asked the following question in a 2013 talk in New York City: "How will you develop the next generation of leaders and thinkers if you are teaching them through route memorization"? A second question emerges from the one above; How might we provide an educational experience that supports the development of critical and creative thinking skills to young afghans who live in Kabul?

The cultivation of creativity and critical thinking skills among young afghans is necessary to support the development of strong leaders. Leaders are especially needed in the political, educational, economic development, and environmental sustainability sectors. As the country continues to re-build infrastructure and the economy the protection of the environment must also be a priority. To support the efforts of the government of Afghanistan to reverse the degradation of natural resources, which has occurred due to the dependence on poppy exports, poverty and war it is necessary that the younger population observe the natural environment and be able to critically think about how to solve related issues in the future. Young afghans must also be aware of the benefits of recycling and repurposing existing electronic materials to learn about technology.

2. Project Proposal: *detailed description of the proposed project, research, or course of study.*

In order to provide an educational experience that supports the development of critical and creative thinking skills, the observation of the natural world and the ability to identify and repurpose old electrical components to young afghans who live in Kabul, STEAM Punks kits were developed. STEAM Punks kits allow for children ages 6-18 in Kabul to explore technology and design through making. With these acquired skills students can explore the intersection of design, technology and the natural world by observing, identifying and solving environmental problems. In addition the kits encourage students to recycle electronic parts when creating additional projects. These kits utilize a student centered approach that eliminates the need for direct instruction by a teacher. The overarching goal of STEAM Punks kits is to support the growth of a younger generation in Kabul to imagine the impossible, to see their own potential, and to ask 'what if' so that they may explore and solve tomorrows challenges. It does this through a three pronged approach. First is creation of the STEAM Punk kits, the second is a supportive website and the third is a fabrication and training center.

There are two types of STEM Punks kits. The first type are the leveled kits and the second are project oriented. All kits are being developed using the dominate cultural language, an english translation, common local patterns, colors, tactical materials, respect ethnic backgrounds and political or religious taboos. All kits also provide guides to identify and repurpose old electrical parts to foster a culture of recycling.

The leveled kits are developed for ages 6-10. These kits are leveled according to the users current knowledge and the level of desired exploration. The first kit provides basic electrical parts that are enclosed in shapes that represent their function (fig 1). The kit has wires that connect the different parts through the use of magnates. It also contains a basic bread board and instruction booklet that consists of photos. Each kit includes challenge cards which provide prompts for using the pieces beyond that basic booklet's instructions. the second level kit builds upon existing knowledge to include environmental sensors such as temperature, water and air quality. Each additional kit will continue to include more parts that allow for students to take in information and learn about their surrounding environment.

Fig 1.
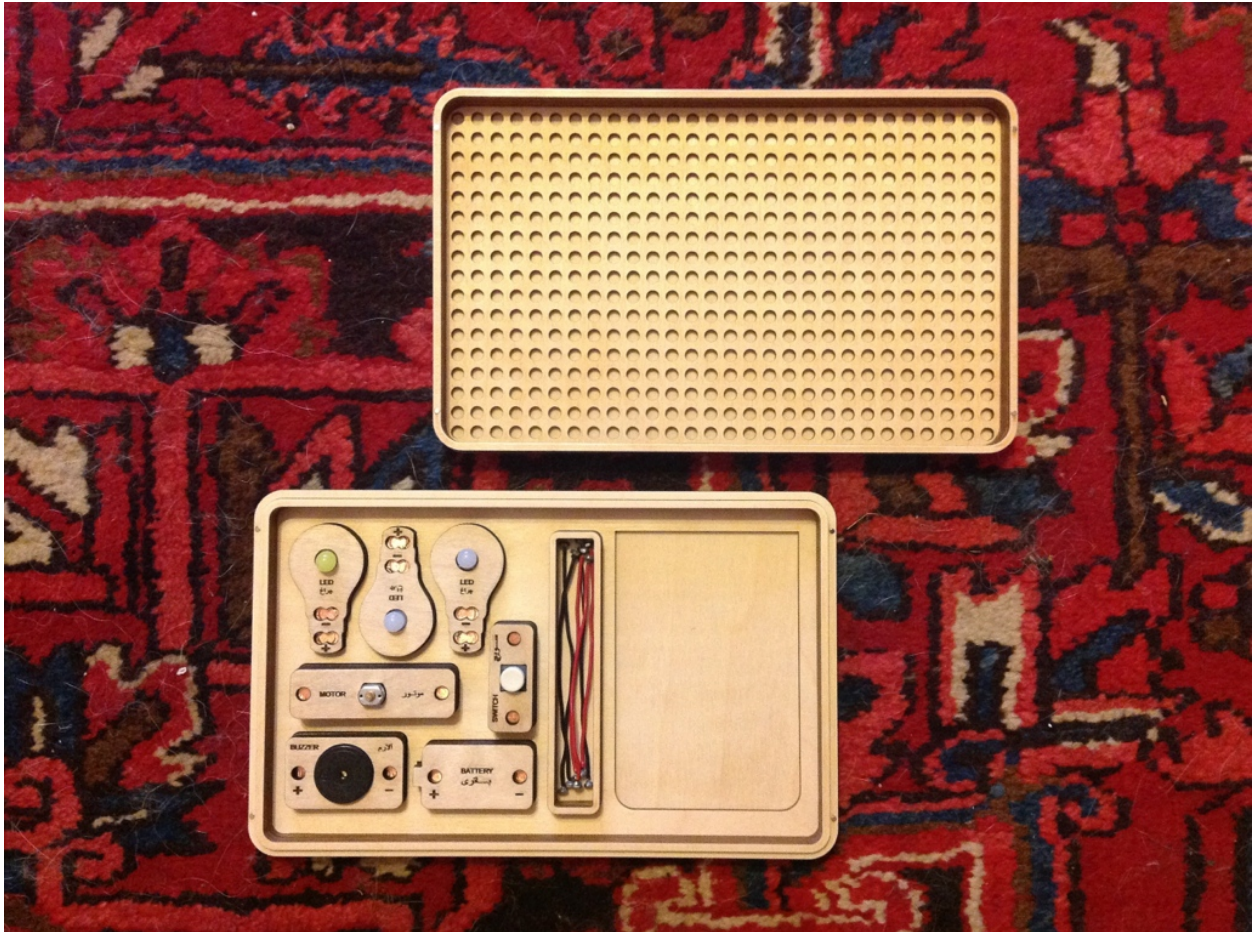
The project oriented kit provides raw materials that are used to make an object (fig 2.). One of the STEAM Punks project oriented kits is called Lamps for Learning. The goal of this kit is to allow for students to gain the basic skills and knowledge to develop their own designed lamp. In order to facilitate this process the kit contains all the materials needed such as; light emitting diodes, coin cell batteries, battery holders, copper tape, conductive thread, magnets, super glue, enclosure design templates, pencils and clear tape. The kit includes extra material for continued exploration and creation. An instructional booklet and a graphic novel are included. The novel is about a character that is trying to make a lamp to get home. At the end of the story users should have demonstrated their critical thinking skills through the process of using iterative design through prototyping and creating a working circuit. The working circuit contains a portable power source, switch and multiple light emitting diodes. This kit also includes instructions and parts to create a solar panel battery charger.

Fig 2.

Specific attention was given to the development of the kits' intended educational outcomes which includes the development of critical thinking skills and observation of the surrounding environment. The curriculum was designed using a backwards planning by design model. Due to the development of a detailed curriculum each kit has testable clear outcomes. This allows for easy assessment of the kits' objectives. The curriculum and lesson plans for each kit is available for teachers online if a teacher would like to use it in a lesson.

Eventually STEAM Punks would like to work specifically with science teachers to support the collection and exploration of the surrounding environment. The additional sustainability pages at the back of each booklet present examples so that students may learn how to reuse old electronic components.

3. **Outline Budget:** *description of the work to be accomplished along with a detailed budget outline.*

We have already created the curriculum, prototyped the kits and formed partnerships with two organizations that run schools and community centers in New York City and Afghanistan. We are currently testing with The Women for Afghan Woman (WAW) organization in Flushing Queens this spring. In order to continue the implementation of the pilot of the first part of this project we require funding to be able to fabricate the needed pilot kits and travel to the partnership schools in Kabul. After completing the pilot round STEAM Punks will work with the organizations in Kabul to identify the next steps for the iteration of the kits, identification of future funding sources, and the development of the instructional website to support the training of teachers. STEAM Punks will compile a user experience report to document the findings and a narrative of the experience to be summarized in a paper and submitted to appropriate conferences, journals or exhibit documentation at galleries. The preposed budget is as follows.

4. Budget
***The cost of the materials for 1 copy of the level 1 kit is $43. (Not including the labor/working hours). The cost of labor, HANDMADE, 1 copy is 9 hours for one kit= $90). That means roughly the cost of one prototype kit (user test) is around $133.This budget is calculated based on the cost of the tested prototype and not with a manufacturing deal in mind.

Leveled Kits
Raw Material Cost: $43
Cost of Labor for 9 hours @ $150 : $180
Total: $220. X 5 = 665

Project Kit
Raw Material Cost: $30
Booklet Cost: $40
Cost of Labor 5 hours @ 10$: $50
Total: $180. X 5 = 600

Total of kits = 1,265
Travel = 3000
Room and Board = 20 per day x2 = 560 (at least)
On Ground Facilitator Distribution time: $175

Total = 5,000

<div align="center">References</div>

Factbook. 2013, Retrieved from: http://www.indexmundi.com/afghanistan/demographics_profile.html

National Public Radio(NPR), 2013. Retrieved from: http://www.npr.org/blogs/parallels/2013/10/24/240482395/are-afghanistans-schools-doing-as-well-as-touted

Shabana Basij-Rasikb (Director of School Leadership of Afghanistan) , In person interview at The Asia society in New York City. By Kristen Kersh , October 3 2013.