ECE 4823/4012 Project Summary

Project Title	Ekwang: Wrapping Leaves to Help Needy Families
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Advisor / Section	Dr. Elliot Moore / GT4823
Semester	Fall 2019
Project Abstract	The current project is to develop a simple, low cost appliance that can manually
(250-300 words)	or electronically wrap Ekwang. Ekwang is a major staple for people in West Africa.
	It consists of a Cocoyam root that is grated into a mash and wrapped in a leaf or
	other material. In the previous semester, the team developed a grinder that can
	prepare the mash. Our team developed a device that will wrap the mash in leaves
	similar to turnip greens.
	The goal of the design was to develop a functioning manual and electrical
	wrapping device that can quickly and consistently wrap the mash in turnip greens.
	The preparation for this meal is time consuming and labor intensive because of the
	time it takes to grate and wrap the ingredients; it takes two hours to prepare a
	meal for a standard family of five, which consists of approximately 60 Ekwang
	wraps. Manually wrapping the mash in leaves takes 30 minutes. Developing the
	appliance will reduce the time needed to make the wraps, which would allow
	women more time to do other things and potentially the opportunity to make and
	sell the wraps for additional income.
	The final testing resulted in an electric wrapping machine that can wrap at a rate
	of 8.5 seconds per wrap. This is half of the time that it takes to manually wrap the
	leaves. The material cost for the finished prototype was \$315.67.

List codes and standards that significantly affect your project. Briefly describe how they influenced your design.	FDA: an industry standard for safety of materials in the context of food contact.
List at least two significant realistic design constraints that applied to your project. Briefly describe how they affected your design.	 -Environmental constraints such as unstable electricity in the geographical area where most end users live have also affected the project. Subsequently, the device is a hybrid (can operate manually and electrically), and the support of the base was made to be detachable for just this flexibility. The support is where the motor is mounted on and is a key component in enabling the transition between manual and electric versions. So, in the case of a blackout, users should be able to easily remove the electrical version and start using the manual version. -Another constraint is health and safety. The project design mainly utilizes HDPE, ABS, PLA and acrylic. But only HDPE and PLA gets in contact with the food (these two materials are approved as food contact materials by FDA).
Briefly explain two significant trade-offs considered in your design, including options considered and the solution chosen.	 -The potential positive social impacts of the designed machine mainly include but are not limited to decreasing the time spent in cooking Ekwang, and creating job opportunities in Cameroon. The use of this device significantly decreases the time used to wrap cocoyam mash in a leaf. People making this food (mainly women) can save their time by using the machine and be productive elsewhere. If the production of the wrapper takes place in Cameroon, it could potentially create more job opportunities in the area. -The potential negative impact is cultural. Whatever cultural value was associated with manually wrapping Ekwang could be lost with the technological substitute of a machine. The noise from the vibrations from operating the machine may be off putting and could perhaps add to the negative impact.
Briefly describe the computing aspects of your projects, specifically identifying hardware-software tradeoffs, interfaces, and/or interactions. Complete if applicable;	The laser sensor modules and the motor operation is all controlled by the Arduino Uno microprocessor. The program was coded using C++. The delays that are incurred by the code's interrupt routines and built-in library functions meant that the motor operation would stall every time the function for the sensor measurements were called. Therefore, the sensor function had to be called only 0.5 second, in order to maintain high responsiveness to any obstacles obstructing the path for the advancing motion of the wrapper handle, without majorly stalling the motor operation.

required if team includes	
CmpE majors.	