## ECE4011/ECE 4012 Project Summary

Project Title	Smartphone Solar Tracker
Team Members (names and majors)	Gideon Odogwu, EE
	Chidi Imala, EE
	Asier Isayas, EE
	Yusuf Ziya Kuriş, EE
Advisor / Section	Professor Jonathan Christopher James
Semester	Fall 2017 ECE 4012
Project Abstract (250-300 words)	Traditional solar panels for residential use are mounted at an optimum angle, where they can receive the most direct sunlight. The problem with this is that the sun's angle changes during the course of the day and also with seasons. This project focuses on increasing the efficiency of a household solar panel by using available equipments. A used smartphone will detect the direction where the sun's intensity is highest and a pan and tilt unit be used to orient the solar panel in that direction thus achieving greater efficiency. We hope to reduce cost of the solar tracker by using a phone's camera to detect the position of the sun. This data would then be used by the pan and tilt unit to position the solar panel in the right angle and position to receive optimum sunlight. The advantage of such a product would be lower cost and afficient solar panel. We have a lower cost the project would use
	<ul><li>available sensors on a smartphone compared to power feedback systems which are typically industry grade due to their cost.</li><li>The benefit of such a product will be that anyone willing to install a solar panel system to their house can increase the efficiency of power generation by using our off-the-shelf product and control it with a smartphone application.</li></ul>

Project Title	Smart Phone Solar Tracker
List <b>codes</b> and <b>standards</b> that significantly affect your project. Briefly describe how they influenced your design.	RS-232: The cable connects the pan and tilt unit to the RS-232 to USB adapter.
	RS-232 to USB adapter: The cable connects RS-232 to USB OTG (On-The-Go) which is a USB female to micro-USB male adapter.
	USB OTG: The cable connects the RS232 to USB adapter to the smartphone to enable host configuration
	Tera Term to PTU-46 serial connection: A 9600 baud, one start bit, eight data bits, one stop bit and no parity connection is used to control the unit with a computer for range testing.
List at least two significant realistic design constraints that applied to your project. Briefly describe how they affected your design.	Since a smartphone camera is required to point to the sun, a smartphone is needed for our product. Samsung Galaxy S7 and LG G Flex were used in testing and demonstrations. The smartphone introduced weight and field of sight (camera detection space) constraints.
	Pan and tilt unit: The PTU-46 is manufactured by Directed Perception. The unit has 318° azimuth and 120° zenith range. The payload limit is 6 lbs. These ranges and limits affected the weight and motion of our design.
Briefly explain two significant trade-offs considered in your design, including options considered and the solution chosen.	Microcontroller versus Smartphone: A microcontroller is less accessible and more difficult to integrate for the domestic user but the microcontroller is easily integrated into the design compared to the smartphone
	Remote versus Local Control: While remote control is convenient, this means that a sender and receiver setup will be needed which will increase cost. Local control through a smartphone requires the user to be near the product, but is cheaper to implement since the phone directly interfaces with the system.
Briefly describe the computing aspects of your projects, specifically identifying hardware-software trade offs, interfaces, and/or interactions.	Manual: The user can move the unit by using the sliders on the smartphone application
	Scan: The unit scans the sky with increments and focuses on the light source once a brightness level above the threshold is detected.
	Focus: A phone camera covered by a solar filter creates a bright circle on the phone screen with a black background. The location of this spot is used to move the bright spot to the center of the screen.
Complete if applicable; required if team includes CmpE majors.	