Remote Sensor Network
for Solar Power Monitoring

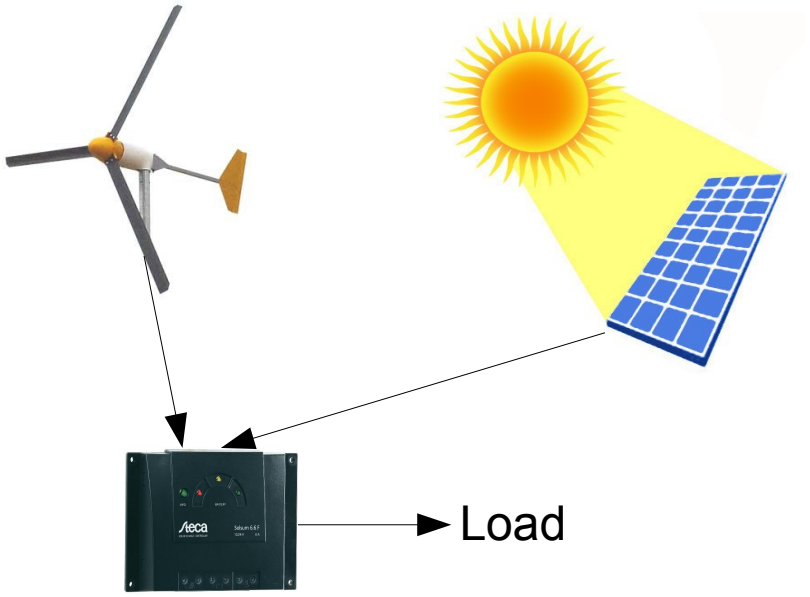
Proposer & Supervisor: Professor Antoine Bagula

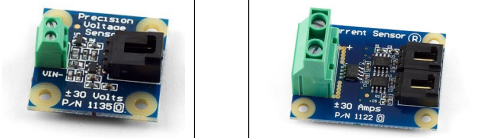
Student/Researcher: Zenville Erasmus

Research type: Intelligent Systems and Advanced Telecommunication

UNIVERSITY of the WESTERN CAPE

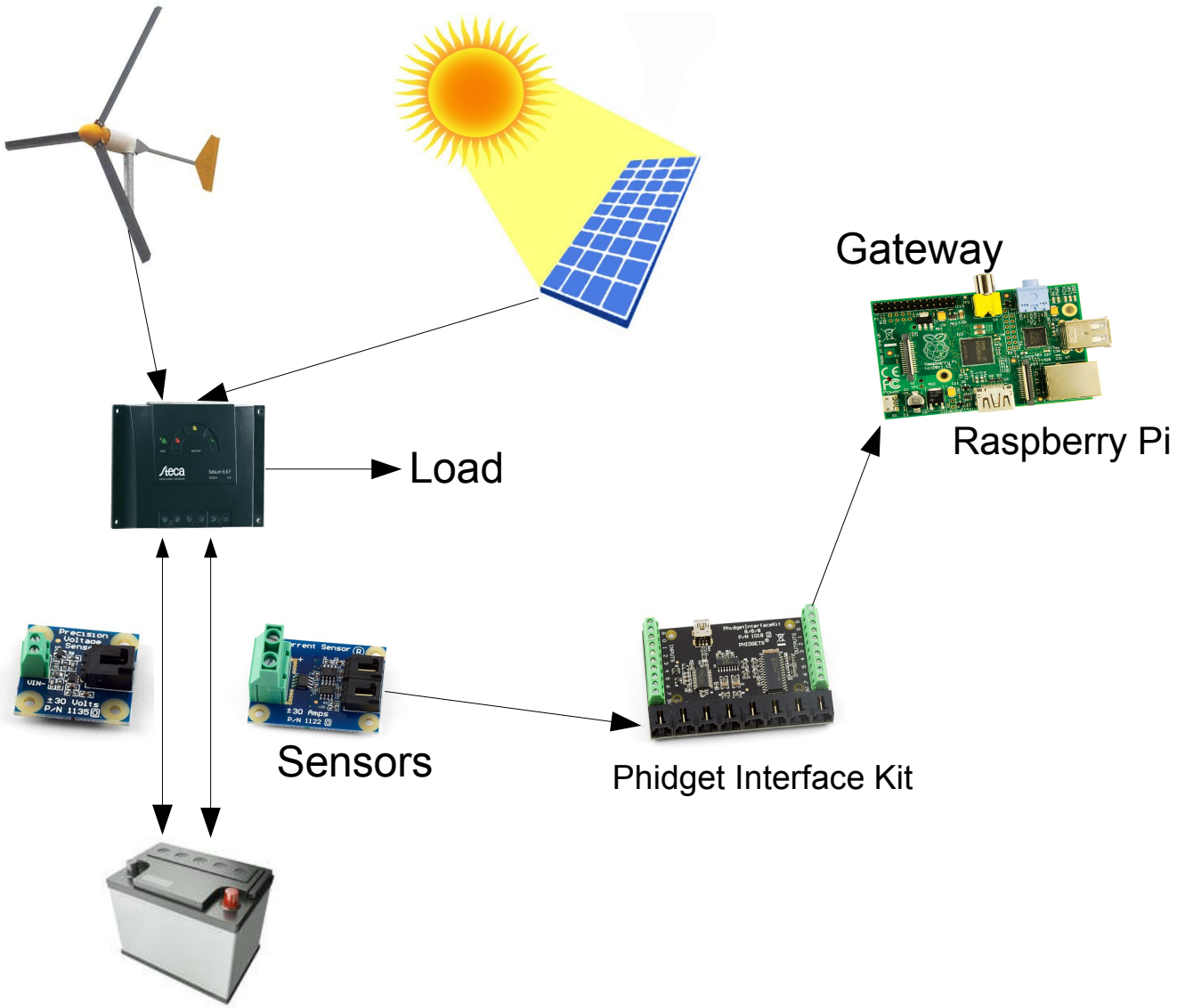
A quick recap...



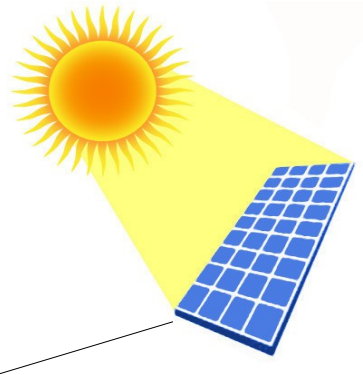


Sensors

A quick recap...

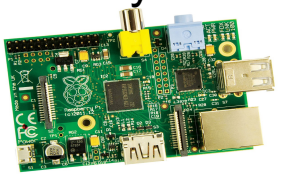


A quick recap...



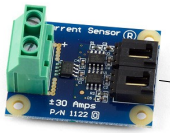
Load

Gateway

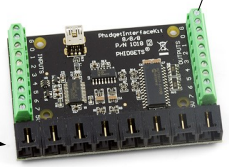


Raspberry Pi

Cloud



Sensors

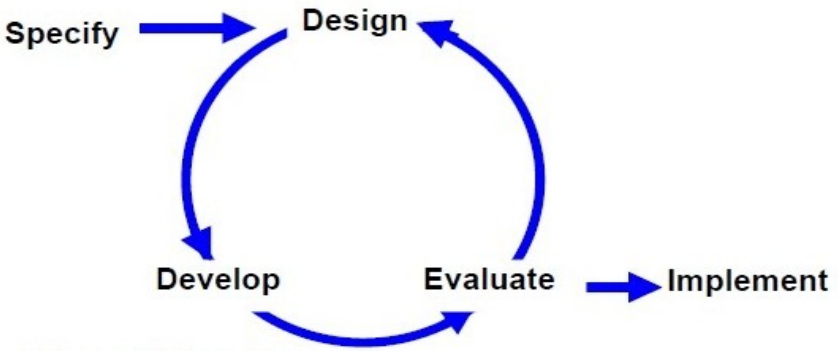


Phidget Interface Kit

Web Portal

Testing Methodology

- Incremental approach

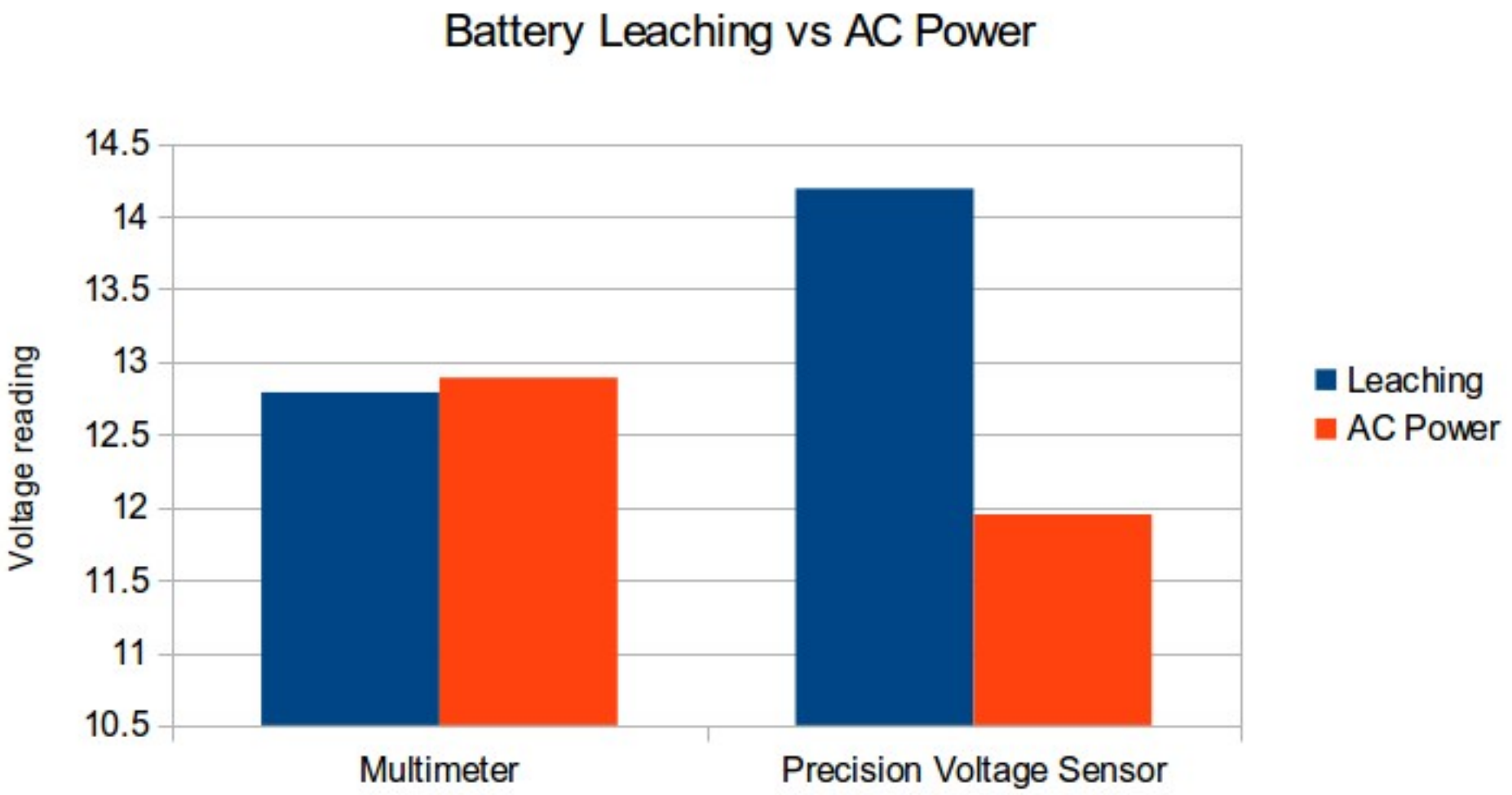


- White-Box testing – Static Testing
- Stress Testing
- Performance Testing

Testing and Validation

- Leaching vs AC Power
- Battery Usage
- Phidget Sensors vs Multimeter
- Lab Temperature
- Panel voltage
- SMS Notification

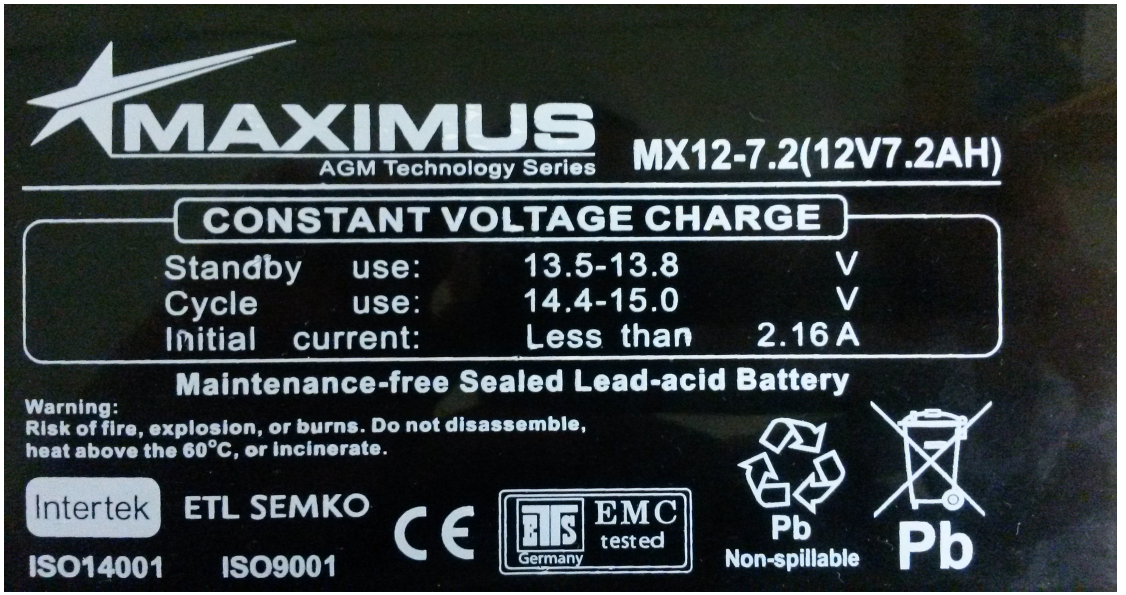
Testing



A voltage leakage exists that effects the Precision Voltage Sensor reading when leaching.

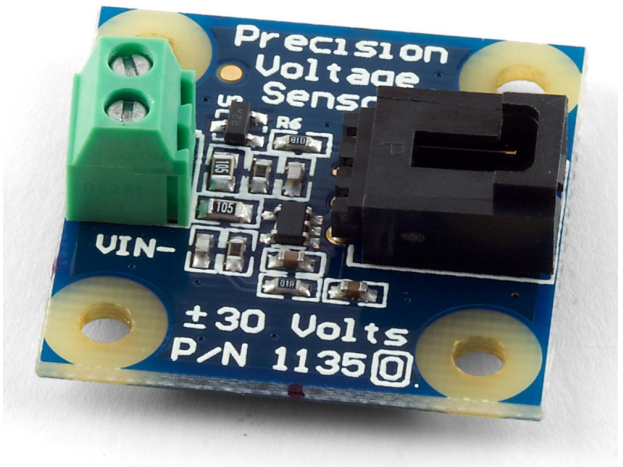
Battery Usage

Cycle	Standby
Power source on regular basis	Emergency power source
Discharged and subsequently recharged	Kept fully charged so that it can “kick in” immediately
	Remains connected to a trickle charger that will keep it fully charged and ready for use



Testing - Calibration
Phidget Sensors vs Multimeter

	Phidget Sensor	Multimeter
Parameter		
DC Volt(s)	11.036	12.07
DC Current	0.152	0.440
Power	1.677472	5.3108



Testing – Calibration
Lab Temperature

Parameters	Phidget Sensor	Lab Thermometer	Aircon. Remote
Ambient Temperature (°C)	21.78	21.70	22.00

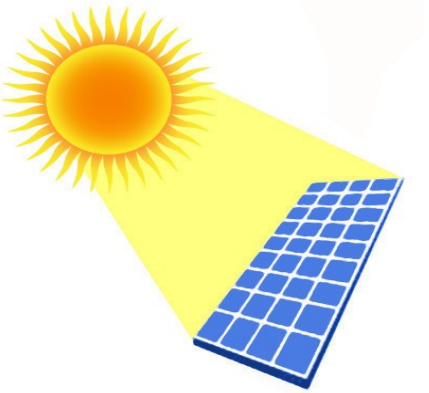
- Temperature readings were measured against twin air-conditioner temperatures set to 22 degree Celsius
- The air-conditioners were allowed to blow for 15 min. before readings were taken.

Testing – Panel Voltage

Parameter	Lab	Outside
Panel Voltage	12.71 - 14.67 V	20.6 – 21.1 V

Readings taken at 14:00 on 21 August 2014.

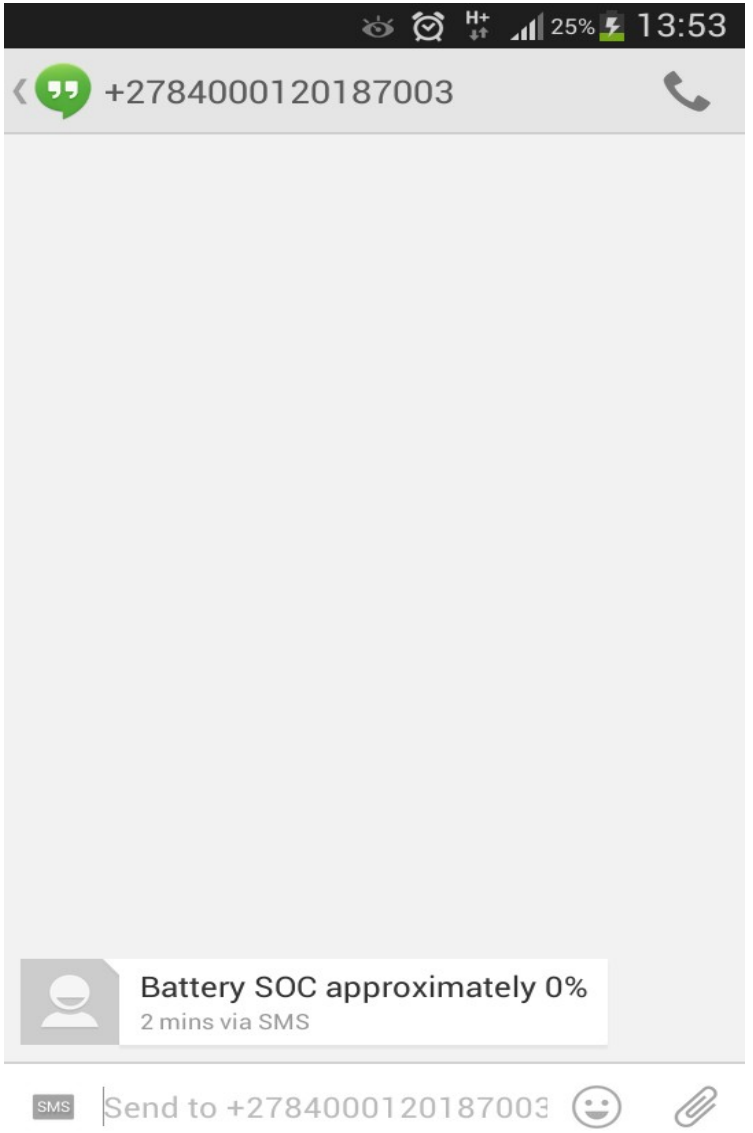
- Main emphasis is to illustrate the power generation capabilities of the panel in use
- It is able to generate a voltage indoors by scavenging from secondary power sources (lab lighting).



Testing – SMS Notification

Voltage Range	SOC (Approx.)
11.58 <= voltage < 11.75	20%
11.31 <= voltage < 11.58	10%
10.50 <= voltage < 11.31	0%

Field test - A voltage of 11.018V



Questions