

Renewable Energy Toolkit

Team A5

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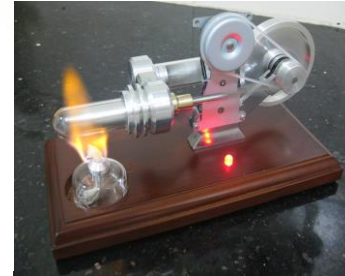
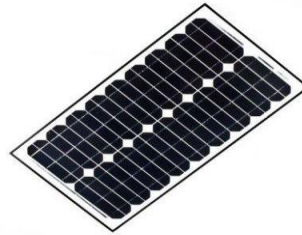
Project Description

- **Goal:**

- Create a renewable energy toolkit to educate students and adults from around the world about how to implement renewable energy sources.

- **Renewable Energy Sources included:**

- Solar Photovoltaic cells (PV)
- Biomass - Air Stirling Engine
- Wind Turbine
- Water Wheel Turbine
- Load



- **Clients:**

- Dr. Tom Acker
- Mark Glauth



Hamad Alsharhan , Renewable
Energy Toolkit Team A5
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PhotoVoltaic Solar Cells

Updates:

- Tablet holder
- Protractor
- Digital angle finder
- Compass

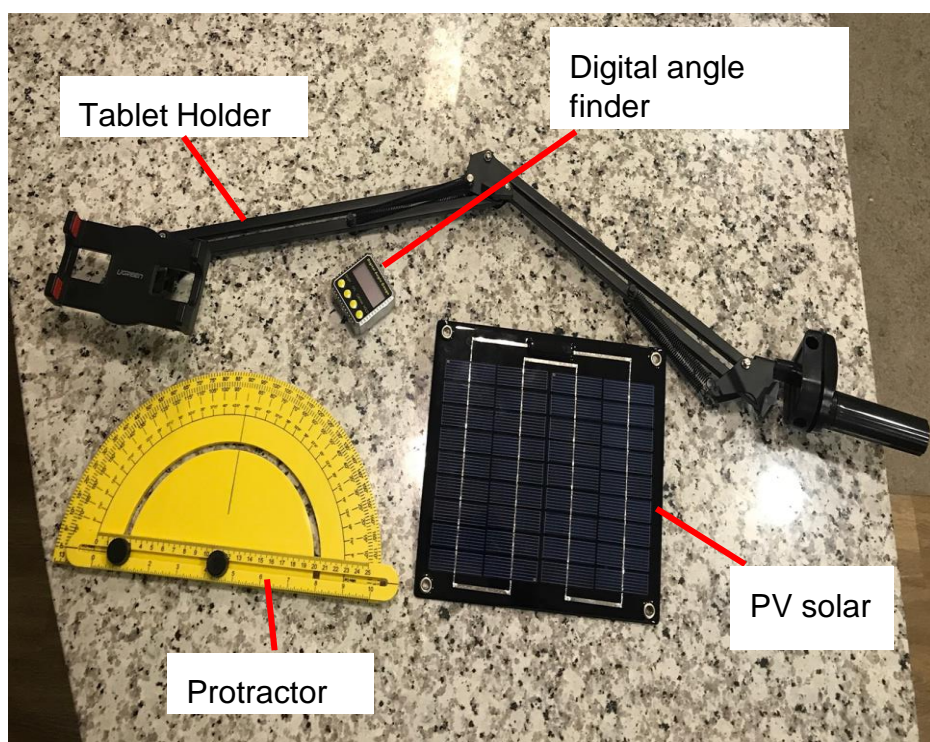


Figure 1: PV Solar Set-up

IA Experiment 1 Summary

- Sun is low during winter & high during Summer
- Finding Angle depends on:
 - a) Time
 - b) Location
- Calculation Method:
 - 1) 15° Method:
 - a) During Winter: tilt angle is calculated by adding 15° to your latitude
 - b) During Summer: tilt angle is measured by subtracting 15° from your latitude
- Solar gives highest energy when they are directly facing sun

Air Stirling Engine

Updates:

- New Air Stirling engine
- Because of the heat from denatured alcohol, the engine will run madly and create the electricity
- Speed: 1300 to 1500 RPM
- Weight: 350g
- Size: 180mm X 90mm X 90mm
- Material: Glass, Wood and Aluminium

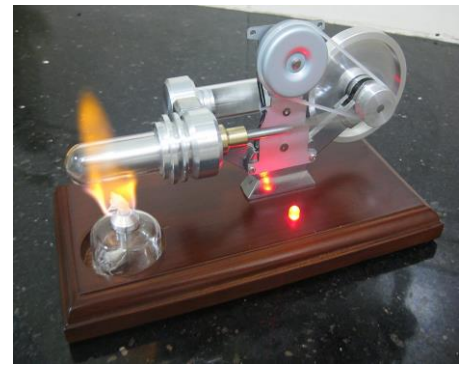


Figure 2 : Air Stirling Engine

IA Experiment 2 Summary:

- Fill up a small can and fire it up then we will see the Stirling engine spin
- Determination of the amount of power a Air Stirling Engine can produce

Wind Turbine

Updates:

- New Wind turbine:-
- Rotor type: Horizontal axis
- Generator type: 12 Volt
- Maximum Generator Output: 15 watts
- Turbine Weight: 1 lb
- Cut in wind speed: Approximately 6mph*
- Telescoping extension pole:-
- 6.5-to-18 foot
- Anemometer



Figure 3 : Wind Turbine

Wind Turbine

Final Design specifications:

- Connect the wind turbine with the telescoping extension
- Then connect the anemometer with the wind turbine

IA Experiment 3 Summary:

- Conversion of energy takes place from kinetic to electrical
- The places where this installation should be done



Figure 4 : Anemometer

Water Wheel Turbine

Updates:

- Bearings
- 15 watts DC motor with gearbox ratio of 50:1
- Aluminum shaft
- Change wheel

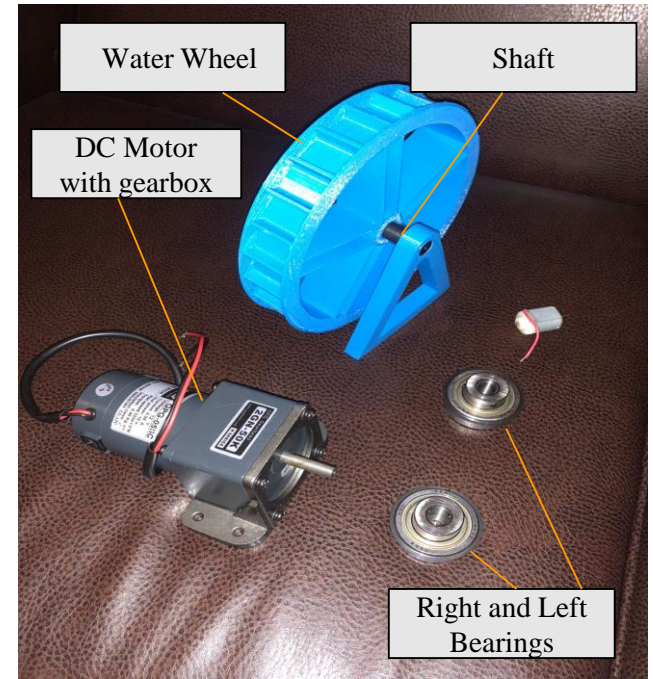


Figure 5 : Water Wheel New Stuff

Water Wheel Turbine

Final Design specifications:

- Build new shaft and Wheel
- Check the torque for gearbox to generate power
- Test design by water sink in Rm 111 Eng Building

IA Experiment 4 Summary:

- Determination of the amount of power a water wheel turbine can produce
- Process of converting potential energy into mechanical energy and electrical energy

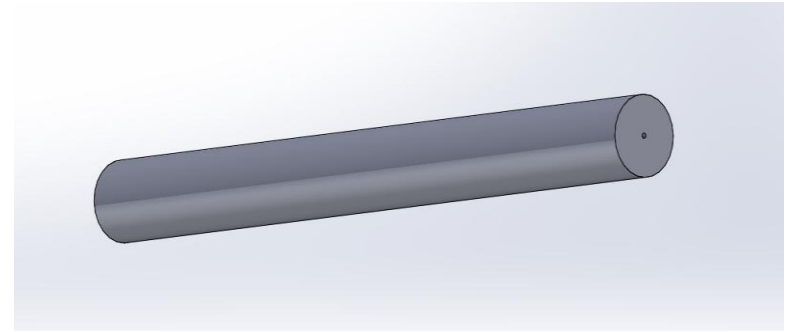


Figure 6 : CAD New Shaft



Figure 7 : CAD New Wheel

Load Box

Updates:

- Watt Meter
- 4 Light bulbs (each 15 W)
- 4 Light Socket Lamp Holder
- Fuse
- Fuse Holder
- 4 Switches

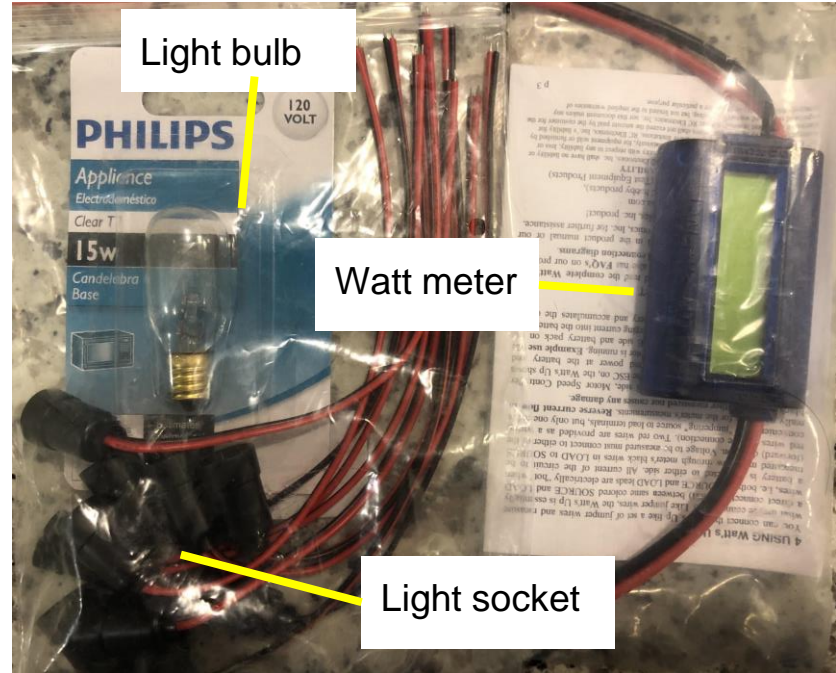


Figure 8: Load box setup

Load Box

Final Design specifications:

- Build the load box
- Test it with each power source

IA Experiment 5 Summary

- How to put together the load box
- The load box will be tested with a battery

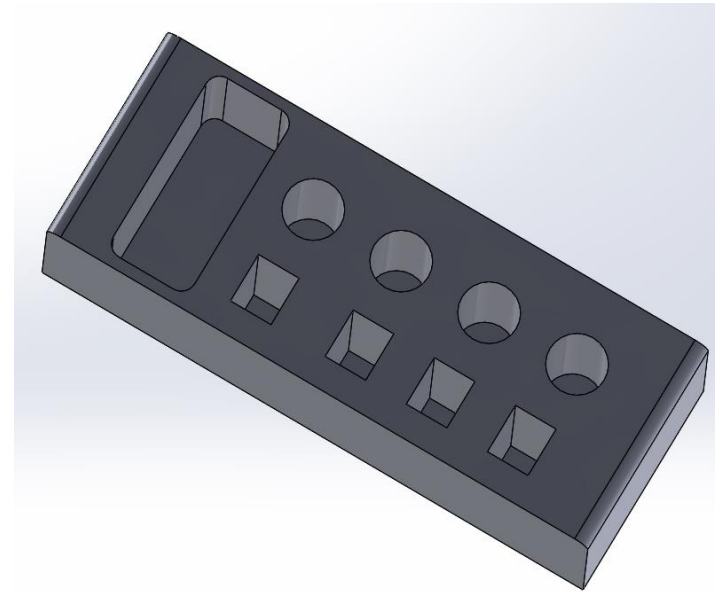


Figure 9: CAD load box

Moving Forward

Table 1: Gantt Chart

Name	Begin date	End date		week 8	week 9	week 10	week 11	week 12	week 13	week 14	week 15
Midpoint Report	3/5/18	3/16/18									
Midpoint Presentation	3/13/18	3/15/18									
Spring Break	3/19/18	3/23/18									
Final Manufacturing	3/19/18	4/1/18									
Final Product Testing	3/25/18	4/5/18									
Op/Assembly Manual	3/25/18	4/16/18									
UGRADS Poster	3/25/18	4/23/18									
Final Report	3/25/18	4/30/18									
CAD Package	3/25/18	4/30/18									

Budget

- Under-budget

Table 2: Estimated Budget

Predicted Expenses	Current Expenses	Future Expenses
\$1000	\$886.51	\$100

Questions?