

# SOLAR ELECTRIC HYBRID BICYCLE

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## Design Requirements:

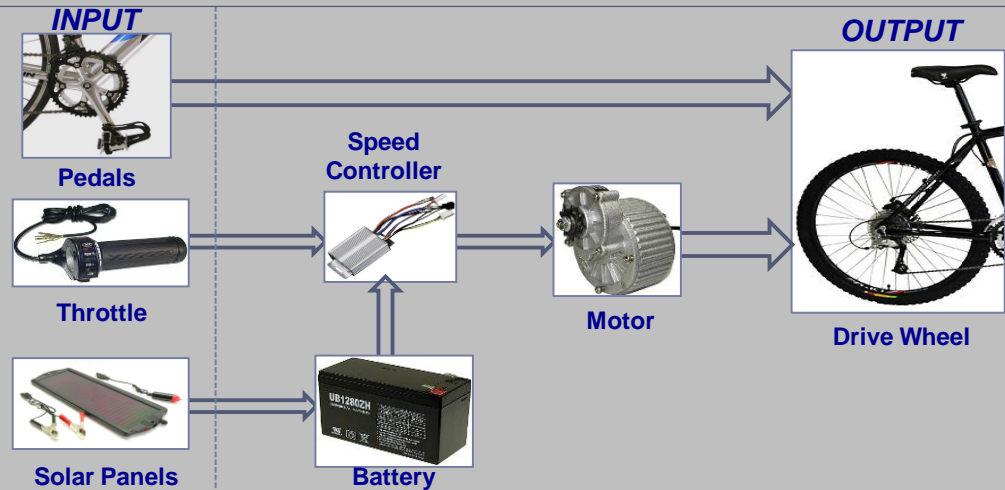
- I. Power an existing bicycle using an electric motor
- II. Engineer a system to convert solar energy into electrical energy
- III. Construct a design allowing for both manual and electrical power inputs
- IV. Abide by all Indiana state laws while constructing a high-performance machine

## Design Goals

<b>Voltage (volts)</b>	: 24
<b>Power (watts)</b>	: 250-500
<b>Range (miles)</b>	: 15-20
<b>Speed (mph)</b>	: 20
<b>Weight (lbs)</b>	: <75
<b>Price (\$)</b>	: <700



## ENERGY FLOWCHART



# PERFORMANCE AND TEST RESULTS



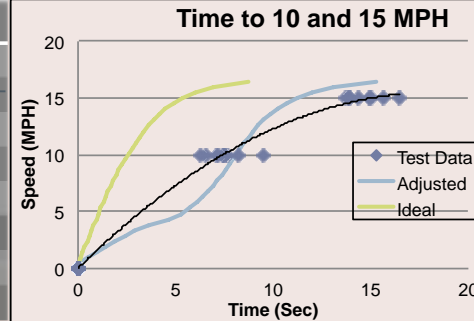
## ACCELERATION

### 0-10 mph

10 Run Average	: 7.50 seconds
Ideal Prediction	: 2.57 seconds
Adjusted Prediction	: 8.11 seconds

### 0-15 mph

8 Run Average	: 14.76 seconds
Ideal Prediction	: 5.36 seconds
Adjusted Prediction	: 11.25 seconds



## TOP SPEED

6 Run Average	: 15.83 mph
Predicted	: 16.44 mph

## BRAKING 10 – 0 MPH

Stopping Distance:	: 10.75 Feet
State Law:	: 15.40 Feet

## WEIGHT

Overall	: 85 lbs
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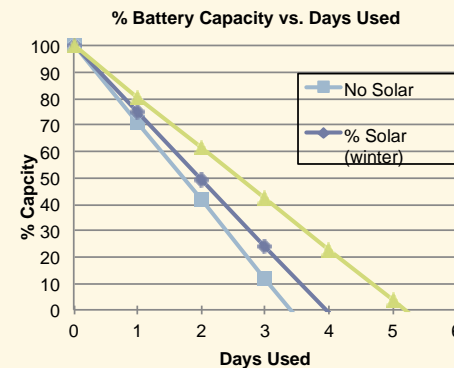
## SOLAR RECHARGE

### Assumptions

Charge Voltage	: 16 Volts
Measured Current	: 40 mA
Battery Capacity	: 12 Ah
Charge Duration	: 12 hr / day
Motor Current	: 8.5 Amp
Motor Run Time	: 25 min / day

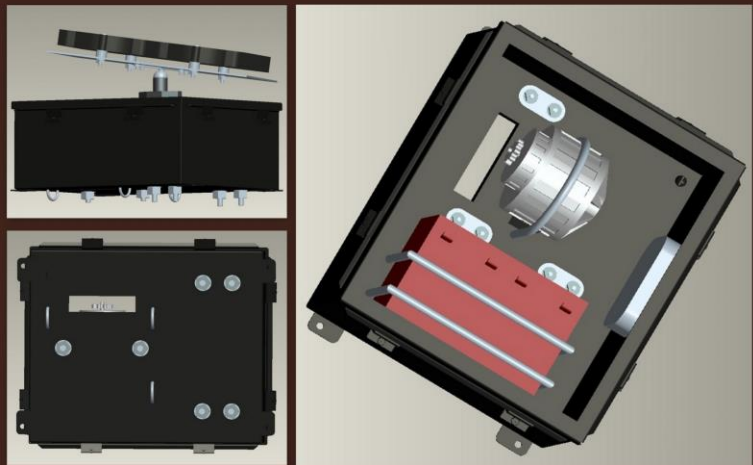
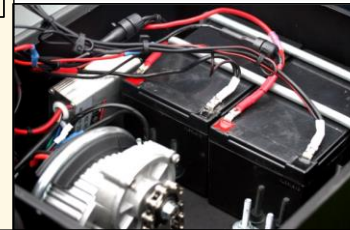
### Results (% Increase in Battery Life)

Winter	: 15.8 %
Ideal	: 51.8 %



## RANGE

First loss of top speed	: 7.5 Miles
Dead Battery	: 12.75 Miles
Full Throttle Prediction	: 8.51 Miles



## RECOMMENDATIONS

- Lower center of mass
- Reduce weight
- Stronger bike rack
- Higher power/voltage
- Add multiple motor gear ratios
- Change motor mount location
- Use road tires