

Photovoltaic Martian Bugs

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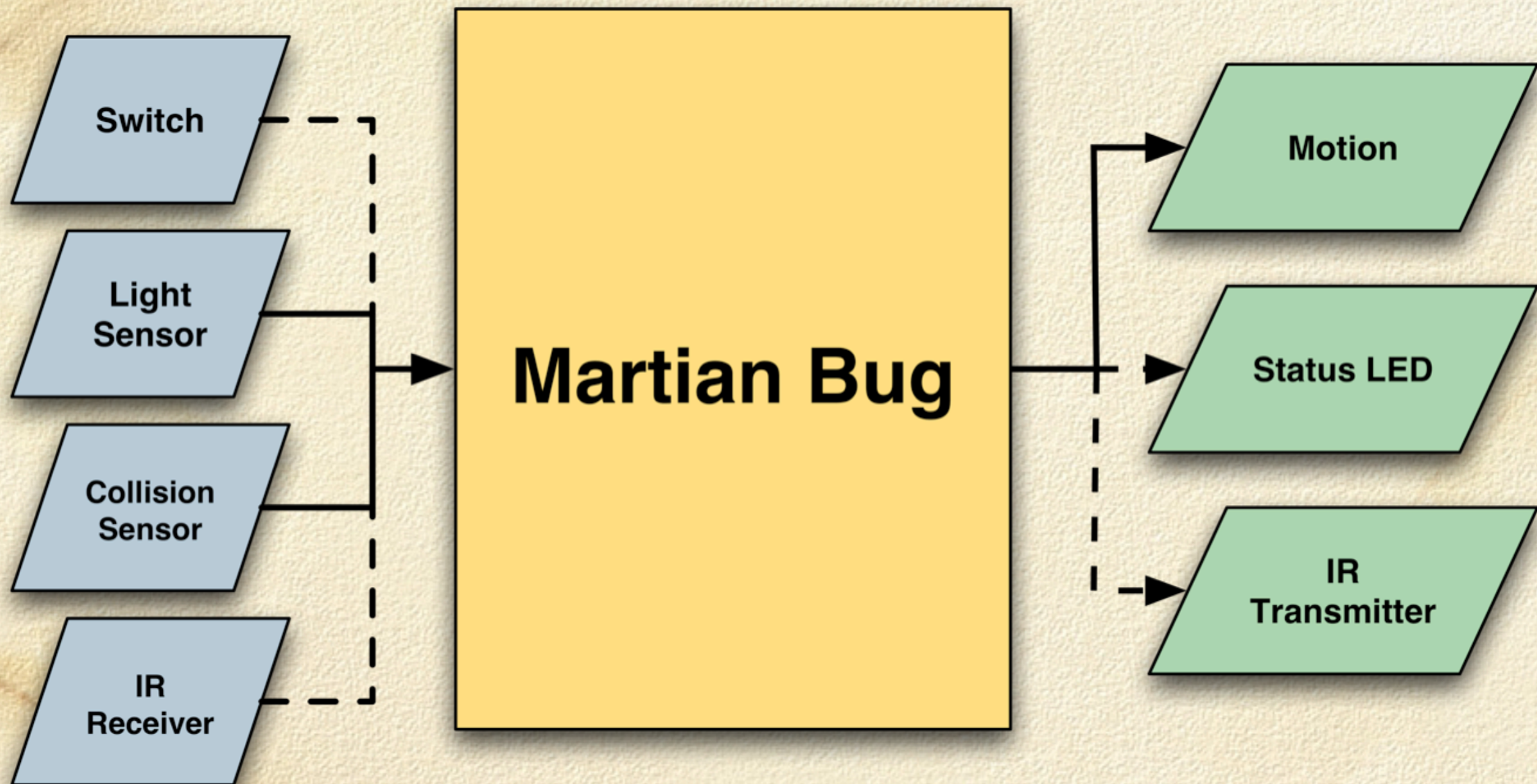
Advised By:

Dr. Huggins & Dr. Malinowski

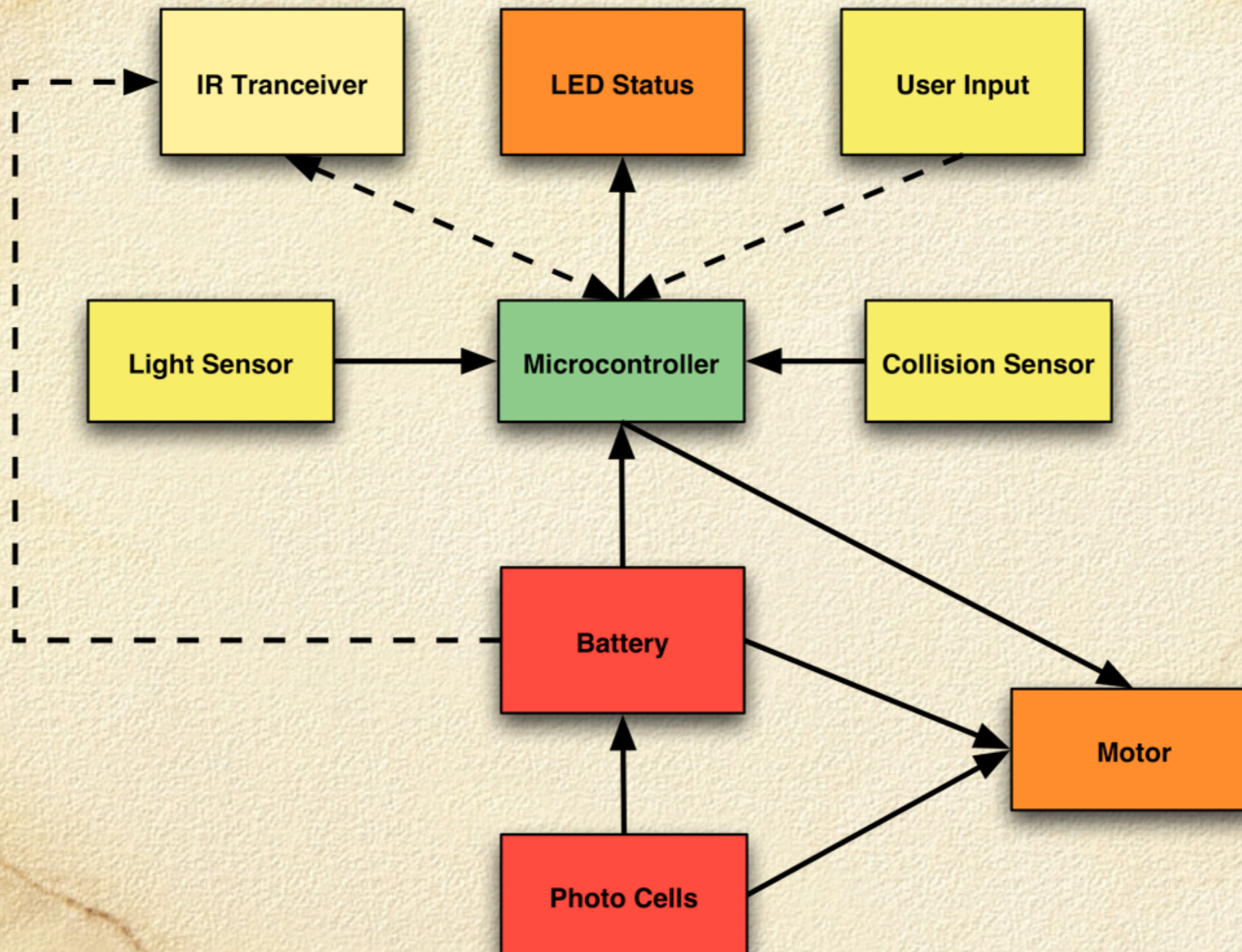
Project Summary

- ❑ Small autonomous robots
- ❑ Solar powered
- ❑ Interact with the environment
- ❑ Operate in sunlight and low light conditions
- ❑ Several operational modes
- ❑ IR communication

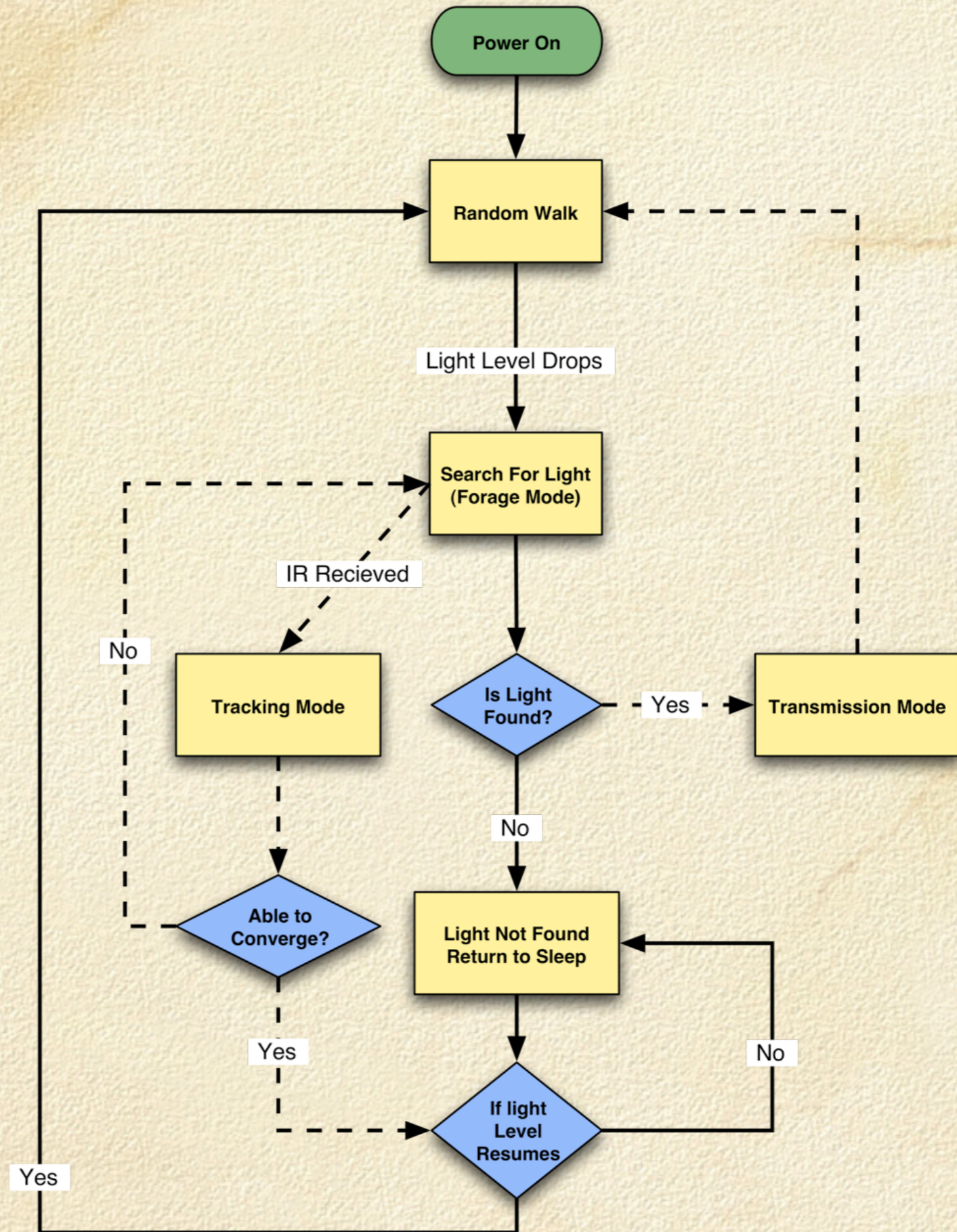
Overall Block Diagram



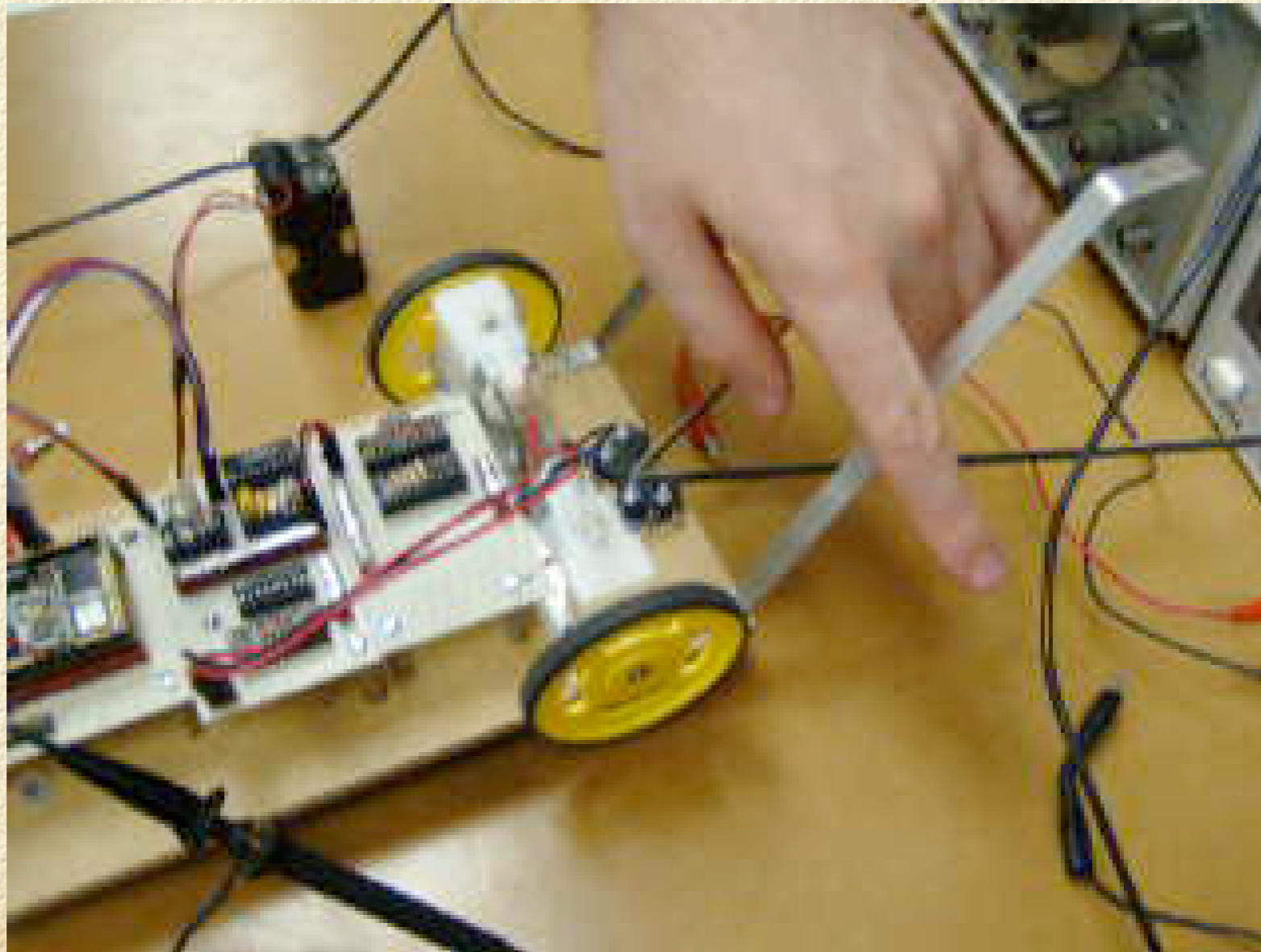
Proposed Hardware Flow Chart



Software Flow



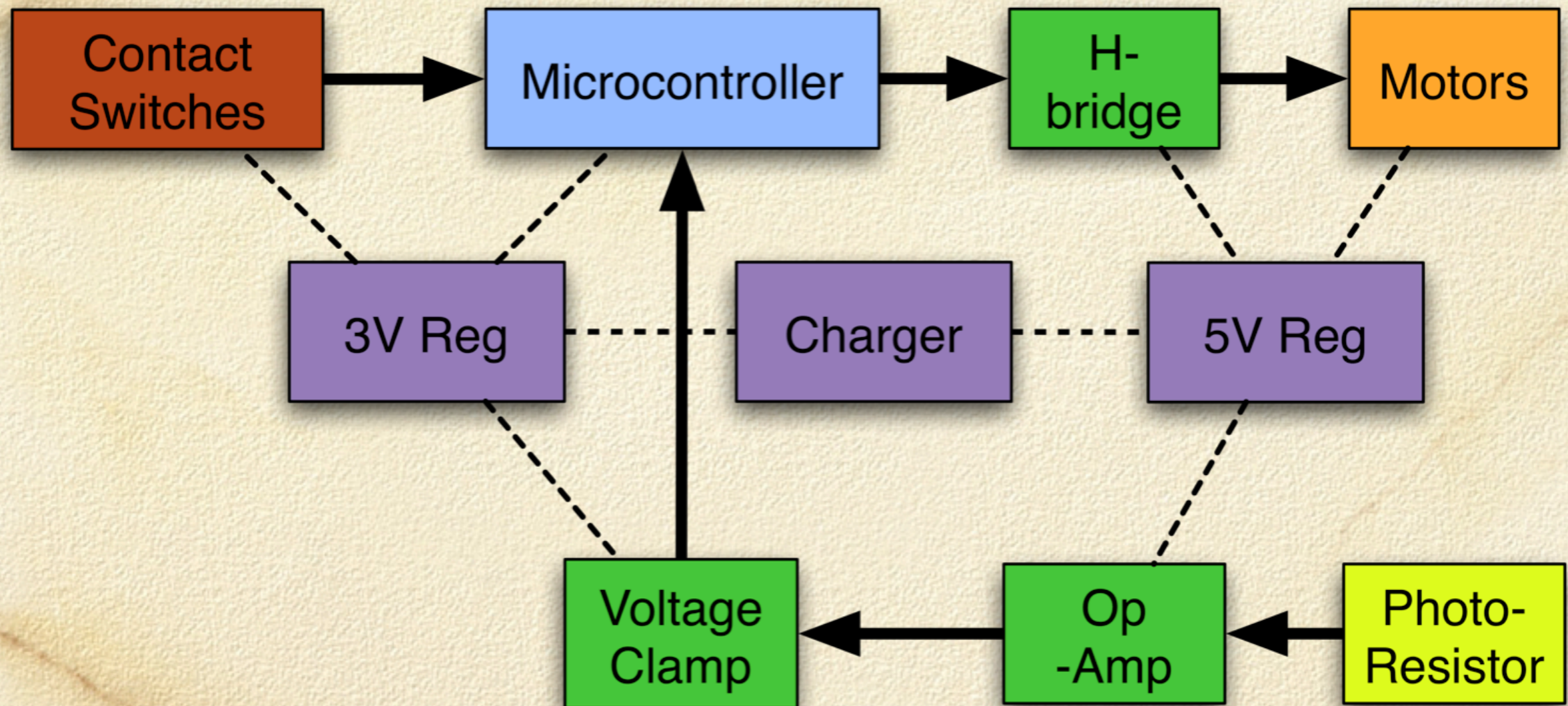
Contact Operation



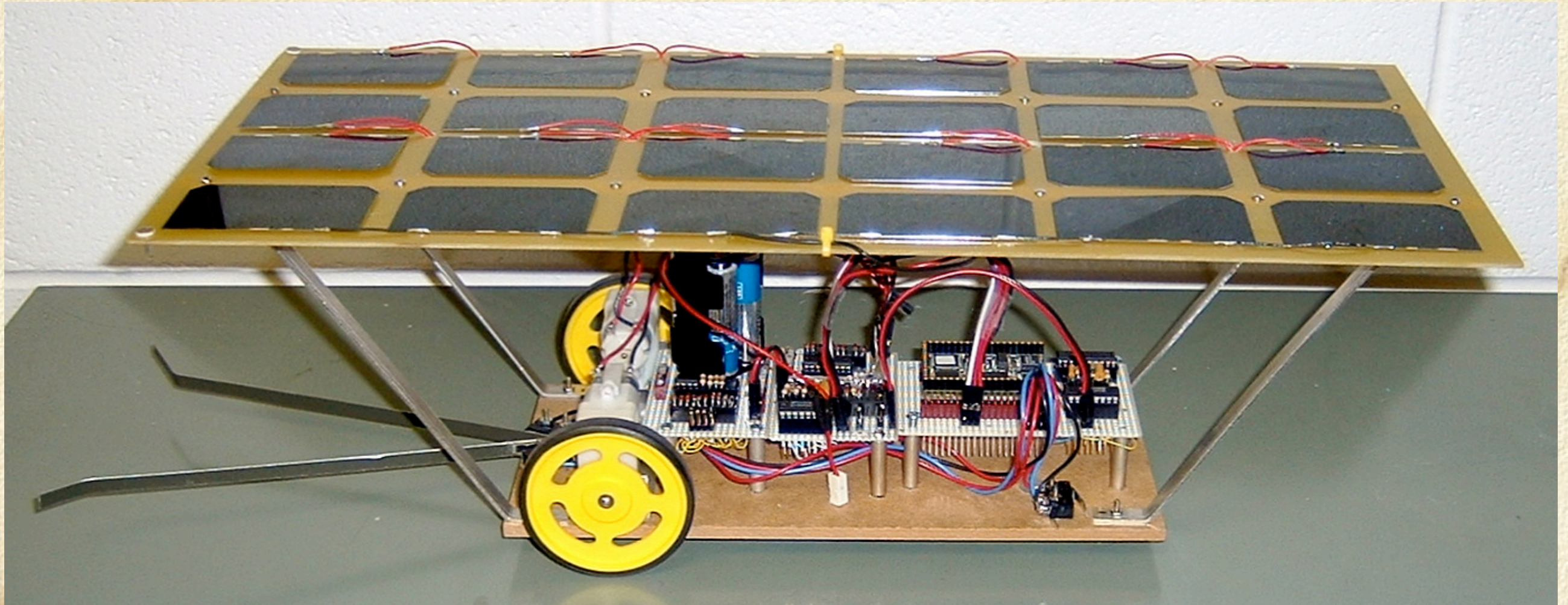
Completed Tasks

- ❑ Solar Panel Testing
- ❑ Power Regulation
- ❑ Microcontroller Setup
- ❑ A/D Interfacing
- ❑ Motor Circuitry & Interfacing
- ❑ Light Sensor
- ❑ Chassis Fabrication

How It's Connected



Up Close



Bug In Motion

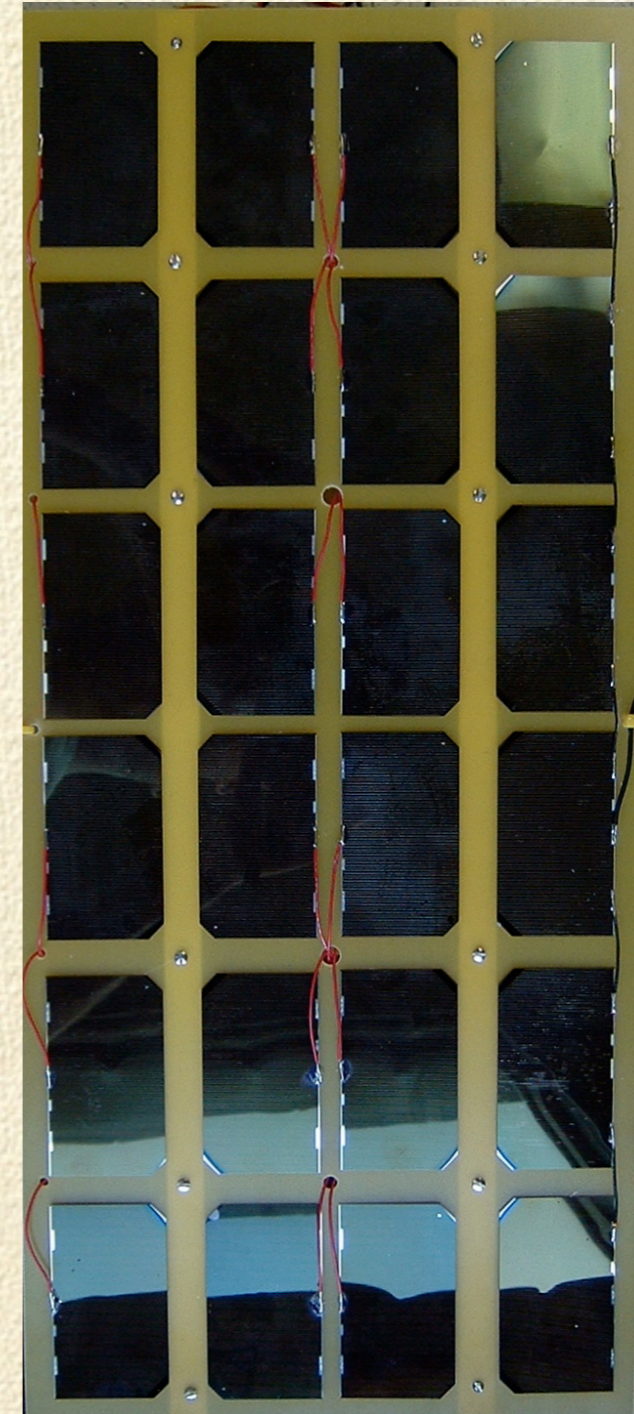


Power Values

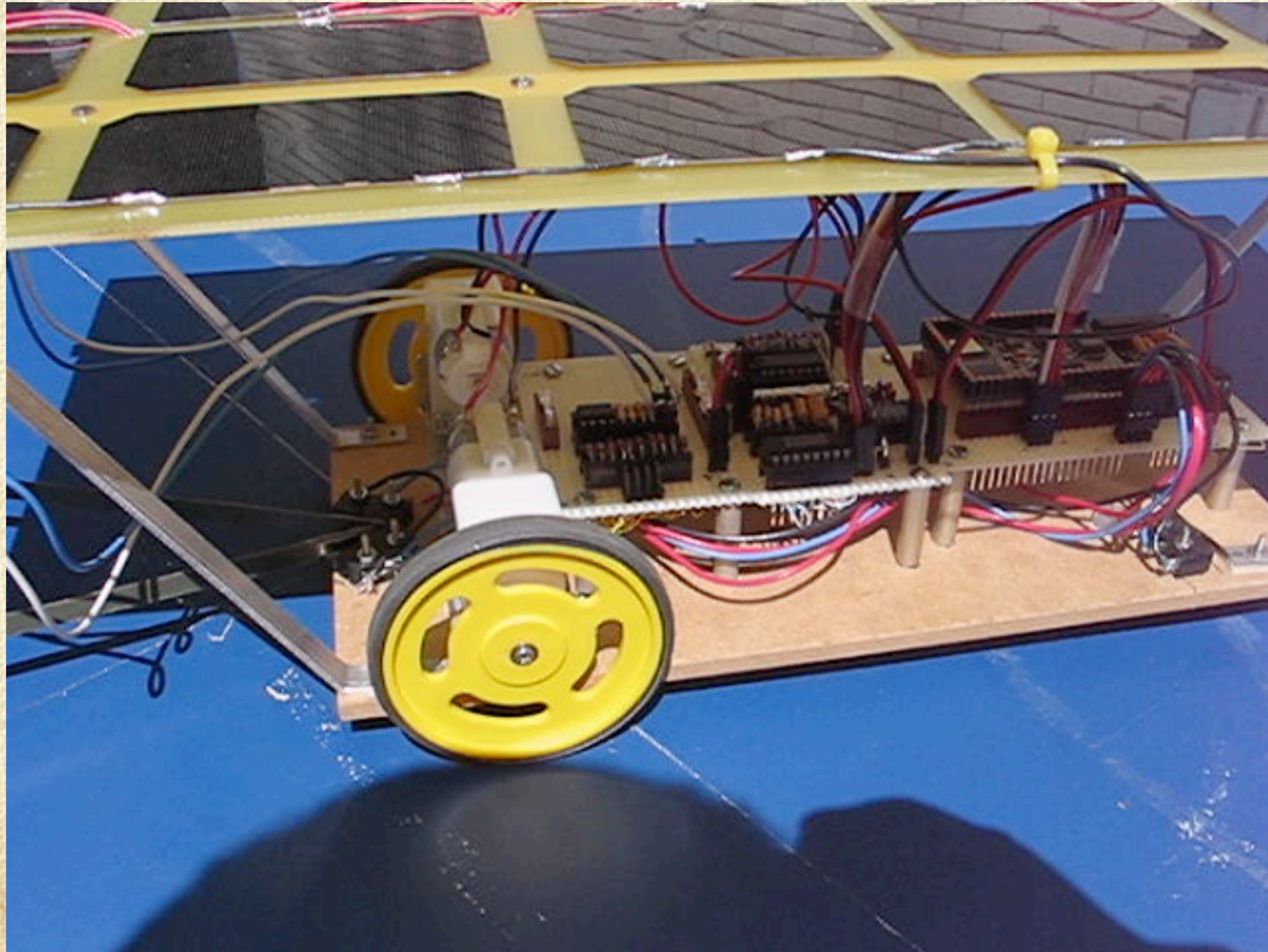
- ❑ Low Battery = 5.8 Volts
- ❑ Out of Regulation = 5.2 Volts
- ❑ Motor Controls/Sensors
 - ❑ 36 mA while active
 - ❑ 220 mA with both motors
 - ❑ less than 1 mA while disabled
- ❑ Microcontroller
 - ❑ 30 mA while active
 - ❑ Less than 1 mA on low power

Solar Array

- ❑ Maximum Output Voltage = 8 Volts
- ❑ Maximum Output Current = 1.5 Amps
- ❑ Maximum Power Output = 12 Watts
- ❑ Estimated Needed Power = 1.5 Watts
 - ❑ $6[V] * .25[A] = 1.5[W]$
- ❑ Actual Needed Power = 1.74[W]
 - ❑ $P_{total} = 5[V] * 294[mA] + 3.3[V] * 82m = 1.74[W]$



Sun Power



Future Work

- ❑ Better Power Management
- ❑ IR Communication
- ❑ GAL I/O Controller
- ❑ Data Acquisition

Questions?