Phase 2

Use Case

Current/Voltage Measurement

BASIC COURSE:
The User plugs in the microcontroller and starts up the PV Smoothing System. The system generates a PWM Signal and sleeps for a specified time. After the specified time has lapsed, the system wakes up and loops through the following steps indefinitely; reads battery temperature and determines if temperature is below limit, reads ADC Inputs for Voltage and Current sensors from Sensor ADC, performs PI calculation, updates PWM Signal, and sleeps for specified period of time, wakes up, and repeats steps.

ALTERNATE COURSES:
Battery Over Temp: The systems reads battery temperature and determines temperature is above specified limit. The system shuts off PWM signal and sleeps again.

NOTE: We do not know how the system will monitor the battery temperature yet. The Electrical Engineering students still need to design this part of the system. Therefore, the details for this part of the system was intentionally left vague.
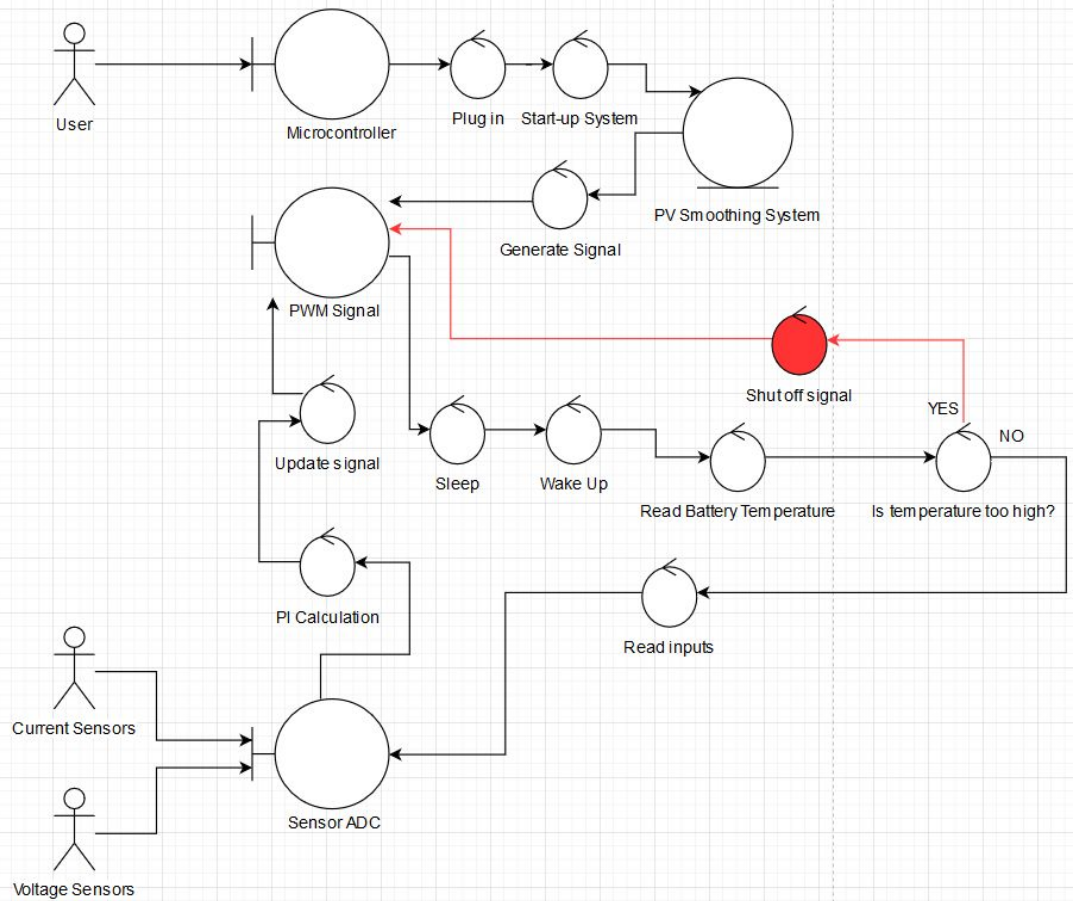
Robustness Diagram

Current/Voltage Measurement

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User

Microcontroller

Plug in   Start-up System

PV Smoothing System

Generate Signal

PWM Signal

Shut off signal

Update signal

Sleep   Wake Up   Read Battery Temperature   Is temperature too high?

YES

NO

PI Calculation

Read inputs

Current Sensors

Sensor ADC

Voltage Sensors
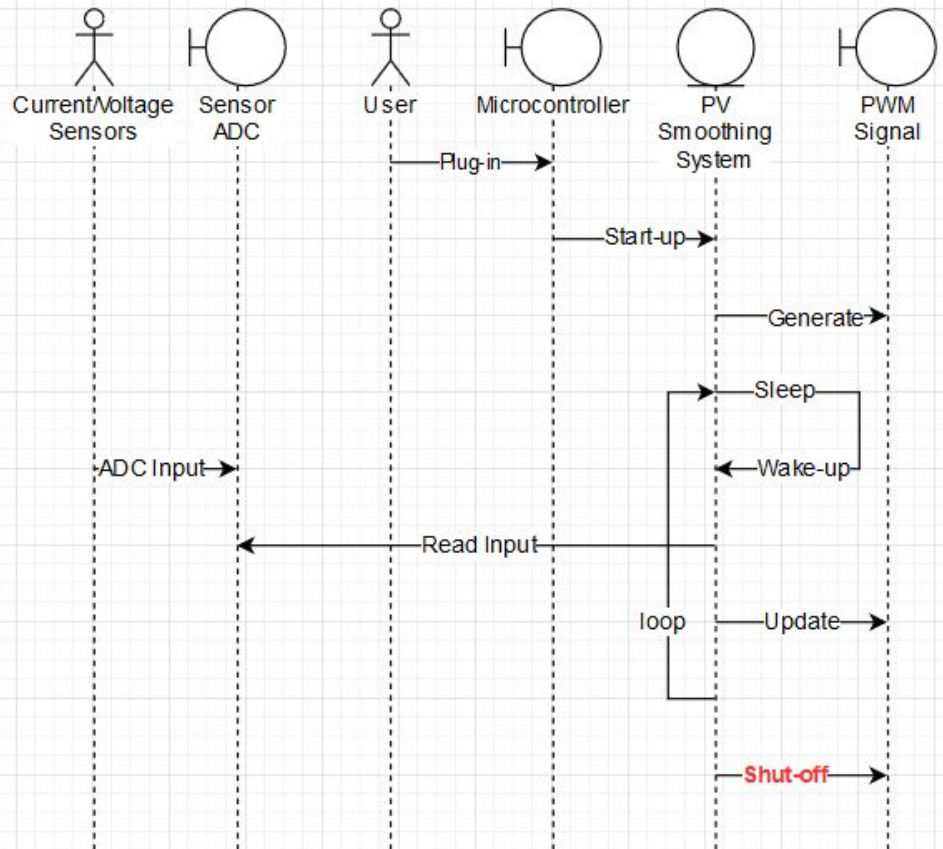
Sequence Diagram

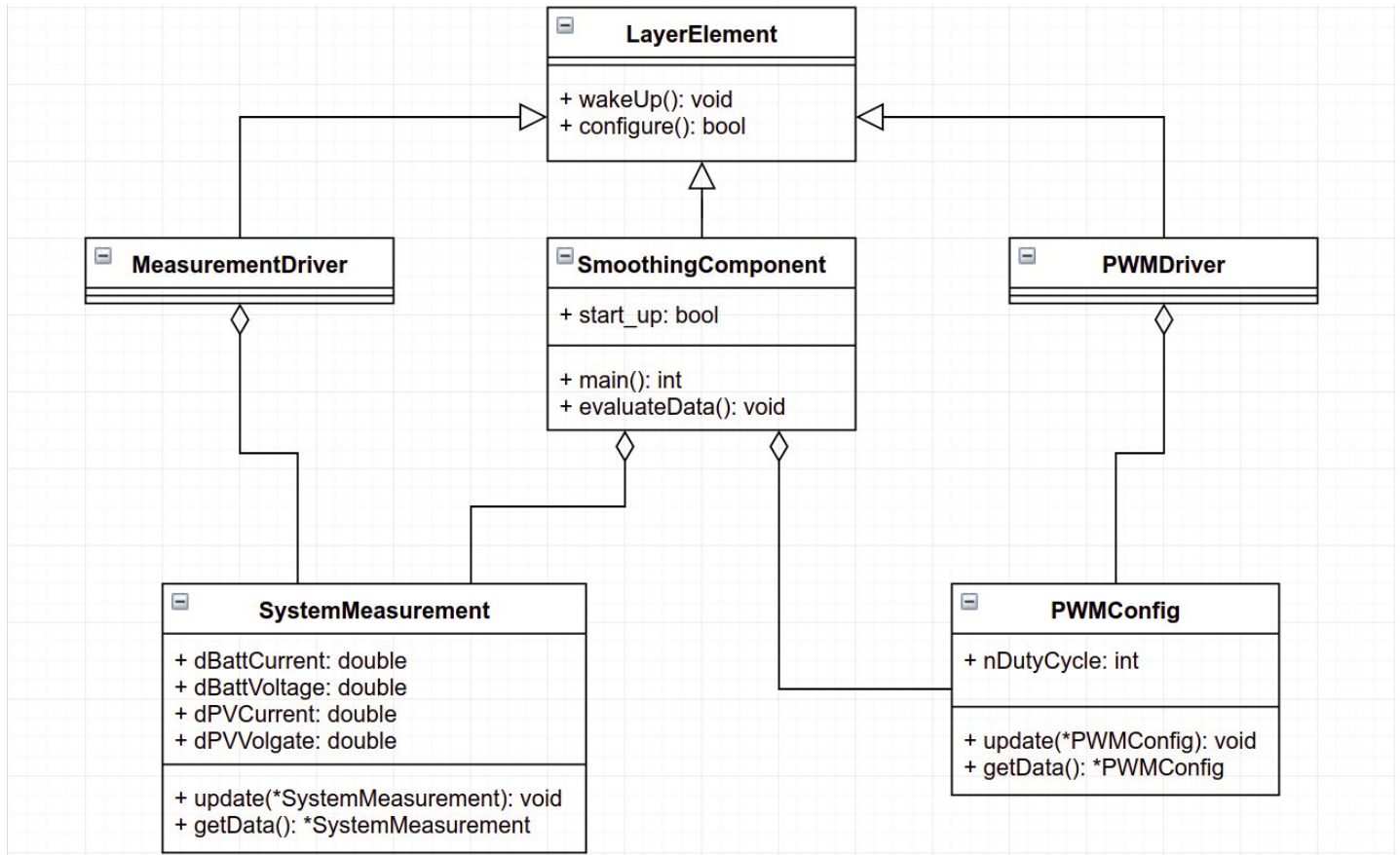## Current/Voltage Measurement

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Current/Voltage Sensors	Sensor ADC	User	Microcontroller	PV Smoothing System	PWM Signal

Plug-in →

Start-up →

Generate →

Sleep

← Wake-up

ADC Input →

← Read Input

loop — Update →

Shut-off →

Static Class Diagram

LayerElement

+ wakeUp(): void
+ configure(): bool

MeasurementDriver

SmoothingComponent

+ start_up: bool

+ main(): int
+ evaluateData(): void

PWMDriver

SystemMeasurement

+ dBattCurrent: double
+ dBattVoltage: double
+ dPVCurrent: double
+ dPVVolgate: double

+ update(*SystemMeasurement): void
+ getData(): *SystemMeasurement

PWMConfig

+ nDutyCycle: int

+ update(*PWMConfig): void
+ getData(): *PWMConfig

Framework/Tool Kits

Texas Instrument's Code Composer Studio (CCS) and the embedded CCS compiler will be used to develop and debug the software for this project.

System Architecture

Component Layer

SmoothingComponent

Driver Layer

MeasurementDriver

PWMDriver