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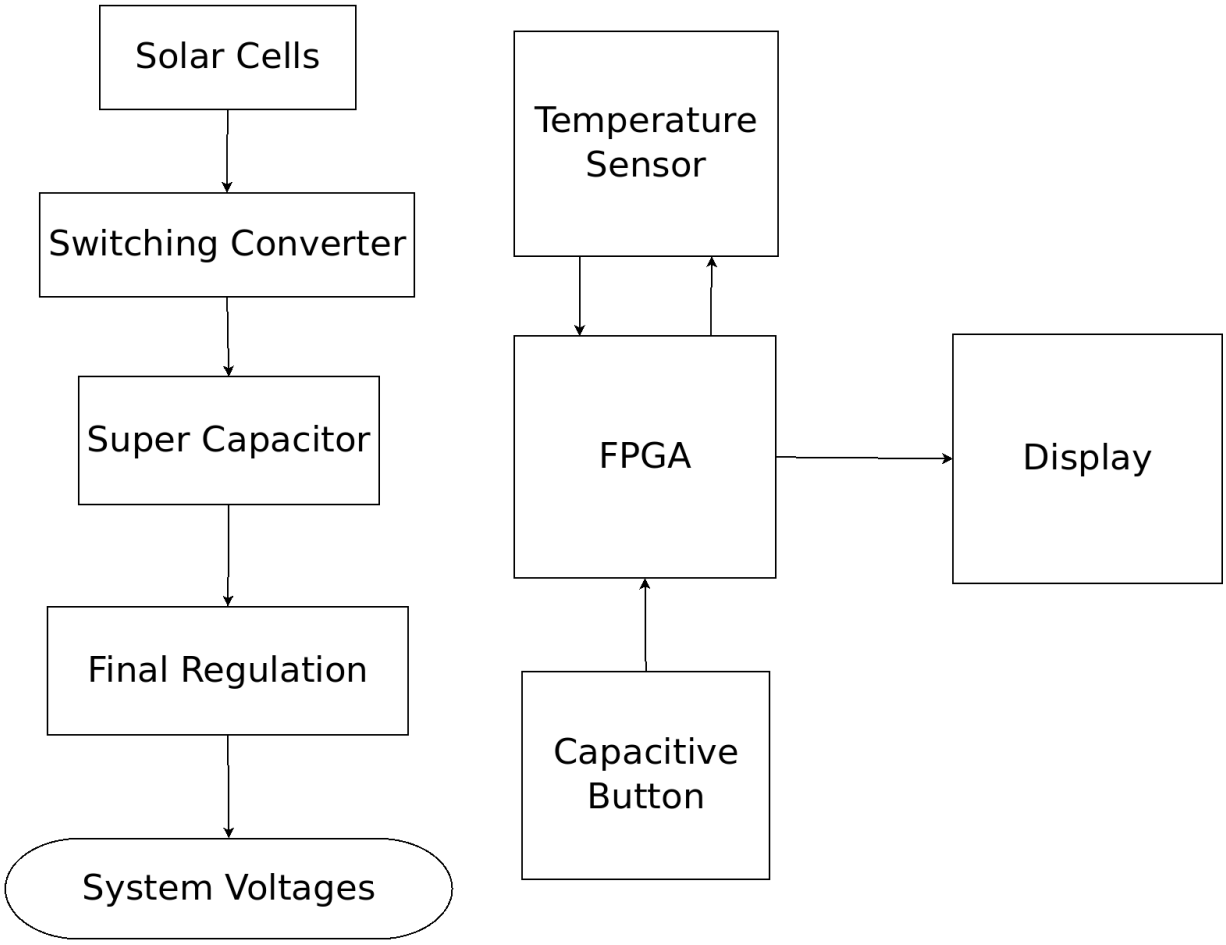
Description: Functional Decompositions

Table of Contents

System Level 0 Decomposition	
Power System Level 1 Decomposition	
Display System Level 1 Decomposition	
Temperature System Level 1 Decomposition	
User Interface System Level 1 Decomposition	
Power System Level 2 Decomposition	
Display System Level 2 Decomposition	
Temperature System Level 2 Decomposition	
User Interface System Level 2 Decomposiston	

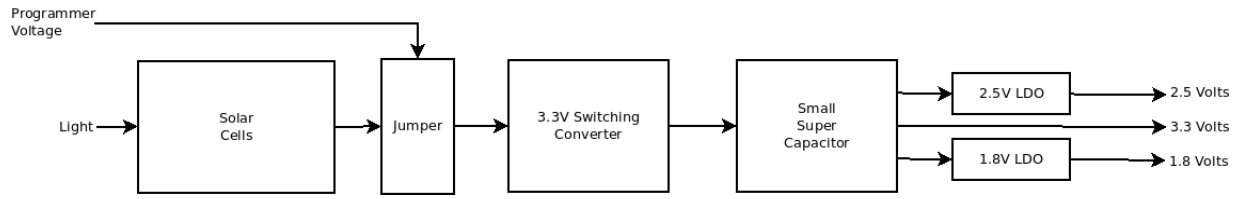
Revision History	
13/05/2021	Initial creation, level 0 and 1 diagrams added

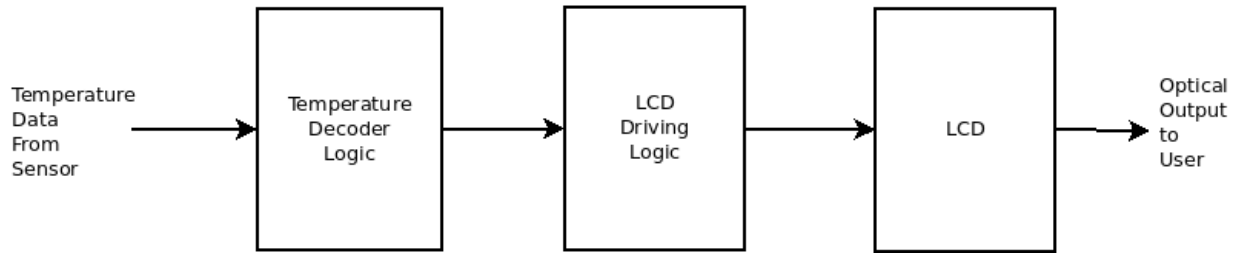
System Level 0 Functional Decomposition

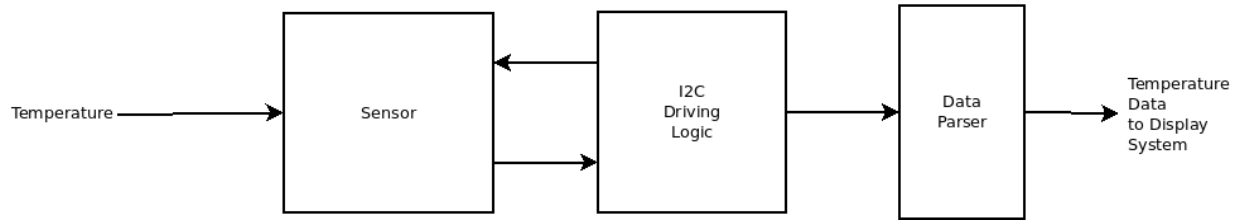


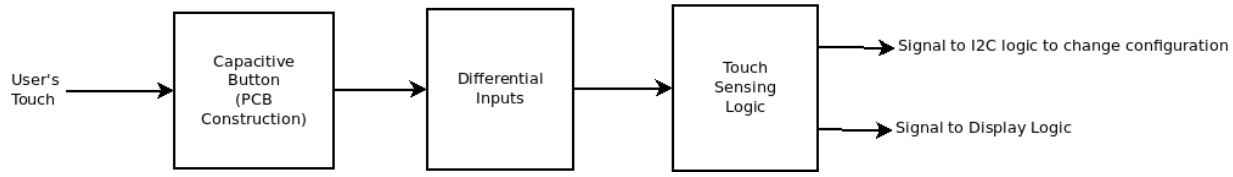
Inputs	Outputs
-Ambient light or sunlight -Temperature Data	-Temperature Data to User via Display

Description: The system converts the temperature to optical data transmitted to a display which the user can read. The system is powered by solar cells.

Power System Level 1 Functional Decomposition	
	
Inputs	Outputs
-Light -Voltage from Programmer	-1.8 V -2.5 V -3.3 V
Description: Converts solar or ambient light input to 1.8, 2.5, and 3.3V voltages. Optionally, voltage supplied by a programmer can be used as the source instead. The raw solar voltage is switched to 3.3V, which is fed into a large decoupling capacitor (supercapacitor), which not only reduces noise on the power lines, but also doubles as brownout protection for the rest of the circuit. LDOs are further used to remove switching noise from the power rails.	

Display System Level 1 Functional Decomposition	
	
Inputs	Outputs
-Temperature Data from Sensor	-Optical Output via Display
Description: The display system converts the raw I2C data from the temperature sensor to the optical output viewed by the user via the display. Raw temperature data is first decoded into which segments need to be driven to display the measurement. The LCD driving logic then drives the LCD to the pseudo AC spec as per the data sheet, such that the RMS voltage to any segment is zero volts DC.	

Temperature System Level 1 Functional Decomposition	
	
Inputs	Outputs
-Temperature	-Parsed temperature data to give to display system
Description: The sensor is configured over the I2C. The sensor will detect the ambient air temperature or the skin temperature of the user. The I2C bus will transfer the raw data from the sensor to the parsing logic within the FPGA core. The parsing block will convert this raw data into a useable measurement to be sent to the display logic.	

User Interface System Level 1 Functional Decomposition	
	
Inputs	Outputs
-User's Touch	-Signal to I2C logic to change sensor configuration - Signal to Display Logic
Description: When the user presses the capacitive button, the touch will be detected by the FPGA core logic using a differential input. Once this input is received, the sensing logic will assert a signal to the measurement logic to change the output of the parsed data. This change will be reflected on the display with a change from metric to imperial of vice versa.	

Power System Level 2 Functional Decomposition	
Inputs	Outputs
Description:	

Display System Level 2 Functional Decomposition	
Inputs	Outputs
Description:	

Temperature System Level 2 Functional Decomposition	
Inputs	Outputs
Description:	

User Interface System Level 2 Functional Decomposition	
Inputs	Outputs
Description:	