

Hierarchical System Design

Introduction

Big Picture

Towers + Car Parking + Garden to Support 1000 Families



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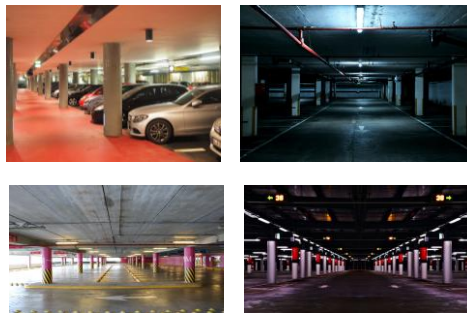
Prof. Kurian Polachan, IIIT-B

Details...

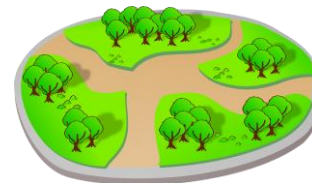
Towers



Garage

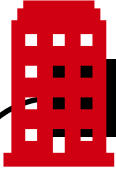


Park

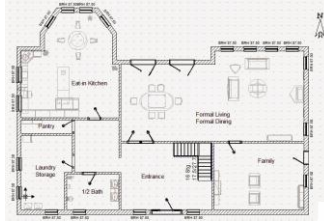


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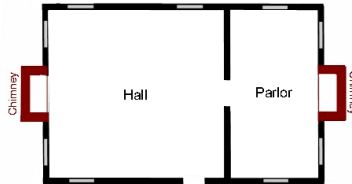
More Details...



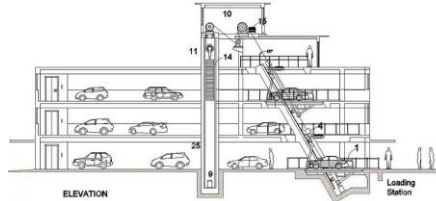
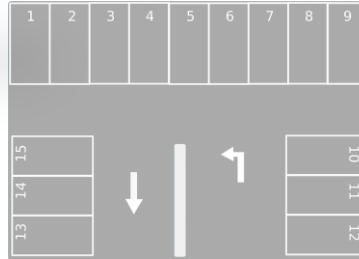
Tower-A



American hall and parlor house floor plan



Garage-A



Park-A



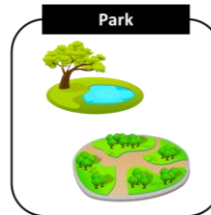
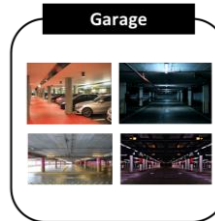
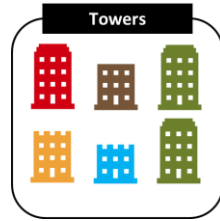
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Levels of Detailing

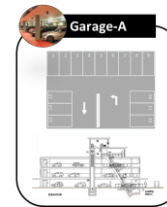
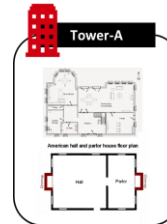
Level-1



Level-2



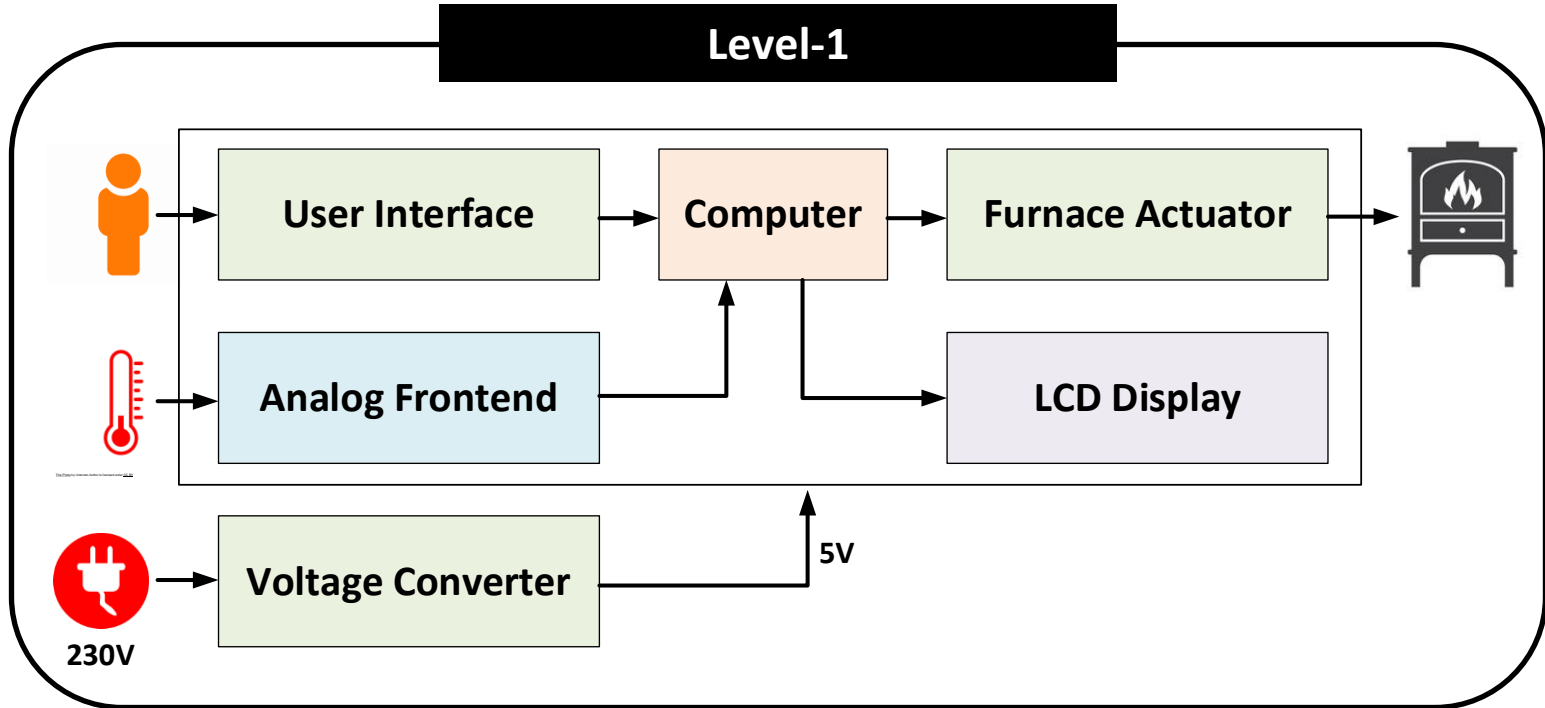
Level-3



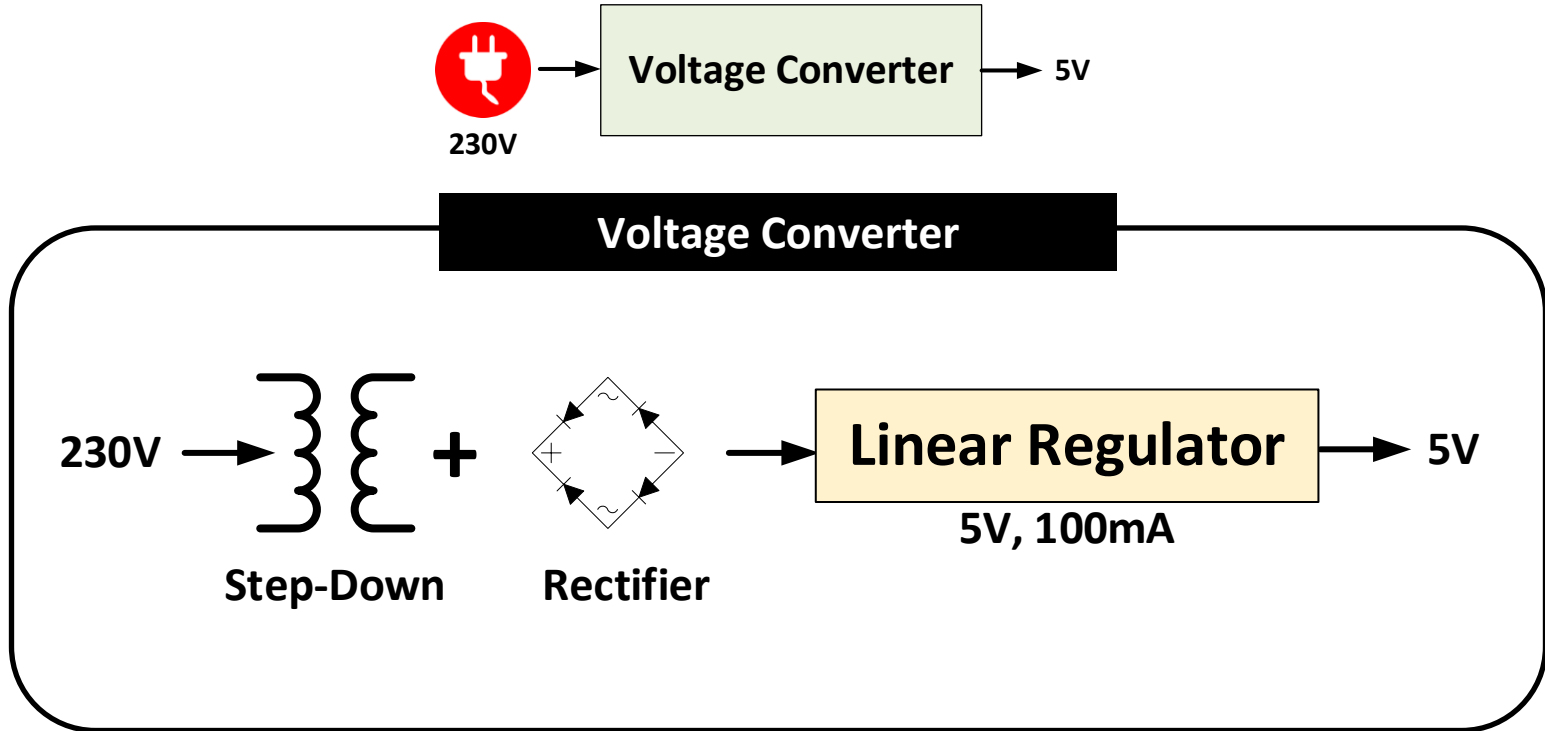
Design Steps

E.g., Thermostat

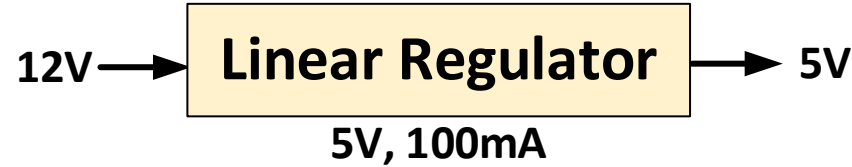
Level-1: Thermostat



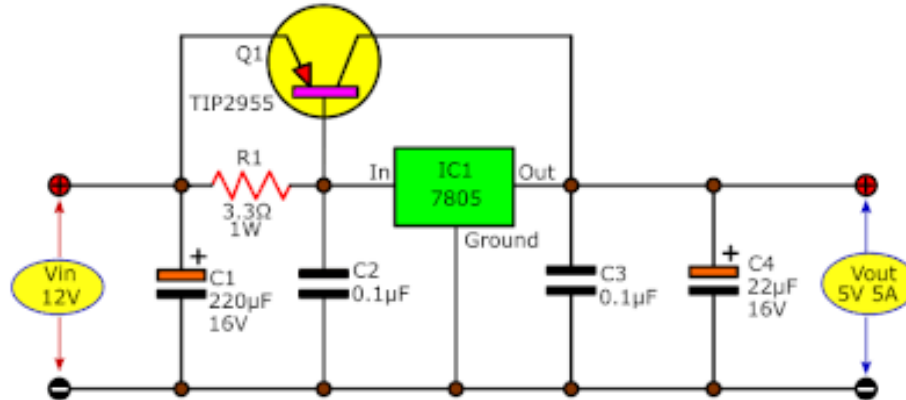
Level-2: Voltage Conv.



Level-3: Regulator

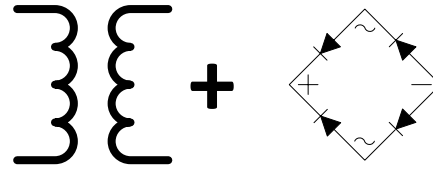


Linear Regulator



Ref: <https://www.eleccircuit.com/12v-to-5v-converter-step-down-3a-regulator/>

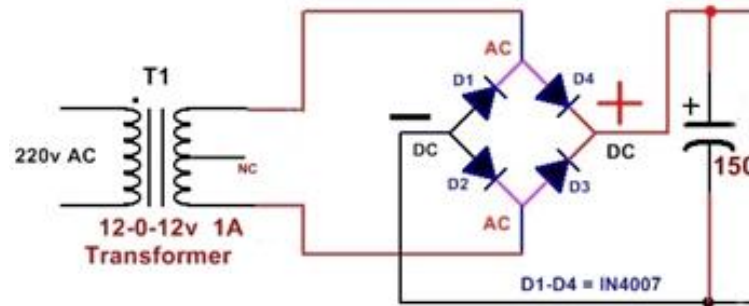
Level-3: Step-Down



Step-Down

Rectifier

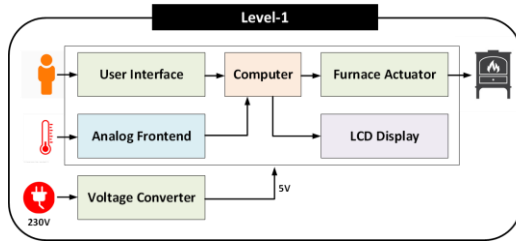
Step-Down & Rectifier



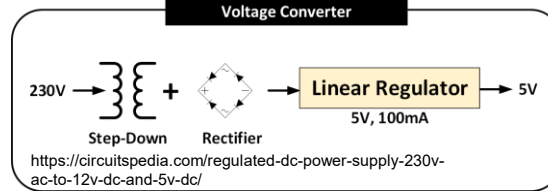
<https://circuitspedia.com/regulated-dc-power-supply-230v-ac-to-12v-dc-and-5v-dc/>

Thermostat

Level-1



Level-2

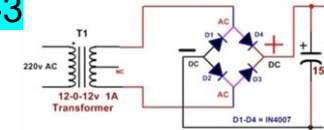


Level-2

e.g., Analog Frontend

Step-Down & Rectifier

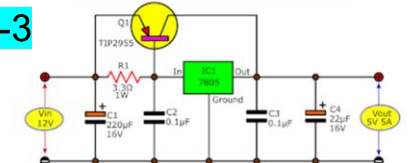
Level-3



<https://circuitspedia.com/regulated-dc-power-supply-230v-ac-to-12v-dc-and-5v-dc/>

Linear Regulator

Level-3



Ref: <https://www.eleccircuit.com/12v-to-5v-converter-step-down-3a-regulator/>

Level-3

Buffer

Level-3

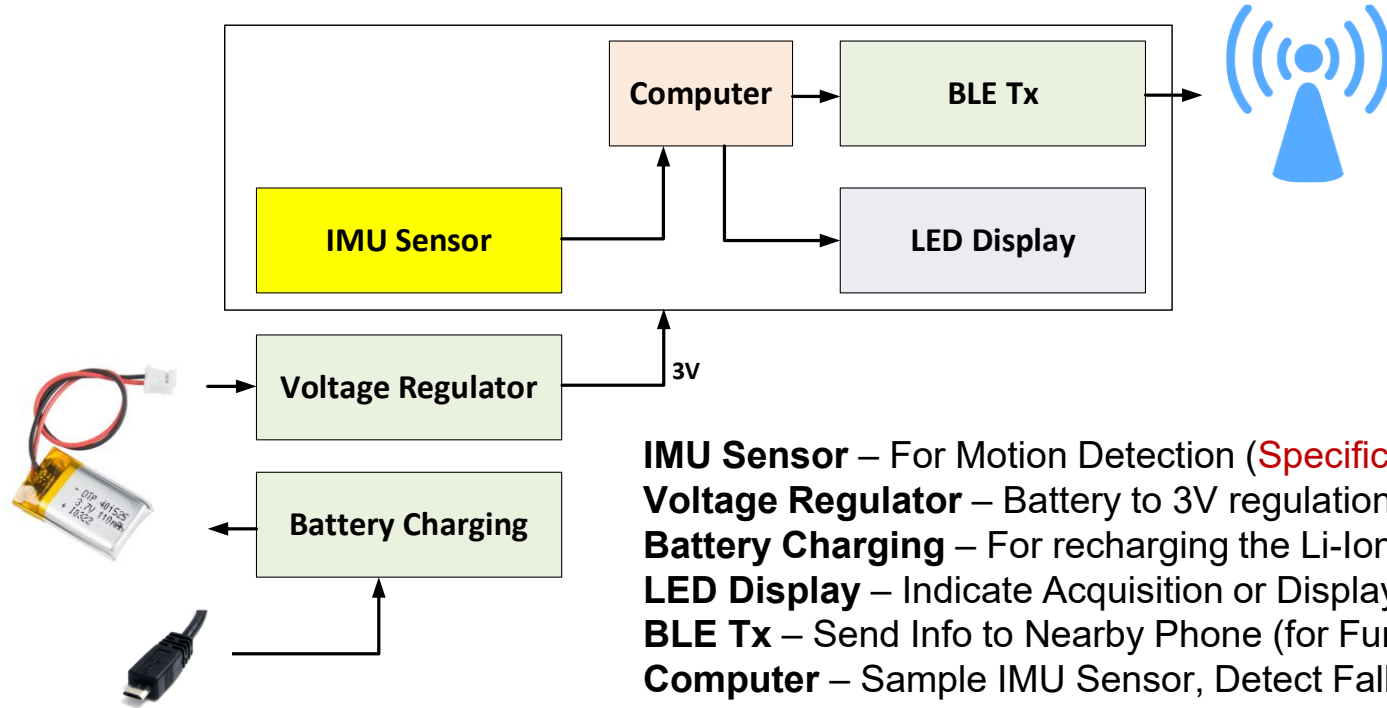
Filter

Level-3

ADC

Exercises

Fall-Detection Patch



IMU Sensor – For Motion Detection ([Specification](#), [Sample IC](#))

Voltage Regulator – Battery to 3V regulation

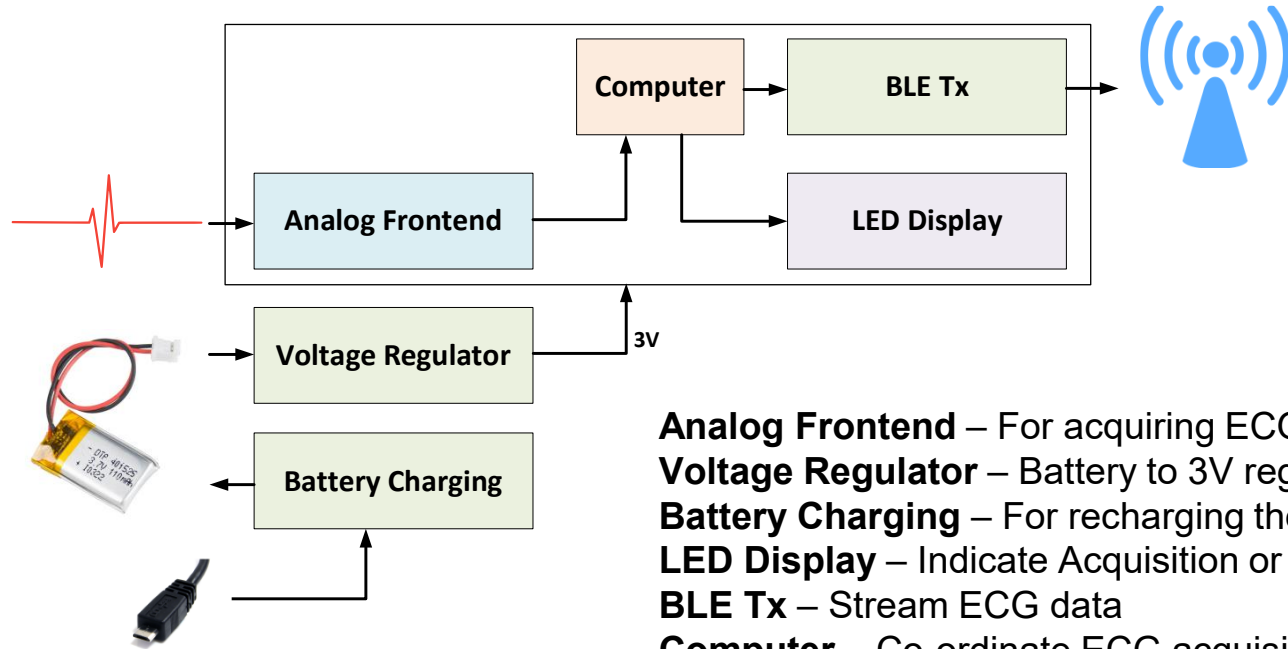
Battery Charging – For recharging the Li-Ion Bat

LED Display – Indicate Acquisition or Display Error Message

BLE Tx – Send Info to Nearby Phone (for Further Forwarding)

Computer – Sample IMU Sensor, Detect Fall, BLE Tx and LED displays

ECG Patch



Analog Frontend – For acquiring ECG

Voltage Regulator – Battery to 3V regulation

Battery Charging – For recharging the Li-Ion Bat

LED Display – Indicate Acquisition or Display Error Message

BLE Tx – Stream ECG data

Computer – Co-ordinate ECG acquisition, BLE Tx and LED displays