

Architecture Requirements

Task, Deliverable, or Feature Requirement	Description of Requirement
Powering the system	To power the system, we need to get 5volts, the supply will come from the mains ac source, then using a switching mode power supply we will convert the power from AC to 5v DC, the current should be minimum 2A to make sure that the system will operate in a good voltage level without flickering or dimming since we are using GSM modem and it requires 1A.
Connecting the Arduino to weighing sensor (using data pin and clock pin)	<p>The load cell outputs cannot be connected directly to the Arduino, although Arduino board can detect small changes in voltage (4.9 mV) but this resolution still not enough for reading from the load cells, a dedicated amplifier board is being used to amplify the load cell voltage.</p> <p>To connect the sensor a synchronous serial protocol is used via two pins one for the data and the other for the clock signal.</p>
Connect the load cells to the Hx711 board	The board Hx711 can be used with two or four cells, in this system we will use four load cells to put them under the bed legs, the four load cells will read the weight of the bed added to the human weight, hence controller can detect when the human leaves his bed.
GSM modem (Serial)	GSM modem communicates with the Arduino using two serial pins (Tx) which is the transmitter and this pin should be connected to a digital pin on the Arduino to work as receiver, the other pin is the (Rx) pin which is the receiver pin, this pin should be connected to digital pin on the Arduino board to act as serial transmitter

IR sensors (Analog)	A set of two IR sensors will be used in this system, the output of the IR sensor is an analog voltage that is reverse proportional to the distance, a threshold will be assigned and the sequence of the sensors triggering will specify the movement direction, this method will be used to detect whether the patient is entering or leaving the room.
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Software Requirements

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Arduino IDE	<p>The Arduino integrated development environment is the platform needed for writing the Arduino code, the Ide can be installed on windows or mac laptops, even there is a web-based version of this software.</p> <p>All manufacturers of the sensor and actuators build a library for their product to make easier to use for Arduino developers, for this purpose the Arduino IDE can be loaded with tons of sensor libraries.</p>
HX711 library	<p>This board library helps to read the analog to digital conversion result, this board has 24bit ADC while the Arduino has 10bit ADC, this means high precision reading for small voltages coming from the load cells.</p> <p>The library has read command which will do the required communication with the board and get the result of the weight stored on the Arduino ram.</p>
GSM library	<p>GMS modem and most modem types are communicating with controllers using Serial protocols which is called UART (universal synchronous a synchronous receiver transmitter.</p> <p>This protocol will be used to send ASCII commands called (AT: attention) commands. For each GMS modem there are a pdf file that exactly specify the required AT command for doing certain task like sending SMS or make a call or even read the operator's name and time.</p>

IR sensor analog read	Ir sensor gives analog output , there are a library on the Arduino to read the analog voltage from any analog pins from A0 to A5.
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