



WIRELESS MONITRING OF IV FLUID IN HOSPITAL



INTRODUCTION

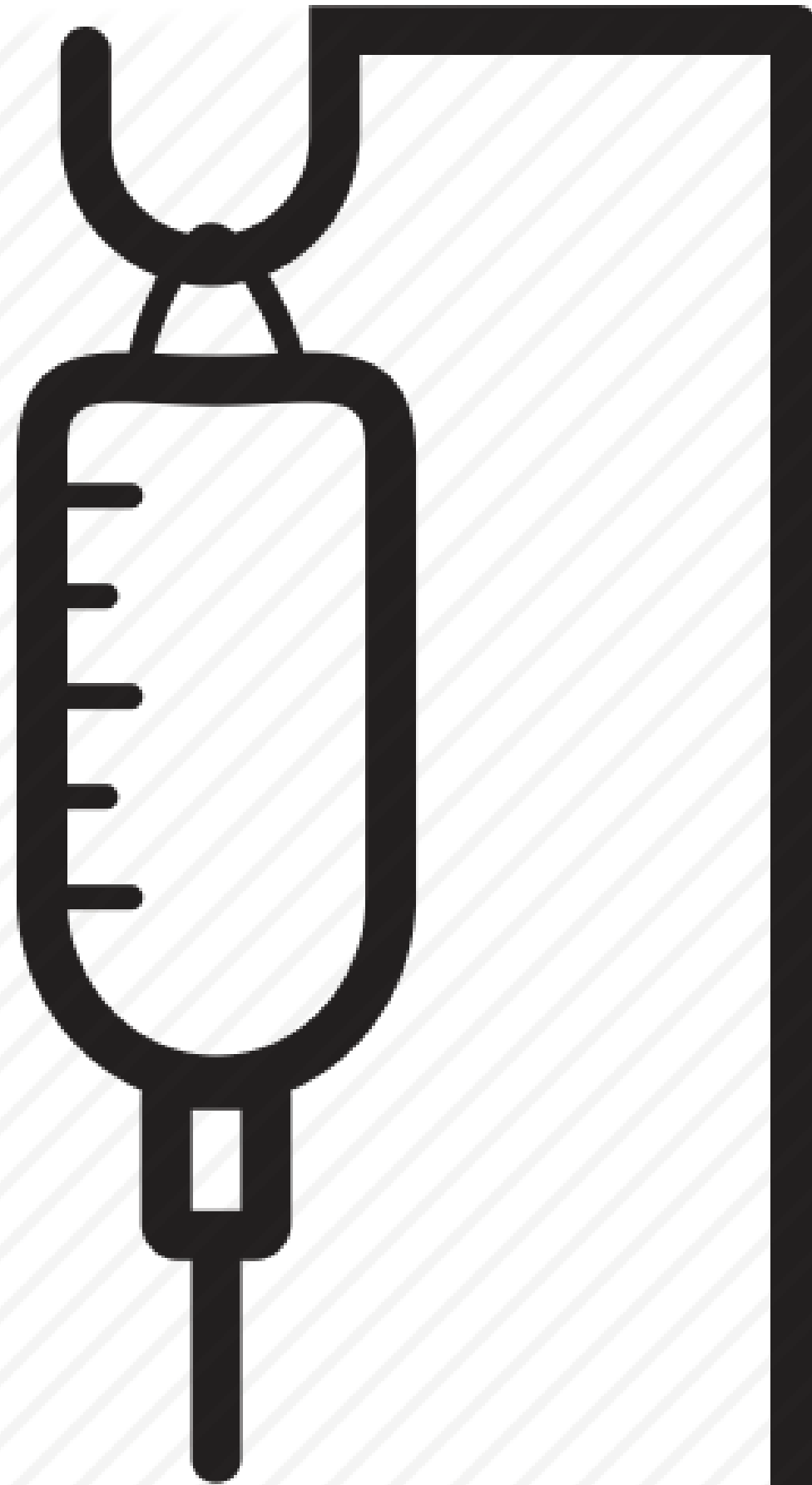
Intravenous fluid therapy has always been an essential part of patient during their hospital stay. The therapy is used to deliver liquid substances directly into the vein of the patient. The IV fluid therapy is necessary in the following cases:

- Fluid Resuscitation
- When the external fluid intake is not viable through oral routes
- compensation of fluid loss
- Uneven distribution of internal fluid.

There is no system for monitoring of the bottle or drip chamber of this therapy. This particular task is done by the junior doctors or ward boy or nurses who know very little about the therapy which they handle. In several cases it may become fatal for the patient instead of life-saving. Air Embolism is a disorder which is commonly associated with intravenous therapy where an air bubble gets introduced in a blood vessel resulting in life-threatening situations.

To prevent such negligence, the proposed system will be used for the constant monitoring of intravenous infusion system in nursing homes/hospitals by integrating hardware devices like load cells, Wi-Fi enabled microcontrollers, power supply and few more.

The system will use traditionally present systems like IV stand with only slight modifications so as to prevent drastic changes which may cause disarray while usage.



OBJECTIVE

- The proposed system will use strain gauge-based load cell which converts the force exerted by the IV bottle into a measurable electrical output.
- The system will use Wi-Fi enabled microcontroller and monitoring system to measure the weight of the bottle and send it to server by router.
- The system uses the MQTT protocol to send the data between Wi-Fi enabled microcontroller and monitoring system and display .
- The system uses GUI for ease of use.

REQUIREMENT



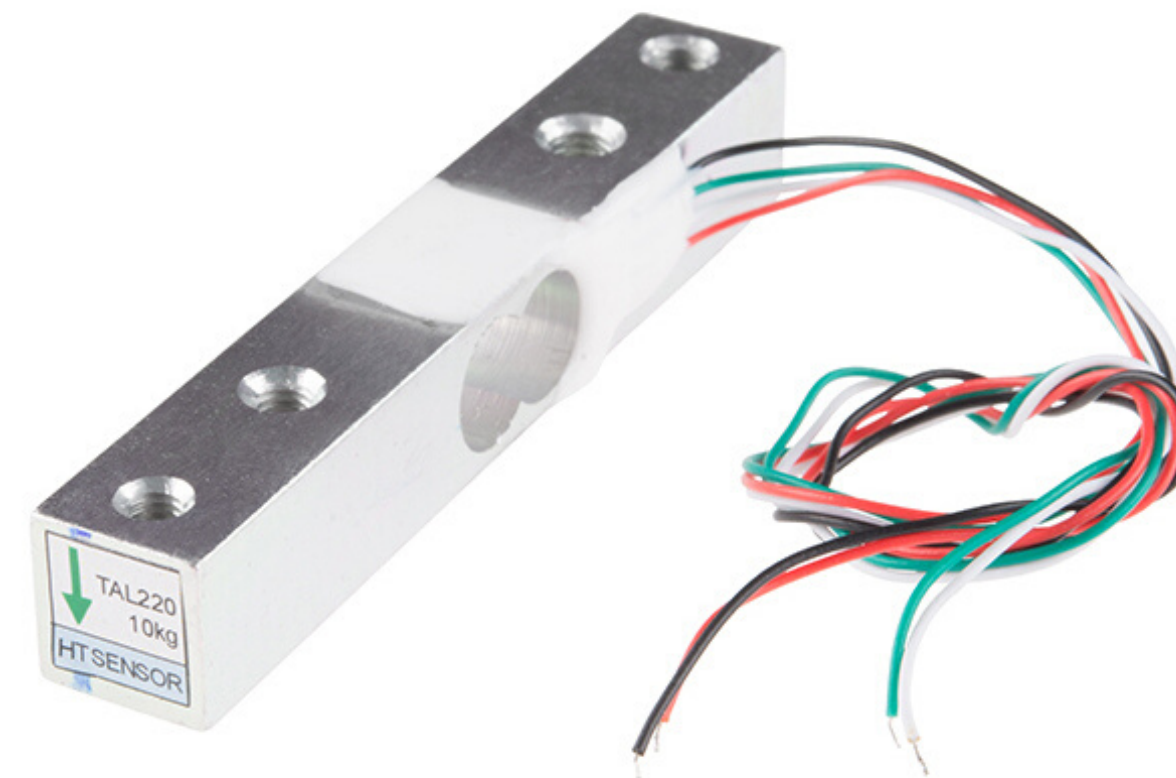
LOAD CELL

load cell is a transducer which convert force into measurable electric output. There are four strain gauges in the load cell. When weight is applied, the strain changes the electrical resistance of the gauges in proportion to the load. The load cell has 4 wire for connection with various terminal. Red is for +VCC, black is for GND, Green is +ve terminal (of output), white for -ve terminal (of output).

Specification

1. Rated load: 1kg

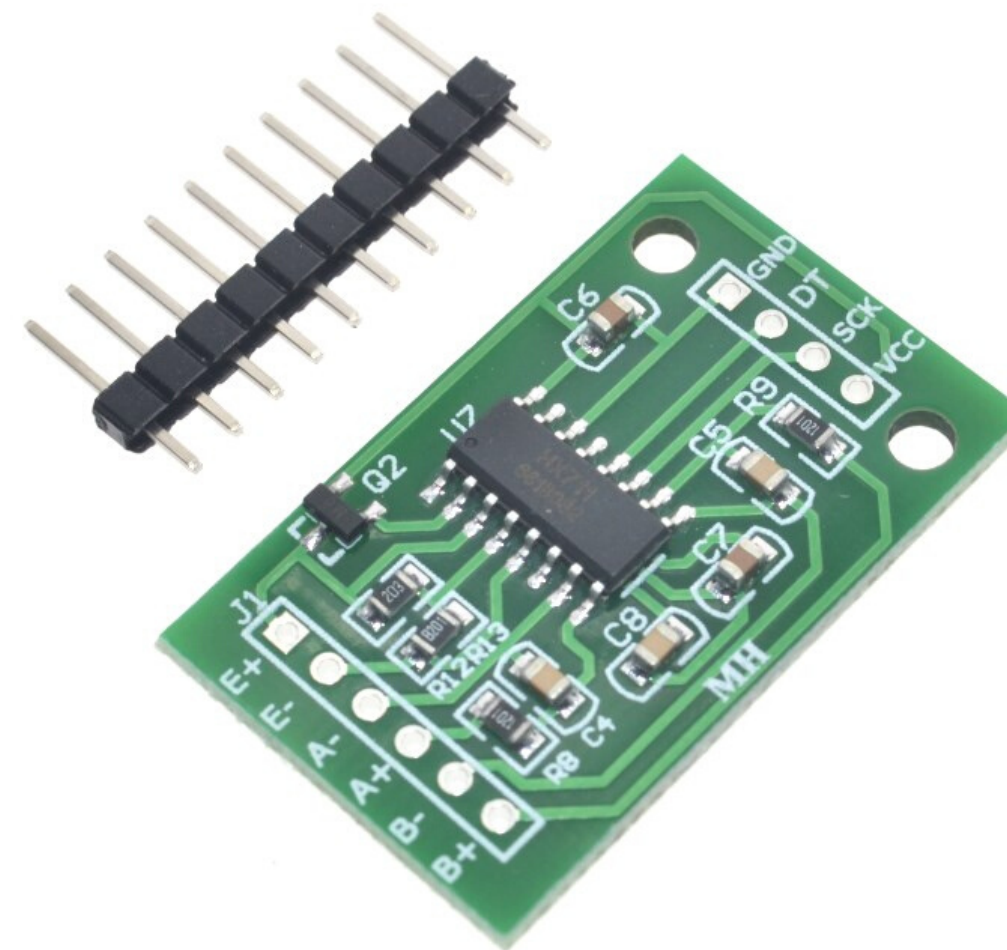
2. Rated output: $1.0 \pm 1.5\text{mV/V}$





HX711

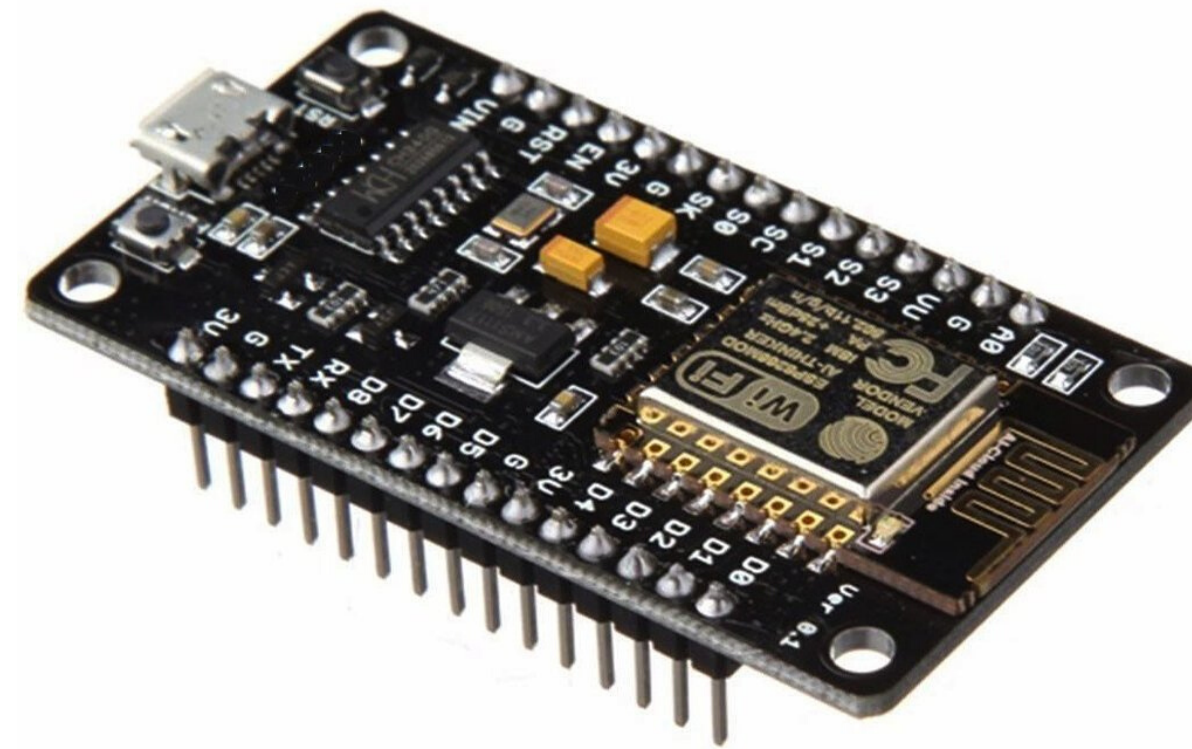
HX711 is a precision 24-bit analog to digital converter (ADC) designed for weigh scaled and industrial control application. The device not only convert the analog output of the load cell but also gives it a boost. The supply voltage ranges of the system is from 2.6 to 5.5 V





ESP8266

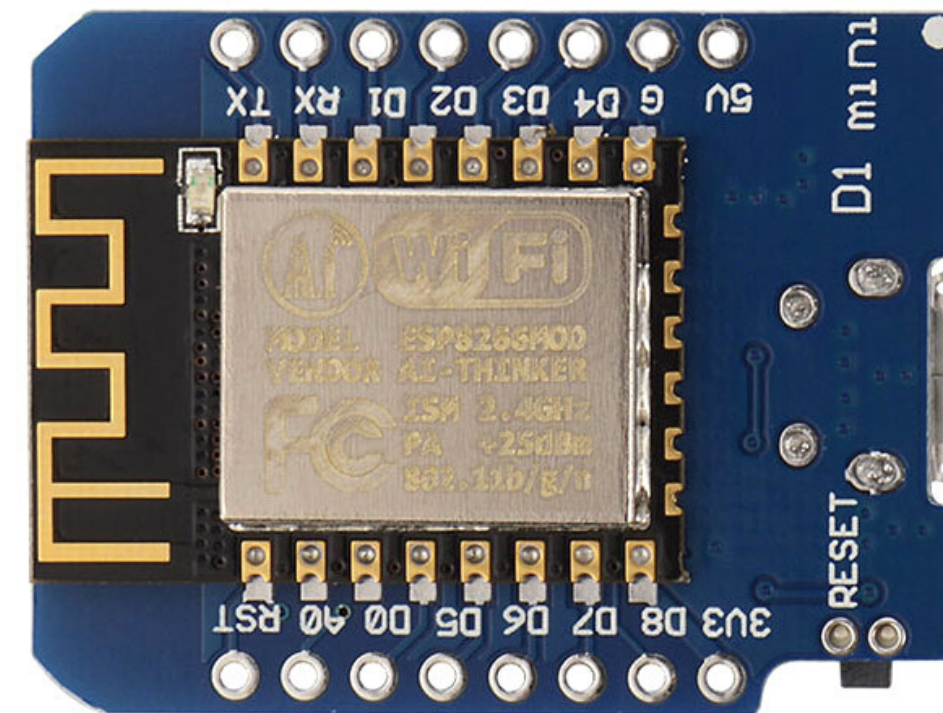
The ESP8266 is a low cost Wi-Fi microchip with TCP/IP stack and microcontroller capability. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections. The specific device used in this project is WeMos D1 Mini. This is used for its small size, 4MB flash Memory and Micro USB connections.





WeMOS D1 Mini

This is used for its small size, 4MB flash Memory and Micro USB connections. It has got 11 digital input/output pins and 1 analog pin (3.2 V max input). It operates at 3.3V DC power supply. Its dimensions are 34.2mm*25.6mm with a weight of 3gm. The device is compatible with Arduino, NodeMCU and MicroPython.





LITHIUM POLYMER BATTERY

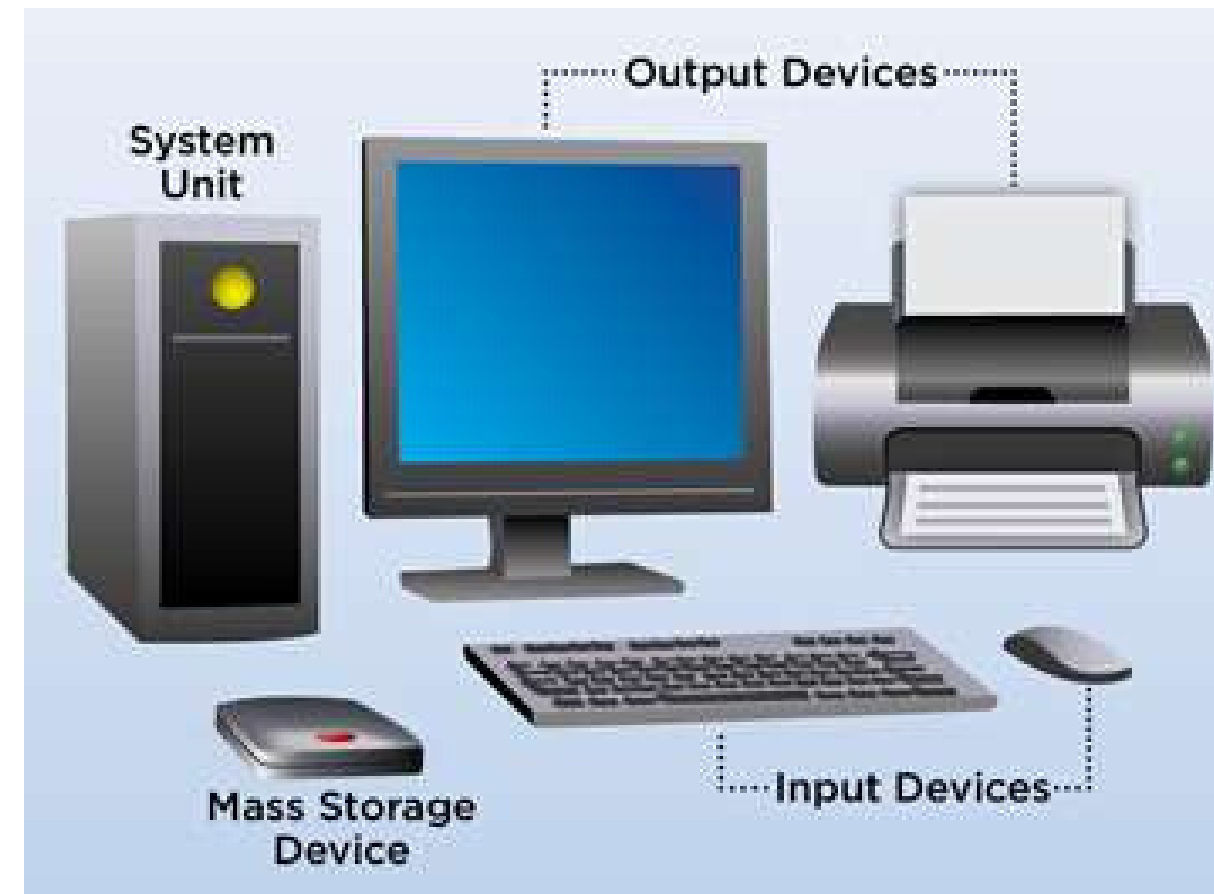
It is rechargeable batteries made up of lithium polymer instead of pure lithium which gives high energy and has less weight. This lipo battery supplies power to the circuit of the ESP8266 and other device which require such power.





DISPLAY WITH GUI

This system used for the display of the information can be anything, a laptop or even a simple personal computer. This system has to have the GUI application loaded beforehand and should not be slow and must be supported by an UPS system for a proper reliable functioning of the proposed project.





B4J

: The software B4J(Basic for java) is a rapid application development tool for desktop,server and IOT solution. This tool uses Visual Basic language for purpose .The compiled application can run on Windows,Mac,Linux and ARM boards.This is free and easy to use software which can be used to create a Graphical User Interface.





B4R

B4R(Basic for Arduino) is a software which allows programmers to write application for Arduino boards.The supported modules include ESP8266 and ESP32.This tool also uses Visual Basic Language.This is free open source tool which will help us in programming our Wi-Fi enabled microcontroller.



C O S T

- Tripler base-Rs 65
- WEMOS D1 Mini- Rs 82.92
- Battery shield- Rs 55.28
- Lithium battery- Rs 82.92
- Hx711-Rs 42.19
- Load cell-Rs 145.47
- Miscellaneous(IV bottle,Heat shrink tube,Connectors,etc)- Rs 200

Total-Rs 673.78



CONCLUSION

Intervenous therapy is an integral part of the medicine industry which has seen massive growth in the last decade. In this case, mannual monitoring of the IV bottles may not be enough due to huge number of beds per ward and the great number of wards in the hospital. This may result in the wastage of a large portion of manpower in the hospital besides being detrimental to the patient in case of accidents happen.