special cases for which it was possible to do all the necessary calculations has shown this proposition to be correct. Unfortunately, the general case has proven too difficult to tackle by ordinary means.

In this article we'll try a different approach; instead of trying to simplify the Evans function by itself, we'll try to establish the relationship between the Evans functions of two problems, possessing exactly the same spectrum with one exception: one single point λ_s belonging to spectrum of the first problem would be altogether expunged from the spectrum of the second problem. It will be shown that the corresponding Evans functions would indeed differ by the factor of $(\gamma - \kappa)$, where $\lambda = -\gamma^2$ and $\lambda_s = -\kappa^2$. The key to success lies in the Darboux transformation [6].

2.2 Yang–Baxter equation

In physics, the Yang–Baxter equation (or star-triangle relation) is a consistency equation which was first introduced in the field of statistical mechanics. It depends on the idea that in some scattering situations, particles may preserve their momentum while changing their quantum internal states. It states that a matrix R, acting on two out of three objects, satisfies. In one dimensional quantum systems, R is the scattering matrix and if it satisfies the Yang–Baxter equation then the system is integrable. The Yang–Baxter equation also shows up when discussing knot theory and the braid groups where R corresponds to swapping two strands. Since one can swap three strands two different ways, the Yang–Baxter equation enforces that both paths are the same.[7]

3. Design and manufacture electronic scales for adult patients

3.1 Design Requirements

After learning about the device is used in Bach Mai hospital and survey the actual requirements of the Academy of Sciences Center in Bach Mai hospital room, consult edit, change of function, way use, they put out requests for product design as follows:

Provide information and time: It provides functions such as patient data, time balance information, and patient weight. Include the following information: date, month, year, and hour, minute. To ensure accurate time clock timer device must correspond with the actual clock, independent operation, timer continuously even if the device is not powered. In addition, the device must provide custom functionality for the time value convenient to use.

Display and user interface: Weight display information visually. Also need to show real-time information to the user can install real-time information, dates.

Accurate measurement of patient weight: Equipment function is measured through patient weight 2 pylons. The system uses two sensors placed opposite each other, the weight is measured as the sum of two sensors, namely the two load-cell, according to the general principles of synergy. Weight is measured from 0 degrees to 100 kilogram, gram resolution 100, the error does not exceed 1%.

Table 1: Weight - volume – frequency relational table.

Weight (kg)	*Volume* (ml)	*Frequency (per minus)*
2	16-20	30
3	24-30	25
10	80-100	20
20	150-200	18
30	240-300	16
40	320-300	14
50	400-500	12
60	480-500	10
70	560-700	10

Data Storage patient information 5 most recent measurements: Device automatically stores patient information 5 most recent use. Information stored includes: measured weight and balance time, stored data even when there is no power supply for the device. This is a new feature compared with the current device is added at the request of the Academy of Sciences Center of Bach Mai hospital room.

Print patient information data upon request: It provides printing functions in place of the patient data are measured or existing patient information stored in the device. Printed information including measured weight of the patient and time scales.

Other Requirements: Anatomy of price mechanical balance for sure, there is no phenomenon falls, flip patient during the balance. Stable operating system in the hospital environment, easily replaceable parts if something goes wrong. Layout by Vietnamese, friendly, easy to use. Weight information, the time is displayed loud, clear, easy to see. Use two power supplies - one way or battery power to ensure people's mobile devices.

3.2 Design Schematic

We are in demand for offering optimum quality electronic scales for adult patients. Our system is widely used in medical designing industry and in medical stores for accurate measurement of very less quantities. These Precision scales are designed with perfection to offer highly accurate results. Hardware structure is built on the microcontroller device stability. The circuit was designed and tested in accordance with medical standards of the Ministry of Health, Vietnam. We also simulate the operation of the device and assess the damage can occur.

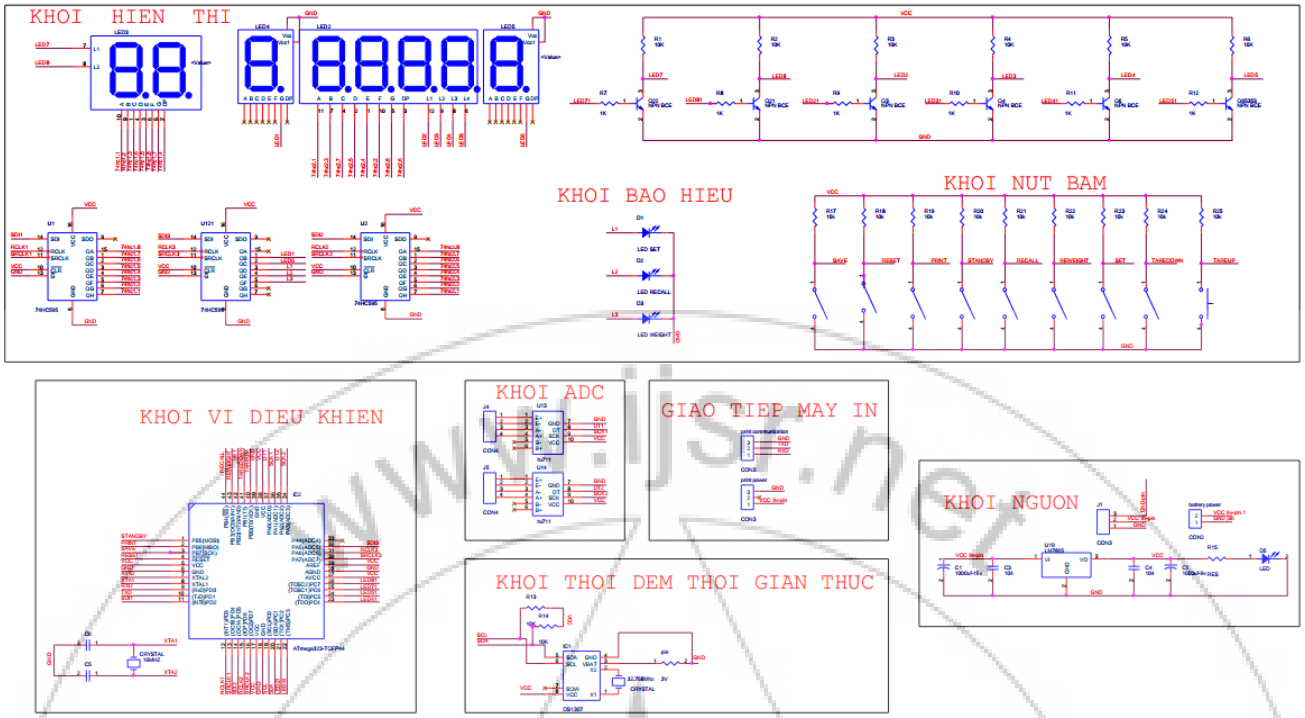

Figure 1: The schematic of electronic scales for adult patients

3.3 The mechanical design

After design the controller for the device, we conduct drawings mechanical design of the weight closer to weighing patients in bed is used in Bach Mai Hospital. The load cell is customize for widely use, it not depend on the shape, structure in Bach Mai hospitals.

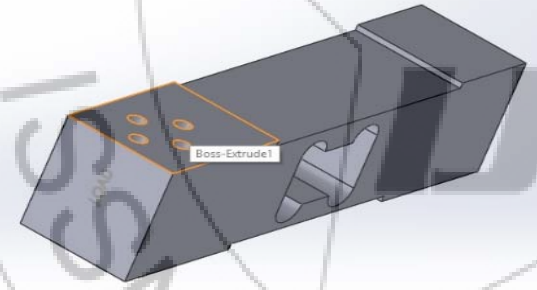

Figure 2: The 3D model of load cell mechanical design

We also redesigned the rack mount system with load cell ensuring aesthetic and safety techniques while balancing patient as well as the weight moves.

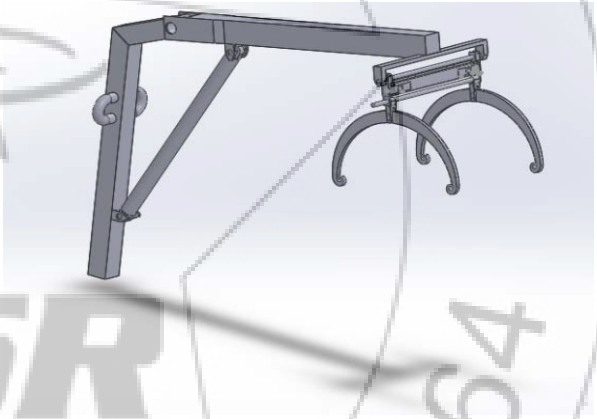

Figure 3: The body of the device on complete balance

4. Results

The device is fabricated research. The process for testing active devices to achieve good results. The figure 4 below describes the stability of the device to change the patient's weight. However, some devices also limited as Interface with the user interface is not friendly design uses 2 power supply circuit is not optimized, mechanical part design accuracy is not high.

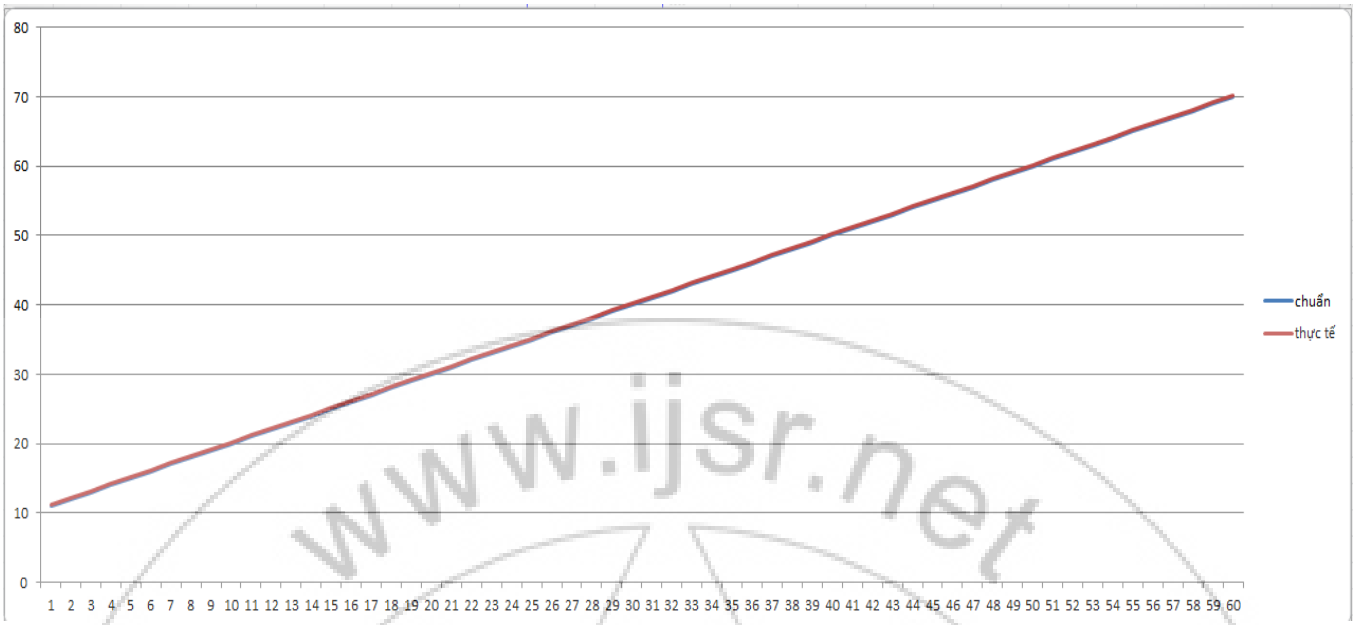

Figure 5: Results of weight on weight equipment

We will continue to improve the interface with the user interface, and battery charging circuit design using the adapter, component mechanical design to achieve high precision, achieving aesthetic techniques in use. Besides, we will store patient data into the computer by wireless communication.

5. Conclusions

We had complete design of mechanical components and control circuits fulfill the function. The device's balance is stable performance, measured values of patient weight exactly to specifications given. We also have some backup circuit for testing and replacement while the circuit's weighbridge controller at the hospital is in trouble. Process transparency test at the hospital tomorrow to see devices achieve high precision stable, ready to be put to use in the future in Vietnam

References

[1] Brass, Brian (2006). ""Candlesticks, Part 1", Equilibrium, No. 1". Isasc.org. pp. 3099–3109. Retrieved 2014-02-26.
[2] John W. Evans. Nerve axon equations. III. Stability of the nerve impulse // Indiana Univ. Math. J., 22:577-593, 1972/73.
[3] Robert L. Pego and Michael I. Weinstein. Eigenvalues, and instabilities of solitary waves. // Philos. Trans. Roy. Soc. London Ser. A, 340(1656):47-94, 1992.
[4] Bjorn Sandstede. Stability of travelling waves. // Handbook of dynamical systems, Vol. 2, pages 983-1055. North-Holland, Amsterdam, 2002.
[5] Jian Deng and Shunsau Nii. An infinite-dimensional Evans function theory for elliptic boundary value problems. // J. Differential Equations, 244(4):753-765, 2008.
[6] F. Gesztesy, Y. Latushkin, K. Makarov. Evans functions, Jost functions and Fredholm determinants // Archive for Rational Mechanics and Analysis vol. 186, N.3, pp.361-421.
[7] Gateva-Ivanova G., S. Majid, Set theoretic solutions of the Yang-Baxter equation, graphs and computations, J. Symbolic Computation , 42 (2007), pp. 1079-1112.

Author Profile

Le Xua Canh is working at equipment biomedical engineer at the Department of Department of Medical Supplies & Equipment. He has 10 years of experience in medical devices.

Kien Nguyen Phan is Lecture at Department of Electronics and Biomedical Engineering, School of Electronics and Telecommunication, Hanoi University of Science and Technology. He has over 10 years' experience in biomedical equipment design, signal processing and teaching.

Hoang ChuDuc is Researcher at Department of Electronics and Biomedical Engineering, School of Electronics and Telecommunication, Hanoi University of Science and Technology. He has 8 years' experience at researcher in biomedical equipment design, signal processing and teaching.