

2007 TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY : Electronics

PROJECT : Listen to Your Heart

AWARDS : Medicine and Health Second Award

**SCHOOL : S.K.H Bishop Mok Sau Tseng Secondary
School**

**FINALISTS : Tso Shuk Han
Yau Lai Yin**

COUNTRY : Hong Kong China

APPENDIX 2

ABSTRACT OF EXHIBIT TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY : Electronics

TITLE : Listen to Your Heart

NAME : Tso Shuk Han, Yau Lai Yin

COUNTRY : Hong Kong China

Contents of Abstract: (maximum 500 words) include

a. Purpose of the Research

Nowadays people are getting unhealthy, especially the heart. Since the outbreak of SARS, the Hong Kong citizens cared more about their health.

In the past two decades, due to the technological advancement, many medical instruments that were used by doctors are now available to the public. One of the examples is the sphygmomanometer used for measuring blood pressure.

On the other hand, very few heart monitoring devices are developed for public use. As a result, there is a need that such heart monitors should be available to the public.

b. The device

Our device is a modified stethoscope, which electronic components are added to this common medical instrument. The device mainly consists of 3 parts:

1. The sensor: modified from ordinary stethoscope, which a condenser microphone is added to change the heart sounds into electrical signals
2. The signal processor: integrated circuits and resistor-capacitor couples, which the cost is much lower than digital electronic components, are used to amplify and filter the noise in the electrical signals.

The processor is divided into 3 stages:

- Preamplifier: Amplifies the electrical signals converted from heart sounds
- Low pass filter: Filters the noise in the signal. The

cut-off frequency is 600Hz, which most of the heart sounds are below 600Hz.

- Power amplifier: Amplifies the filtered signals before outputting into computers or earphones.
3. The output devices: it can be a computer or an earphone. In a computer, the heart sounds can be converted into graphs, enabling precise graphical analysis.

Since many abnormal heart conditions will alter the heart sounds, with the aid of computers and graphs, people can know whether their hearts are normal or not, and can seek for medical support before developing any critical situation. Moreover, abnormal heart sounds are more significant in graphs, so any heart problems can be discovered more easily.

c. Data

During an exhibition in Hong Kong, about 1000 people tried the device. Among them approximately 150 people were confirmed to have heart problems with abnormal heart sounds. Using our device, we discovered 109 of them. As a result, the accuracy of the device is about 72.6%

d. Conclusion

With the low cost of our device (~ € 9.80/US\$12.80), everyone would be able to afford it. As a result, people can check their conditions of their hearts more frequently, and would be able to discover any early heart problems.

評語

The purpose of this study is to develop a low cost stethoscope with modern electronics. The design is good and well executed.