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# Heart rate measurement and electrical pulse signal analysis for subjects span of 20–80 years

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## Abstract

The preliminary research constructs the heart beat or pulse measurement for medical science. The electrical pulse signal analysis that supports one significant clinical study. The research prototype focuses the pulse rate and analysis system which consist of hardware and software parts. The hardware uses the ATMEGA 2560 ADK R3 for processing the input optical sensors, output result to LCD, and record data into SD memory card. The software as embedded algorithm is designed for controlling the input/output parts. Research techniques are applied in term of analog to digital converter, I2C, and data grouping.

The 40 subjects are informed consent and measured with ethical research. Experimental result explains the subject behaviors with maximum/minimum pulse values, patterns, and similarity three groups. The distinctive point of medical and health science prototype is accuracy, durability, low power consumption, and cheaper price.



*Keywords:* Heart beat; Electrical pulse analysis; ADK R3 micro-controller; Optical sensor

## 1. Introduction

This research is a fundamental principle of the tools and programs to contribute to the development of health science. The initial focus on the pulse, which is one of the four vital signs (Puongthong Kraipiboon, 2014) with a significant indicator of the performance of the heart. Pulse caused by the compression of the heart (Lalita Achanuphab, 2014) to send blood around the body, causing pressure on the walls of the arteries as a result, blood vessel contraction and

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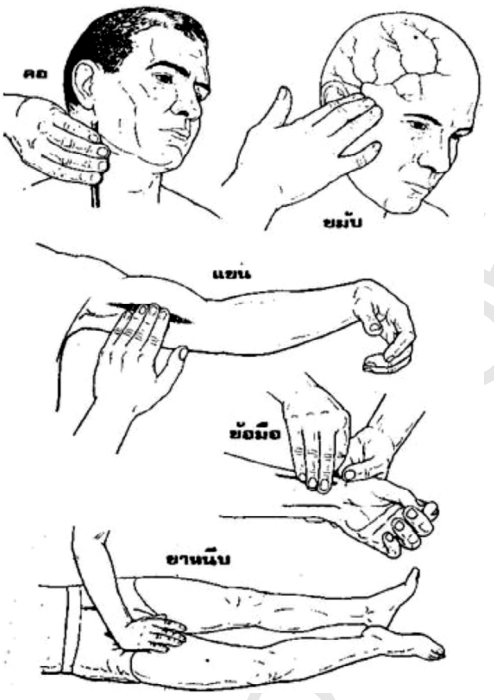


Fig. 1. Body pulse position (Lalita Achanuphab, 2014).

expansion of the cardiac rhythm. We can feel exactly where the artery running through or easy to understand. Pulse is the rhythm of the heart. Fig. 1 shows the location of a palpable pulse, the body will find that often are at the bone joints such as knees, wrists, arms, groin, head and neck. Pulse (Wannachart Kataichan, 2014) can be explained other words, the shock waves of blood flow caused by the compression of the left ventricular wall of the artery is expanded into a rhythm. The Pulse rate, heart rate or heart beat (Puongthong Kraipiboon, 2014) is called to convey the same meaning and reflect the pacing of the heart (beats per minute), by counting the beats of the artery within 1 min. We can take the pulse while measuring heart rate anytime factors influencing the pulse (Wannachart Kataichan, 2014), there are many factors which are important to the cardiovascular system and the issues which led to the creation of measurement parameters. The key questions such as age, the age of increased pulse rate will drop, sex after puberty, the average pulse rates of male to female is slightly lower. Exercise, the pulse rate increases with exercise, fever, increased pulse rate. To adjust to lower blood pressure, reduce the dose of certain medications, such as pulse, heart disease.

Q2 Fig. 2 shows a system of the heart and the pulse generator [12] described below.

1 Atrium begins to depolarize.
2 Atrium depolarizes.
3 Ventricles begin to depolarize at apex.
4 Ventricles depolarize.
5 Ventricles begin to re polarize at apex.
6 Ventricles re polarize.

## 2. Background

To explore the issue, and the importance of the issue of the rate of heartbeat is normal or abnormal, and it is an important issue that needs to be researched. The heart rate measurement error may lead to subsequent damage. This research is creating a measurement system to values that are more accurate, the rate of heartbeat or pulse, the number Q3 of times the feeling of the waves on the arteries of an inch at a time, 1 min (bpm: beat. per minute) (Table 1).



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