Citius Minds

STETHOSCOPEs

A Brief look at the Evolution of Stethoscopes
A LOOK AT THE EVOLUTION OF STETHOSCOPEs

A Beginning...

Medical devices are becoming portable and user-friendly so, that you don't need to visit the doctor unnecessarily. These medical devices are giving promising results and use extensively at homes. The technological enhancement is racing and changing the earlier invention's outlook. As remembering the old inventions in medical devices, one of the prominent and iconic inventions was of the stethoscope. We are all familiar with a stethoscope that hangs around doctor’s neck and marks as a symbol for them. Many are arguing that the technology is at its obsolete stage and may vanish very soon.

It has been 200 years for its invention and it was first designed with a wooden tube. In 1816, French physician René Laennec invented the first stethoscope to avoid the awkwardness of intimate contact with the patient to hear chest sound. In 1851, Irish physician Arthur Leared did some enhancement in design from monaural to the binaural stethoscope. In the
subsequent year, New York physician George Cammann redesigned the stethoscope that is still in use.

Picture credit: Wikipedia - Laennec’s stethoscope

From 1960 – 1970, it has gone through many designs and modifications. One of the major improvements was by Professor David Littmann of Harvard Medical School, he designed lightweight stethoscope with better acoustic sound. Later, 3M acquired Dr. Littmann’s patent and further introduced tunable diaphragm, ambient noise reduction, and Bluetooth stethoscope connectivity. These features protracted the real capabilities of the stethoscope.

Picture credit Wikipedia - Dr. Littmann’s stethoscope
As we progress in the technology, the traditional acoustic stethoscope is replaced by electronic stethoscope. And with the advent of smart devices, stethoscope has also become smart enough to record data, store data, transfer real-time data and visualize heart or lungs sound waveform on smartphones/tablets. These stethoscopes are app based that can connect wirelessly to smartphone or tablets or ipads and provide real-time heart and lungs sound visualization with a better user interface control.

**Top Technology Trends:**

Technology is moving too fast and so it’s hard to keep a track on them. The smart device, IOT, AI and Machine learning has revolutionized the world. There is a gigantic change in the technology of stethoscope too. The journey of the stethoscope from a wooden tube to the palm-size device has taken almost 200 years.

Therefore, to honor such a great invention, we came up with an overall trend analysis in this field for past few years. We performed this analysis in the year 2017 that might not give a complete overview as most of the patent has not published yet. This analysis is done to study the general trend in this field. It doesn’t provide a clear picture from the sub-technological perspective.
Seeing the above graph, it is evident that in last 2-3 years publication of patent in this domain has increased and 2016 seems to be the most promising year. The total number of the patent published with respect to publication year since 1990: a decline in the year 2017 can be attributed to the patent applications which have not been published yet.
Patent Filing Trend

The above graph gives insights that there is an increase in patent filing in the last two to three years. A total of 49 patents has been filed in the year 2016 which is the highest considering the timeline from 1995 to 2016.

Patent Filing Geographical Trend
The above graph shows the timeline from the year 1995 – 2005; it appears that the United States leading the chart by filing a maximum number of patent overall.

But considering timeline from 2006 – 2016, China came out to be a prominent filing country (2013 onwards). This trend depicts that China is now filing patents aggressively from last three years and giving tough competition to the US.
For analyzing assignee publication trend, we considered top assignees over the years. We removed individual inventors as assignees from our data, in order to sanitize before analysis. 3M Innovative Properties Co., Cheng Du Sizhong Kang Technology Co. Ltd., Beijing Saibn Technology Co. Ltd., and University Guangxi are top filing assignees in past three years.

**Present Technology Overview:**

The stethoscope has reached its digital age. New technological advancement is enriching the capabilities of the stethoscope. There are few other hand-held technologies emerging to replace stethoscope but still has not again that popularity among the doctors. It’s an arguable topic among doctors and
researchers, that hand-held ultrasound could oust the stethoscope. The major key players in the market of stethoscope are 3M, American Diagnostics Corporation, Cardionics Inc., GF Health products, and Jiangsu Yuyue medical Equipment and supply co., LTD.

ITAC identifies that in today’s market, three types of general stethoscope are available to consumers: 1. Acoustic 2. Amplifying 3. Digitizing and broadly it is categorized into two: Amplifying and Digitizing. Also, ITAC in its technology overview mentions three electronic stethoscope models that can transmit serial data for real-time transmission: 1. Littmann 3200, 2. Telehealth Technologies TR1-EF 3. Care Tone.

**Littmann 3200**

The most popular electronic stethoscope is Littmann 3200BH27; it has the capacity to reduce 85% of background noise and provide better listening power for obese patients. It can also record, save and playback up to 12 track sound records for different patients. These stethoscopes are quite popular and most trusted among doctors.

**Telehealth Technologies TR1-EF**

Telehealth Technologies TR series stethoscopes are the pioneer in the field of telemedicine. TR series are the telephonic digital stethoscope which allows
doctors to listen to real-time auscultation. And it also enables to connect
doctor and patient via video conferencing. This is ideal for institutional
telemedicine using broadband.

**Care Tone**

Care tone is the low bandwidth digital stethoscope, making it suitable for use
at home and clinical market. It also provides real-time listening to auscultation
and with the help of telemedicine facility, it reduces patient’s frequency to
visit hospitals.

**Other Prominent Players**

Thinklabs, a company found in 1991 by Clive Smith has designed the smallest
high powered stethoscope that can fit in your palm. This miniature
stethoscope claims to produce very high sound pressure levels, exceeding
100 times the decibels level of a conventional stethoscope.

*Picture credit: Thinklabs store - Thinklabs One - Digital Stethoscope*
Another product in the market is Eko Core Digital Stethoscope; it offers 40X sound amplification and noise reduction with a frequency response range optimized for auscultation of heart, lung, and bowel sounds. It can easily switch between acoustic and digitally amplified modes with a push button. Eko core digital stethoscope also enables the physicians to save, share and record heart or lungs sound in real-time. This digital stethoscope is a flourishing technology in the field of telemedicine. It is not only making the diagnosis comfortable but also treating long distance patients.

*Picture credit: Eko devices- Eko Core Digital Stethoscope*

**Claiming the future:**

Nowadays, artificial intelligence and machine learning are integrated with electronic devices to make devices smarter and reliable. The future is not far away when we will see AI and machine learning incorporated in the stethoscope. **Watson IBM** claims that artificial intelligence can change the way we look at stethoscope, as AI will give more time to physicians deal with the
patient than collecting and evaluating clinical data. Gartner, Inc., a research and advisory firm also predict the future stethoscope as an “intelligent thing” which will collect a massive amount of clinical data and AI give power the doctor’s assistance app to provide the physician with diagnostic support in real-time.
About US

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