ELECTRONIC STETHOSCOPE USING RASPBERRY PI

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College ***:*** *G.M. Institute of Technology, Davanagere*
Branch ***:*** *Department of Electronics and Communication Engineering*
Guide(s) ***:*** *Mr. Chetan B V*
Student(S) ***:*** *Mr. Bharath S*
Mr. Vikas H S
Mr. Manoj Gowda D K
Mr. Manikanta B

Keywords:

Wireless transmission of data, body temperature, condenser microphone, auscultation.

Introduction:

The most often used stethoscope is the acoustic stethoscope. They work by transmitting sound through air-filled hollow tubes from a chest piece to the listener's ears. . Acoustic stethoscopes have a flaw that digital stethoscopes are attempting to overcome. Wireless communication can be used to replace the hollow tube between the chest piece and the hearing piece, allowing for increased device flexibility and a reduction in pathogen transmission. The design of our idea is mostly based on an acquisition circuit, Raspberry Pi data processing, and telemedicine implementation. A real stethoscope head is linked with a microphone that records audible heart sounds that are acoustically amplified by the stethoscope as the initial component of a wireless stethoscope. The design also includes a body temperature monitoring and UV sterilization. The temperature sensor helps in acquiring patient's body temperature to basically analyze Health issue faced by patient by a safe distance and UV sterilization helps in sterilizing the real stethoscope head at the patients end for pathogen free environment.

Objectives:

To provide an interface that stores stethoscope readings using an acoustic stethoscope. To reduce noise disturbances received from the acoustic stethoscope end to the microphone. It can also amplify sound 25 to 50 times more as physicians need. To store the previous recorded data of the patient and send the data to a distant doctor with whom we regularly used to visit for similar problems. To read temperature of the patient to the doctor It also sterilize the patient contacted surface of the stethoscope.

Methodology:

This electronic stethoscope is powered by an embedded CPU, a Raspberry Pi. The sound of a heartbeat detected by a stethoscope head is captured using a condenser microphone. The heart sound, body temperature is collected and stored in raspberry pi and it is uploaded wirelessly via an email for auscultation by various medical professionals. Doctors can also listen to the recorded heart sounds by attaching a Bluetooth device to their phone or directly through the phone's speaker. The suggested system's block diagram is shown in. The system is split into two halves, one for patients and the other for doctors. The

sound and temperature are captured at the patient's side and then sound played back and temperature is shown to doctors when needed.

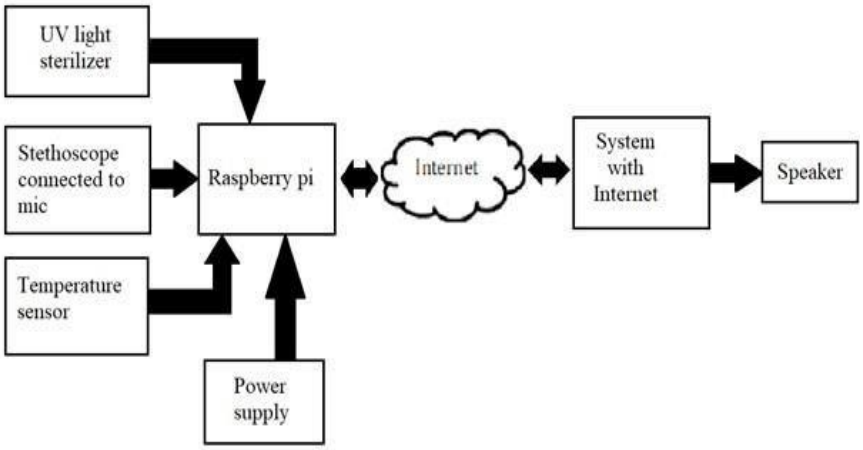

Figure 1 Block diagram of the proposed system

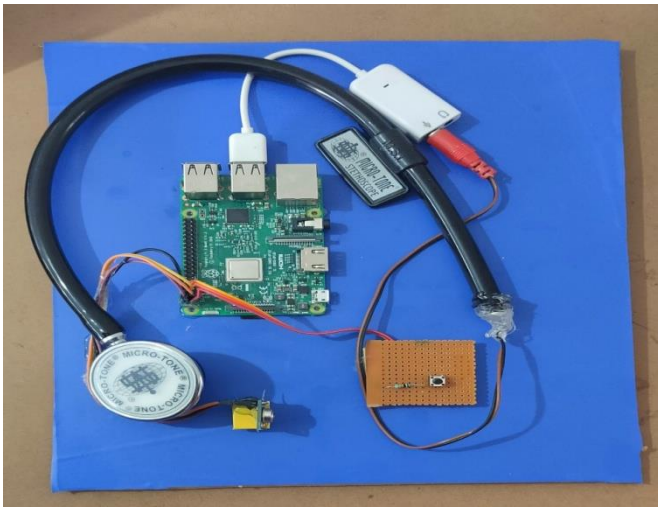

Figure 2 Snapshot of the developed prototype

Results:

1. The system will be able to record stethoscope sounds onto the Raspberry Pi.
2. The temperature sensor will sense the body temperature of the patient and update it on the cloud.
3. UV sterilization sterilizes the contacted surface to eliminate any bacteria and pathogen from spreading due to contact.
4. The doctor may access the recorded file through email and play it again as needed.

Conclusions:

Following the recent Covid-19 outbreak, which imposed strict social distance rules on people's safety, we devised a wireless stethoscope design that would assist both doctors and patients in adhering to social distance regulations. It also sends medical authorities patient metrics from the patient's home, allowing them to work with patients remotely and safely to heal. It might also be used in ICU units, reducing the risk to medical personnel even

more. The information gathered from the patient is given to the doctors and can be kept for future use. By lowering the cost of the equipment and digitizing the capabilities of an acoustic stethoscope, this project provides a reliable alternative that is more public centric, i.e., accessible to all segments of the population. This electronic stethoscope can be easily operated by a non-medical practitioner due to the system's simplicity.

Scope for future study:

Especially during the pandemic, access to such telehealth services aids isolated COVID patients in rural areas with little too few medical resources for their condition. Furthermore, healthcare providers in small hospitals and clinics can use this technology to securely share confidential data virtually with doctors and medical experts in other cities or states. The wireless capabilities of these digital stethoscopes also make them practical for social distancing guidelines. Medical providers can wear Bluetooth earbuds to listen to a patient's heartbeat, allowing them to maintain more distance than the traditional stethoscope allows. Frontline providers make critical decisions and diagnoses based on sounds they hear from the lungs. With the known impacts of COVID-19 on the lungs, this is yet another reason for the "rapid commoditization" of digital stethoscopes. With the noise-cancellation features of many of these digital stethoscopes, medical providers can pick up on sounds from the lungs and heart they might not have heard before. Furthermore, built-in amplification settings allow for the ability to isolate more subtle sounds.