

# **Personal Respiratory Sound Data** Recorder ALİ ENES BİÇİCİ, SERKAN DÜZGÜN

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## Introduction

- Our aim in this project is to record the respiratory sounds from a distance and to send these recorded sound data to the remote receiver by completely preventing the patient-doctor relationship and contact.
- During the Covid-19 Pandemic, the opportunity to be treated remotely ••• without entering the hospital environment and meeting with the doctor face-to-face is the main motivation source in the project.
- Being compact and portable, it is easy and fast to use. \*\*

### **Application Areas**

Application areas are mostly related with medical issues such as patient's early diagnosis.





#### **Specifications and Design Requirements**

- The components used in the system and their features are as follows:
- Microcontroller : Arduino UNO(Atmega328P)
- Power Supply : 9V Battery
- Communication Protocol : SPI(Serial Peripheral Interface)
- Easy to use, compact and portable
- Micro SD Card (Data storage and transferring that data to another medium)

## **Solution Methodology**

✤ With the help of the MAX9814 module, it can convert the analog data we receive to digital data in the ADC of the Arduino UNO microcontroller that we use, and record it in wav format on the MicroSD Card via SPI communication via the SD card module.

#### **Results and Discussion**

With our device in Figure 1, we took respiratory records from the anterior chest region (5) indicated in the circle in Figure 2.





#### Figure-1

- ✤The accuracy of these 15-second recordings was determined by using Matlab and their frequencies were determined with the help of FFT.
- ✤ In order to determine how accurately the system measures, we gave sine waves at certain frequencies and found the transfer functions as a result of these tests.





**Figure**: An overall description of the project components.

- ✤ We feed our system with a 9V battery and reduce it to different voltages of 5V and 3.3V, which are digital pin voltages.
- The system can take 15-second audio recordings each time the button is pressed and save these recordings to the SD card.
- We can monitor the start and end times of these recordings via the red LED we use in the system.
- Our system can be developed by increasing the quality of the materials used and is very suitable for obtaining quality records.

### References

- <u>https://www.mathworks.com/products/matlab.html</u>
- https://www.arduino.cc/en/software
- <u>https://www.webmd.com/lung/lung-sounds</u>
- <u>https://medlineplus.gov/ency/article/007535.htm</u>

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