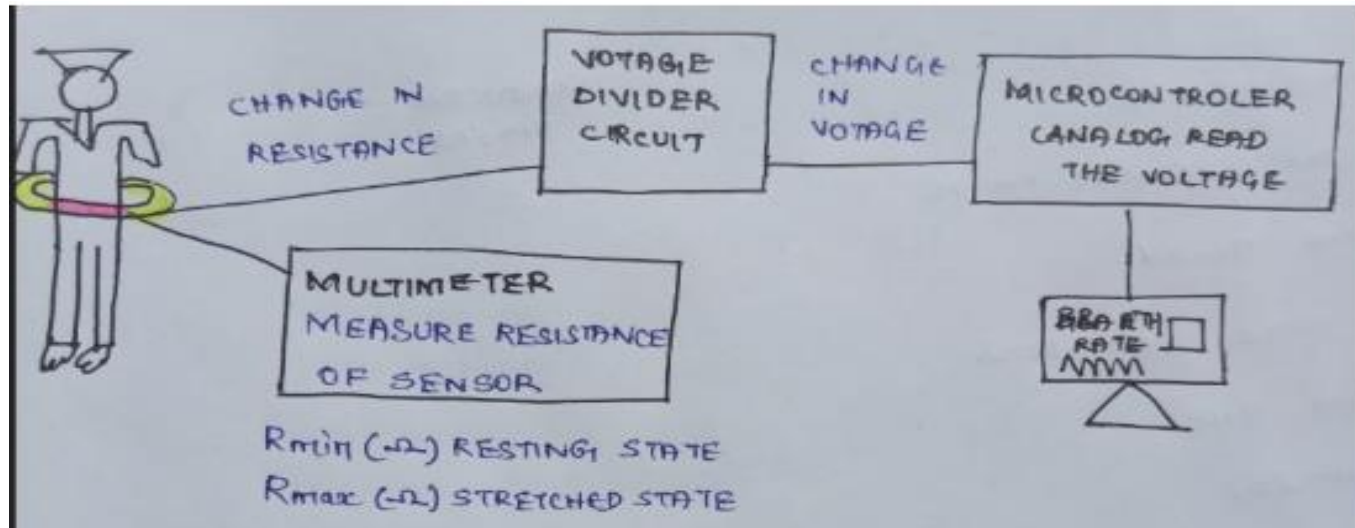


# FABRIC STRETCH SENSOR

# OBJECTIVE

- ▶ The main objective that revolves around all my project idea is tracking of bio signals of users using wearable E-textile interface.
- ▶ A bio signal is any signal derived from a living beings that can be continually measured and monitored. Bio-signal interfaces provide important data that display the physical status of a user.
- ▶ But capturing bio signals is highly complex and demands a lot of efforts and time.
- ▶ As the time is limited, to make my idea work in a small scale project, my primary focus is to build fabric stretch sensors .
- ▶ My extended research goal and future vision would be is to capture biosignal data and help users in seeking for help from others on emergency situation by using IOT technologies

# PRINCIPLE OF IMPLEMENTATION



- ▶ The main concept of my project revolves around building stretchable sensors that could be attached in a belt to capture the breathing rate of the user.
- ▶ The wearable E-textile breathing belt use fabric stretch sensors to turn analog motion to digital data.
- ▶ The capturing of this data can be used to visualize and record human body movement.
- ▶ Sewing stretch sensors into form-fitting clothing allows us to establish a mutual relationship between the movement of the ribs and the movement of a sensor placed on that joint.

# BUILDING OF STRETCH SENSOR



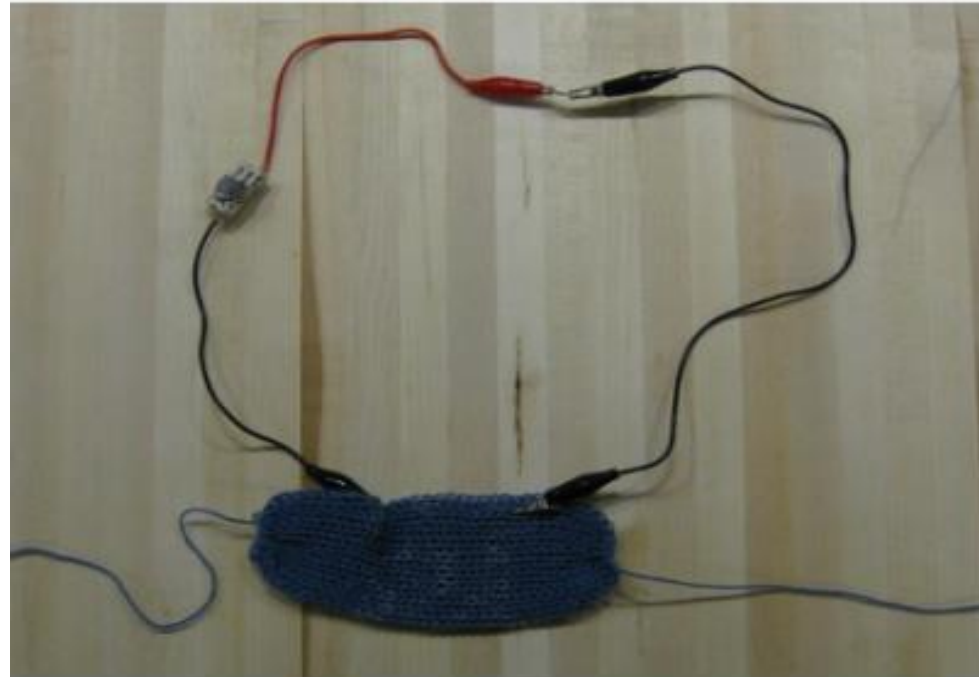
- ▶ This ensures they are always operating within their strain limits and prevents them from being damaged by overstretching.
- ▶ Stretch sensor is made from a conductive fabric designed to have sensitivity allowing for incredibly precise
- ▶ Fabric sensor would be built in such a way that they have a maximum extension of 80mm (80% strain of their active area).
- ▶ Once they have extended to this length, they strainlock (i.e. cannot be stretched any further). The changes are measured by brightening LED's that brightens depending on the stretching and dims up in relaxed position.

# MEASUREMENT AND TESTING

Multimeter could be used to test the intermediate result of the Fabric stretch sensors by measuring the resistance at stretched and relaxed position of the conductive fabric.

In Parallel for the the validation ,Arduino could also be used to measure the sensitivity of the sensor

The resistance at relaxed and stretch positions are noted accordingly



# CHALLENGES IN THE TECHNICAL IMPLEMENTATION

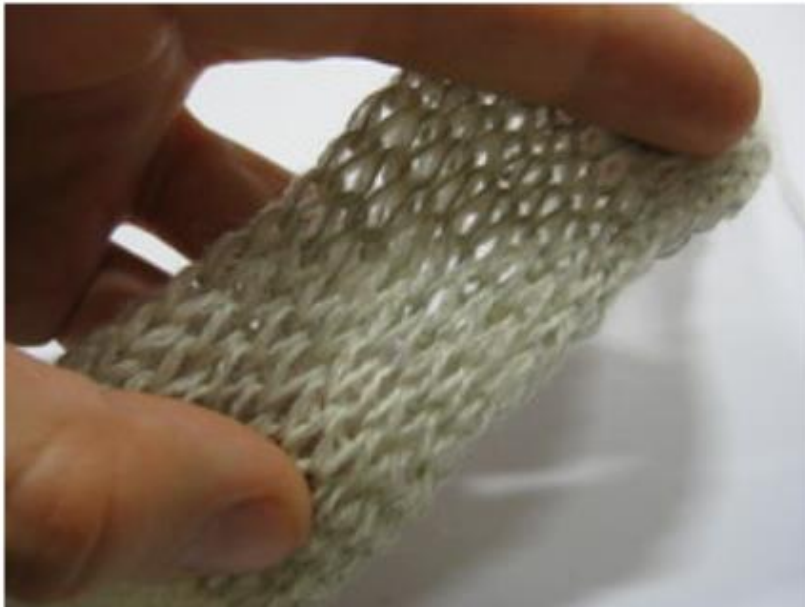
- The main challenges from technical perspective is to know the exact dimension for building the sensor to measure the subtle changes and improve its sensitivity.



- It is challenging to fix an appropriate strain lock which is necessary to prevent over stretching of sensor and damaging it in a prolong run.

# CHALLENGES IN THE INTERACTION DESIGN

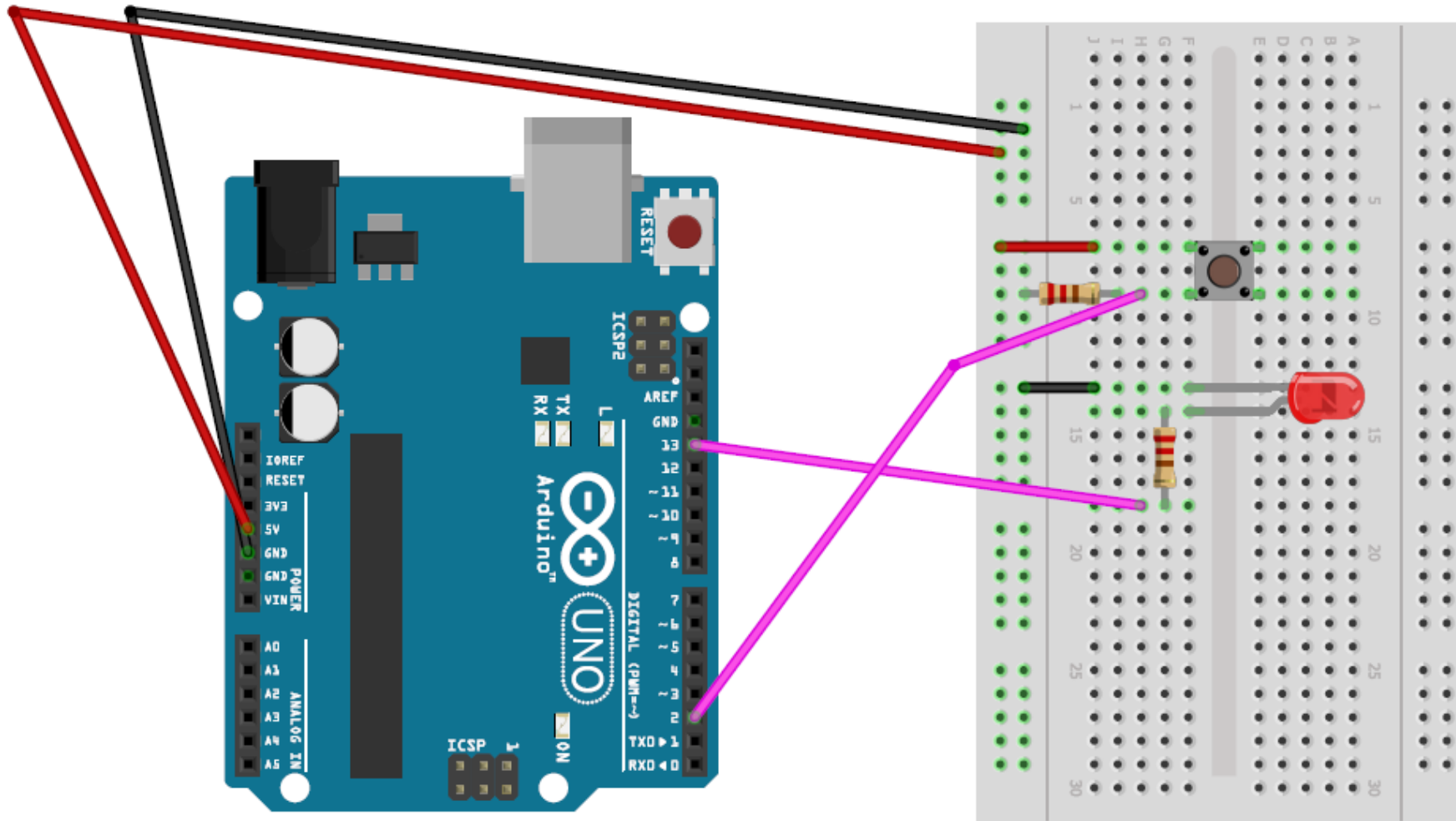
- ▶ As the sensor is planned to be used as a wearable, it is necessary to consider its usage by the user.
- ▶ Sensor is planned to be made from a soft conductive wool, while interacting and washing ,sufficient warning should be given to the user.
- ▶ Proper constrains and affordance should be provided in the design





# CURRENT STATUS OF THE PROJECT

- Prototype of the basic blinking LED circuit which would be used in the project





# OPEN QUESTIONS

- ▶ As my stretch sensor is used to detect breathing, the stretch sensor would be placed across the wearer's ribs, in the area of the diaphragm. How to recognize the level of comfort that should be considered for the belt so it does not interfere with the wearer's experience?
- ▶ Is the sensor prone to deformation in the wear and tear process?
- ▶ What is the appropriate strain lock to be fixed

