



**Title: Signal and biosignal acquisition system for teaching in education: Conditioning and analysis methods with embedded devices physics, Electronics, Electrical magnitudes and their measurement**

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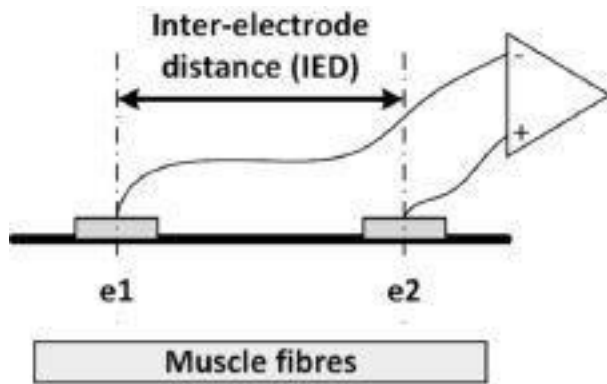
References

# Introduction

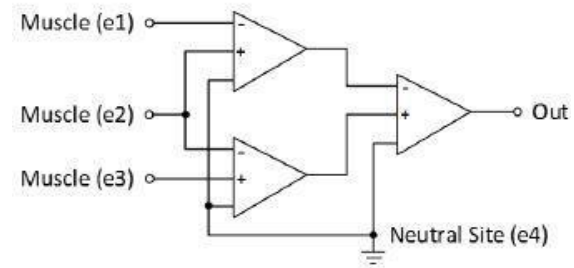
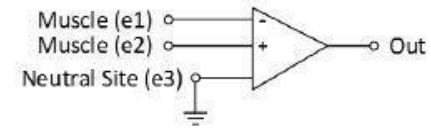
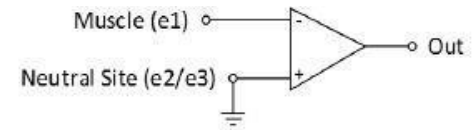
| <b>Engineering area</b> | <b>Signal type</b>     |
|-------------------------|------------------------|
| <b>Biomedical</b>       | ECG, EMG and EEG       |
| <b>Automotive</b>       | Gas mixture and oxygen |
| <b>Electronic</b>       | Ultrasonic and Optics  |
| <b>Mechanical</b>       | Movements              |

**Table 1** Signal types

# State of Art

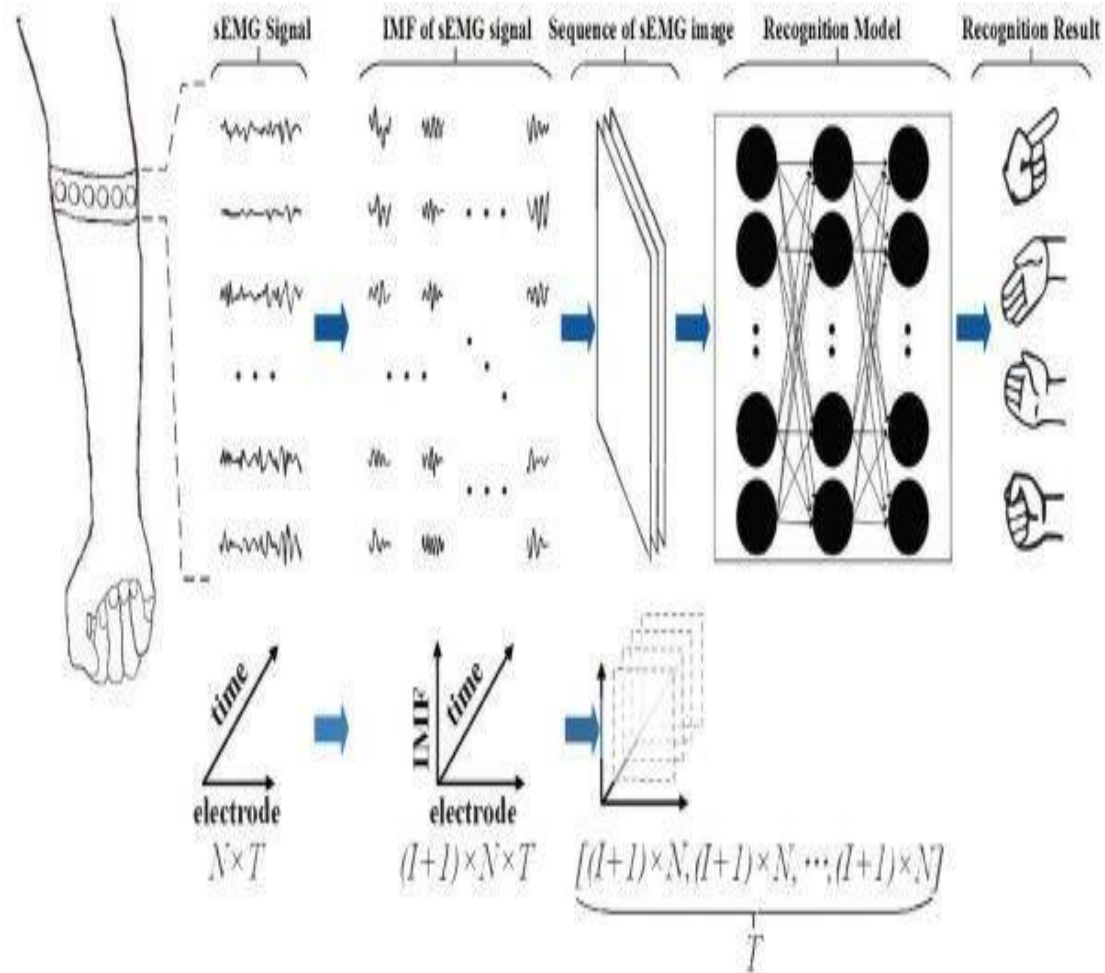


**Figure 1** General acquisition array sEMG



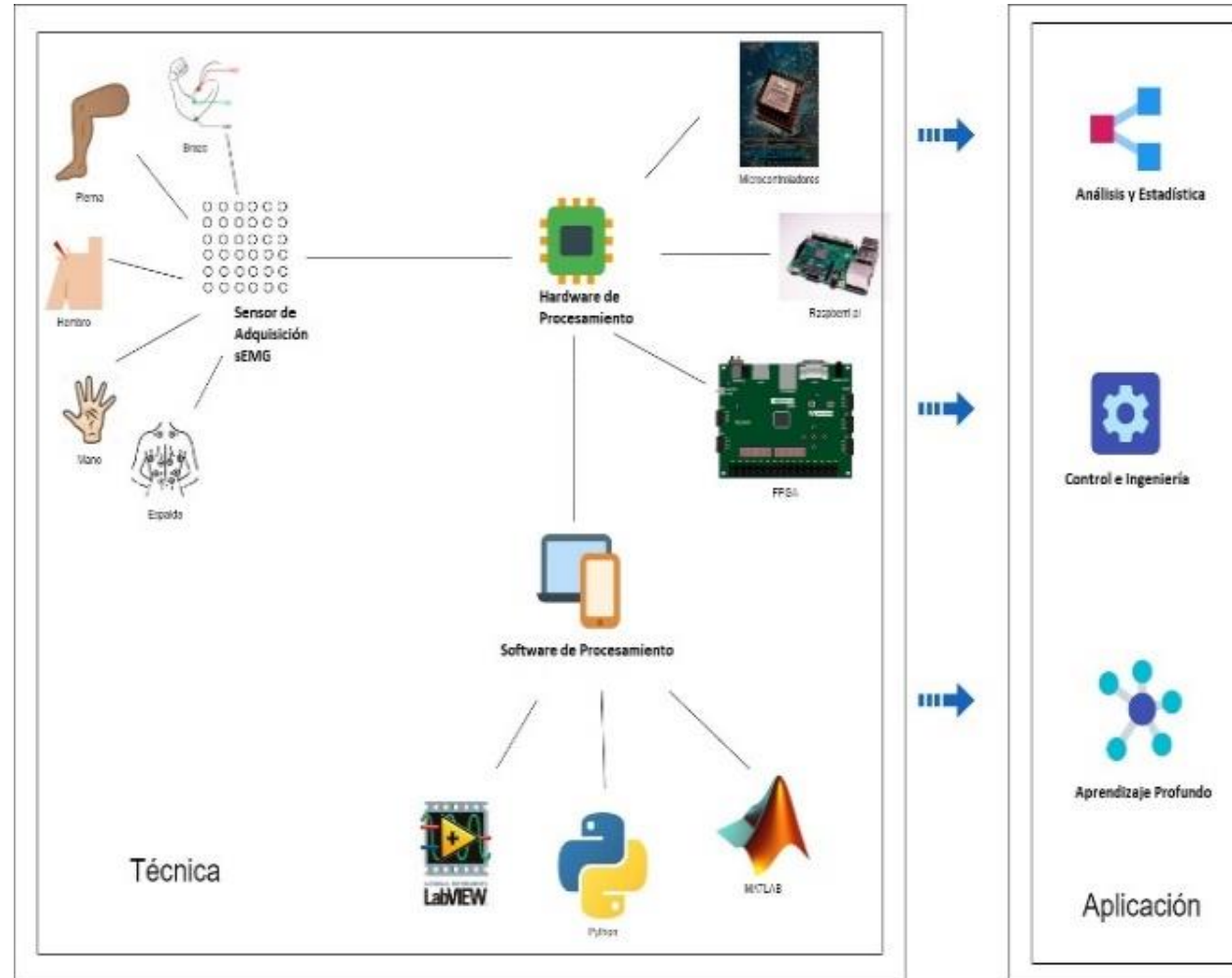
**Figure 2** General acquisition sEMG several derivations

# State of Art



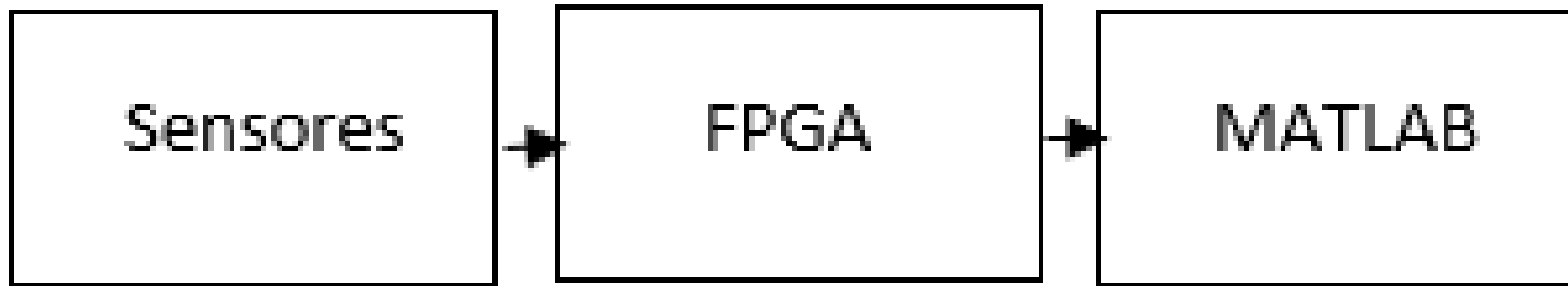
**Figure 3** Gesture recognition through Bandmyo

# State of art analysis



**Figure 4** State of Art analysis

# System development



**Figure 5** Block system diagram

# System development

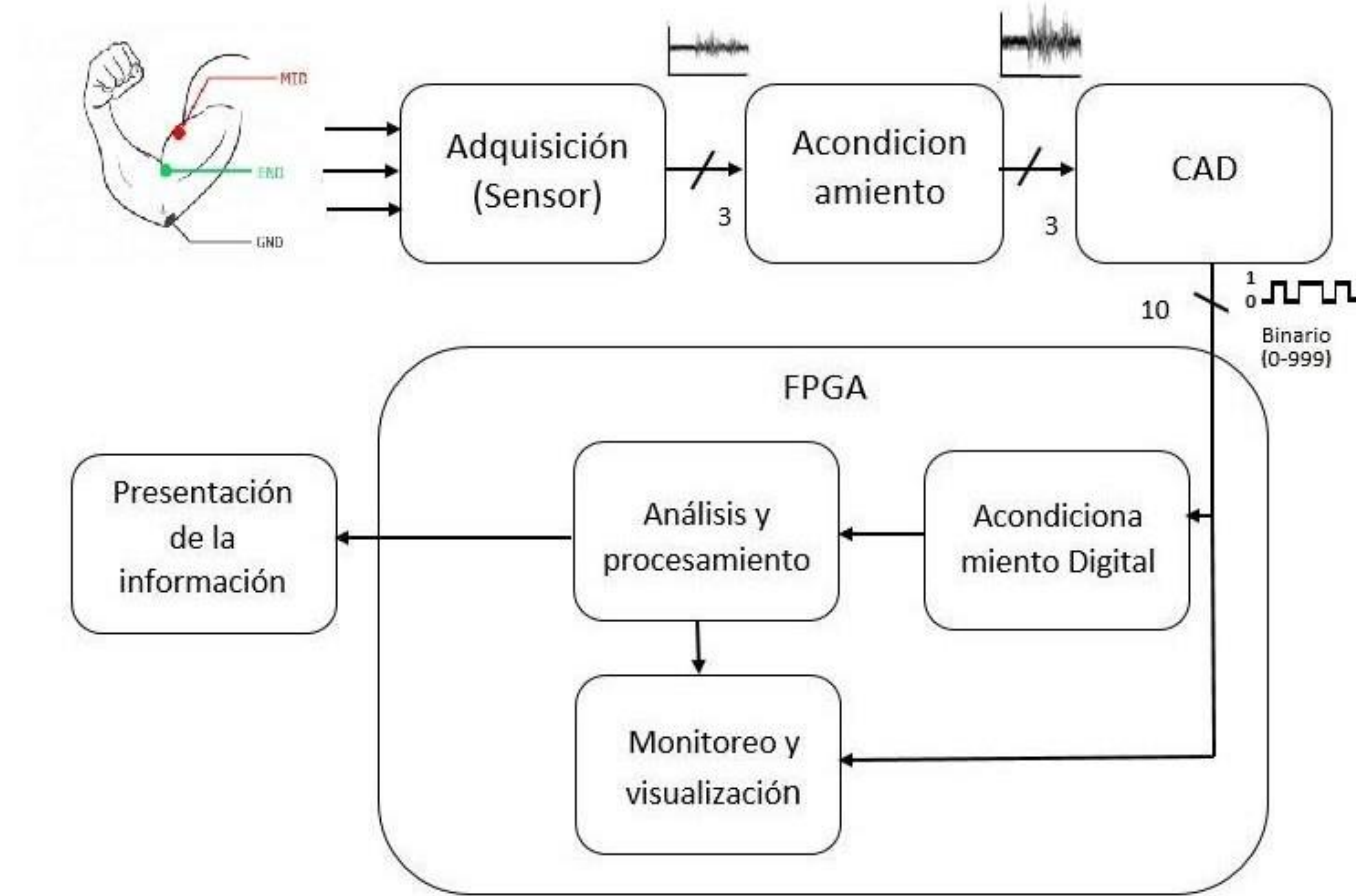
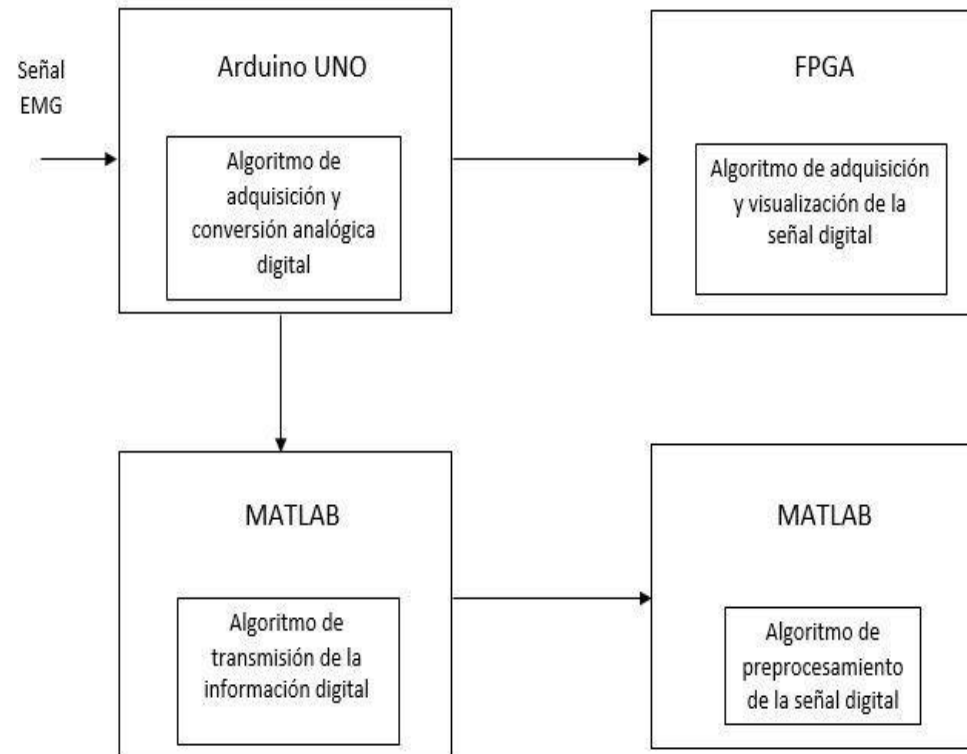


Figure 6 Project Block diagram extended



# System development



**Figure 7** Interface and communication block diagram

# System development

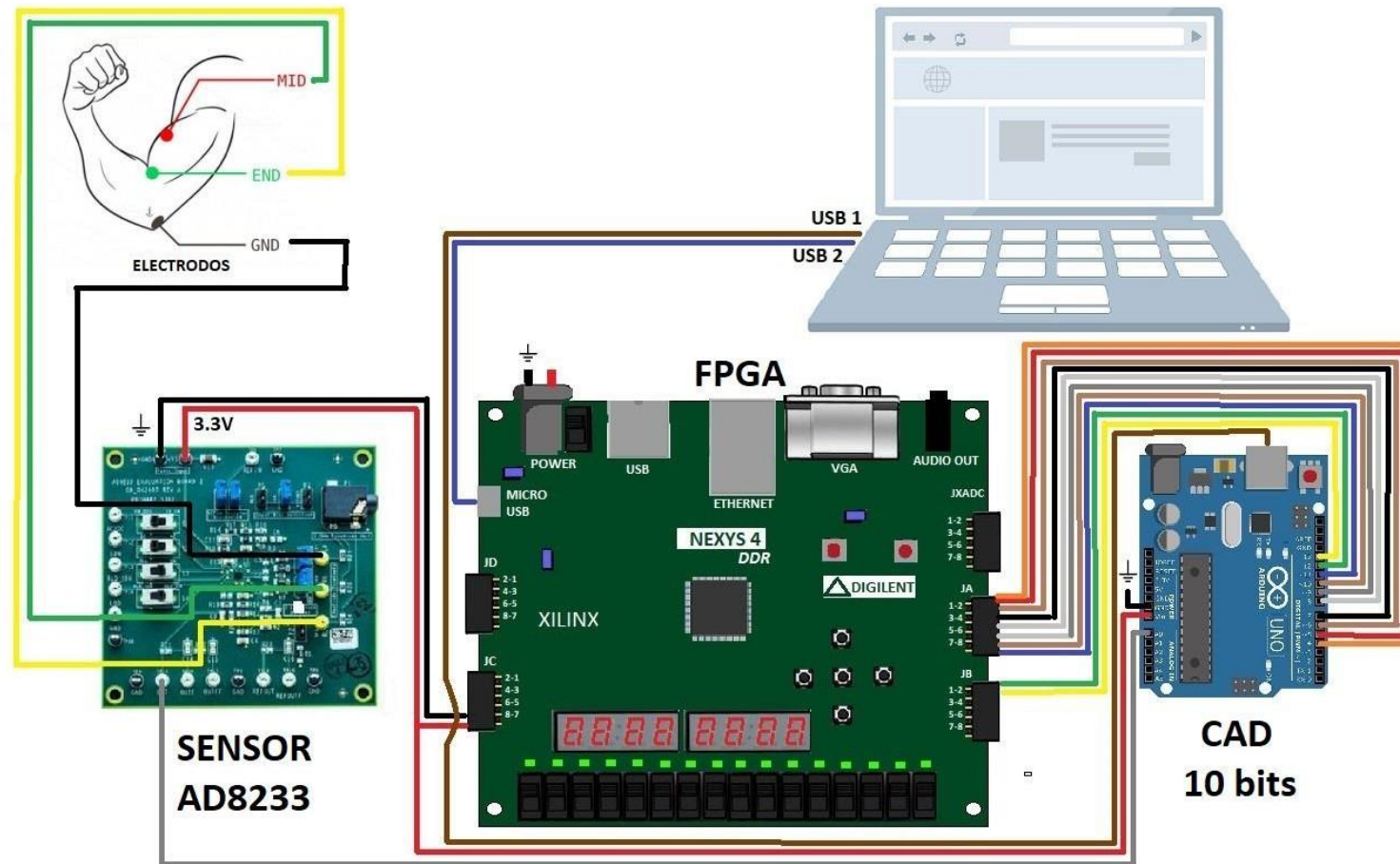
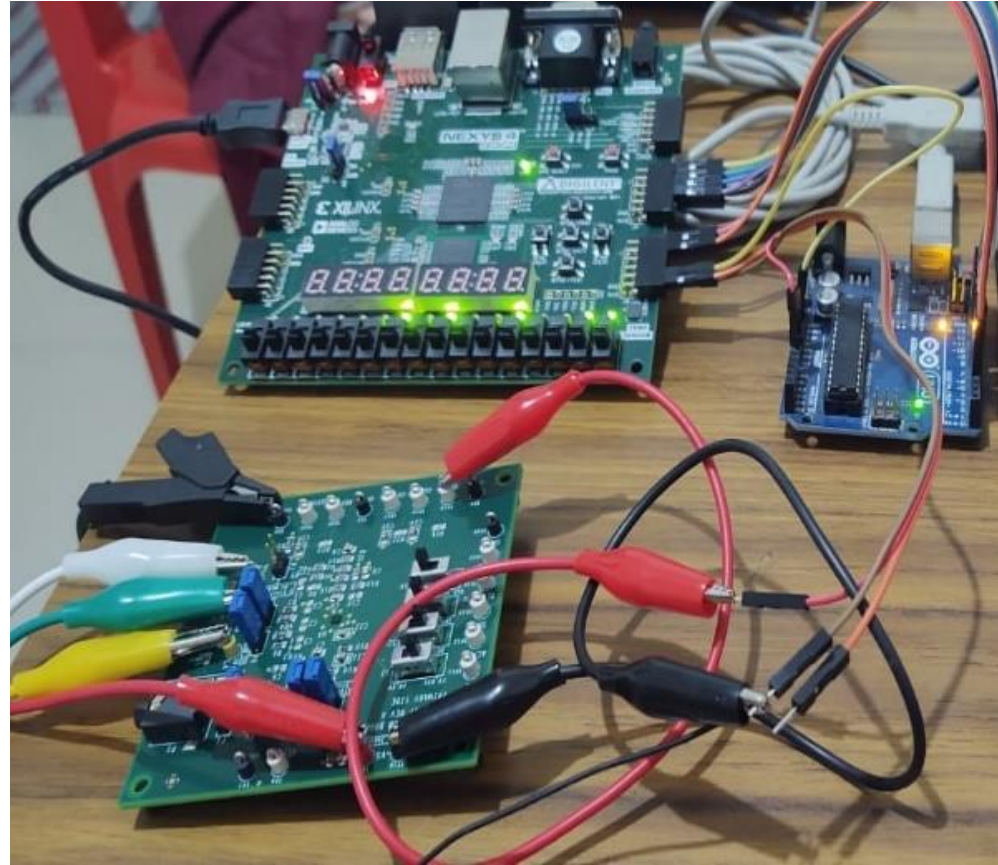


Figure 8 Schematic prototype of system

# System development



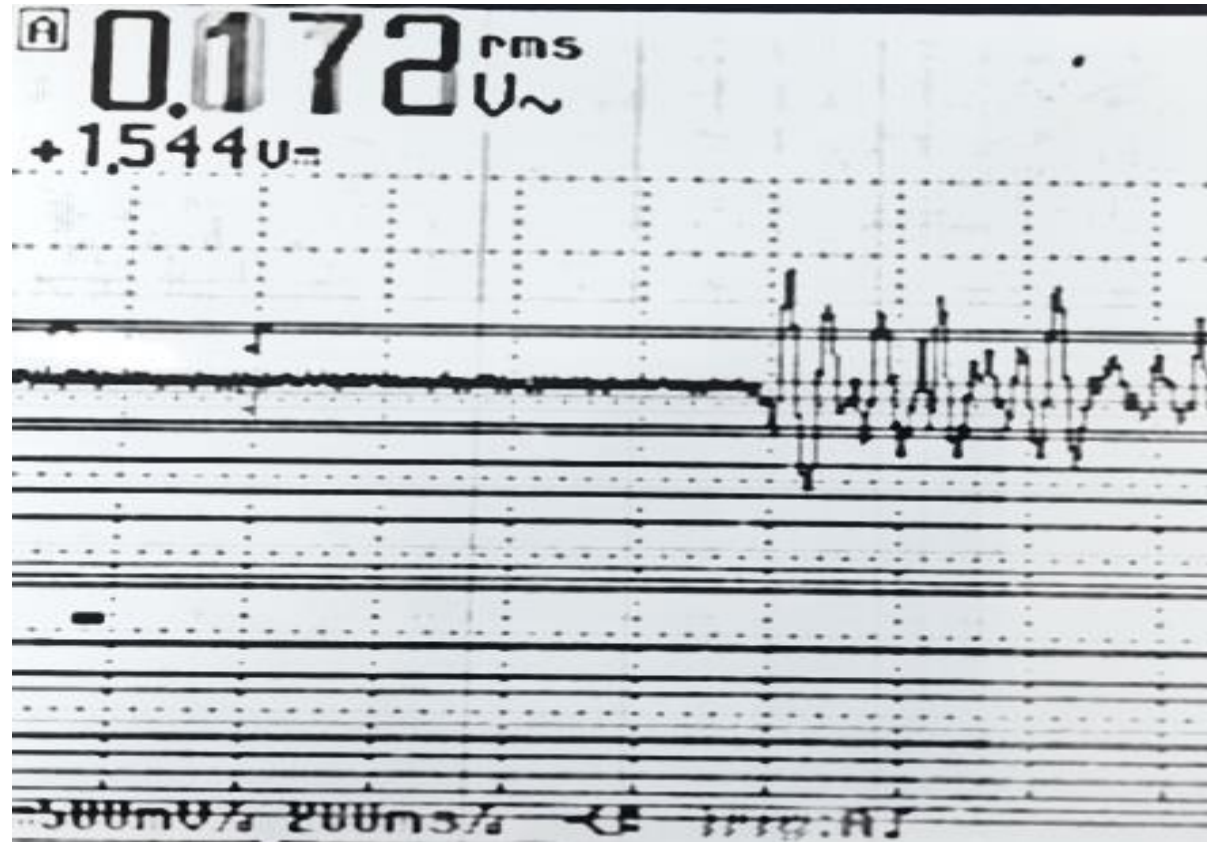
**Figure 9** Signal connection

# System development



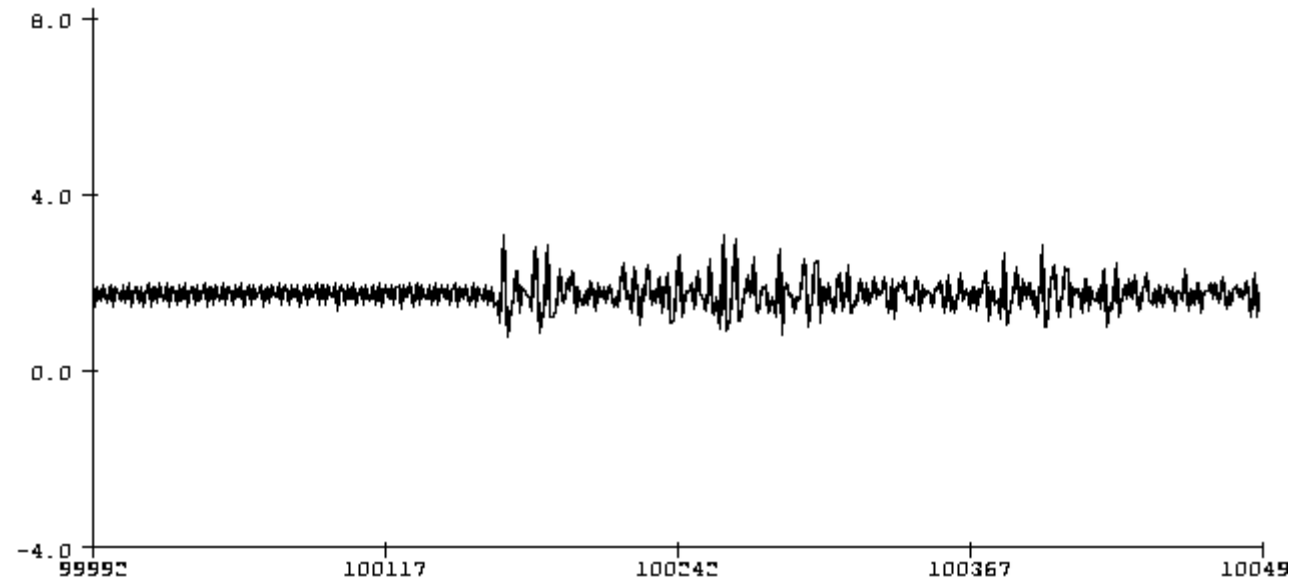
**Figure 10** FPGA digital display

# Results



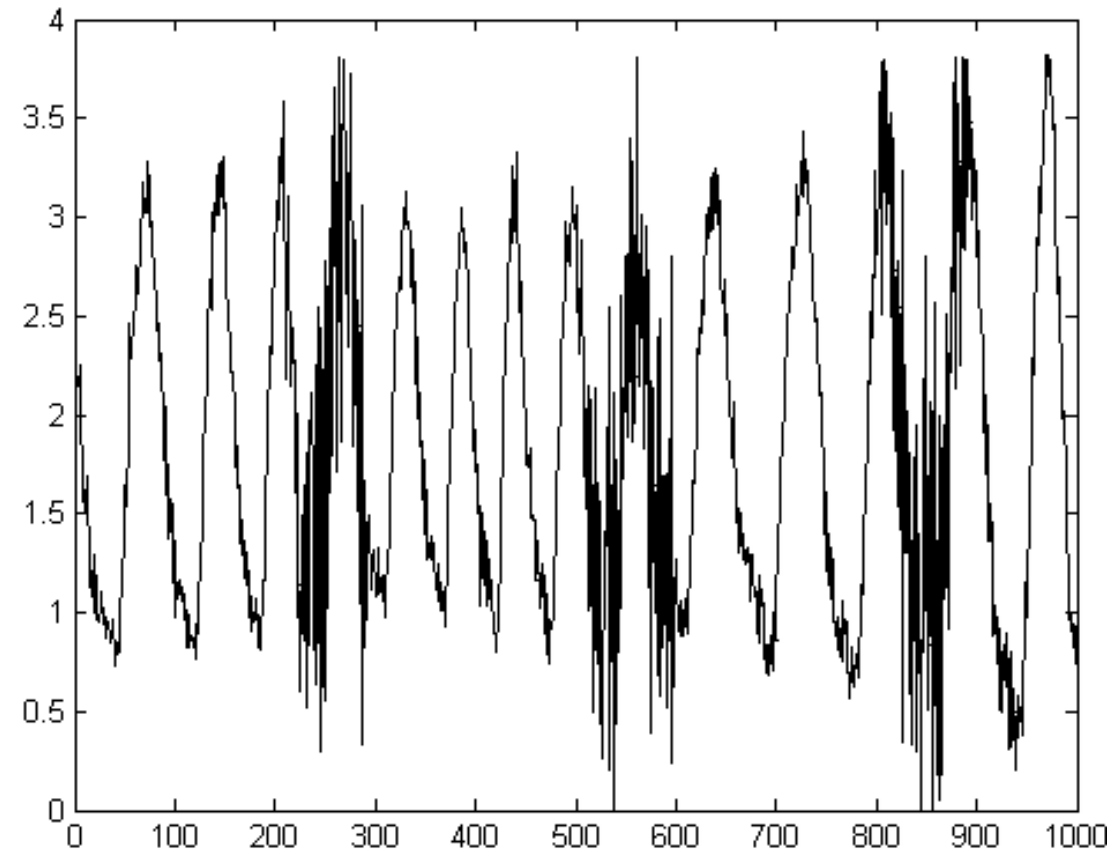
**Figure 11** Relax-strength analog signal ECG acquire with sensor

# Results



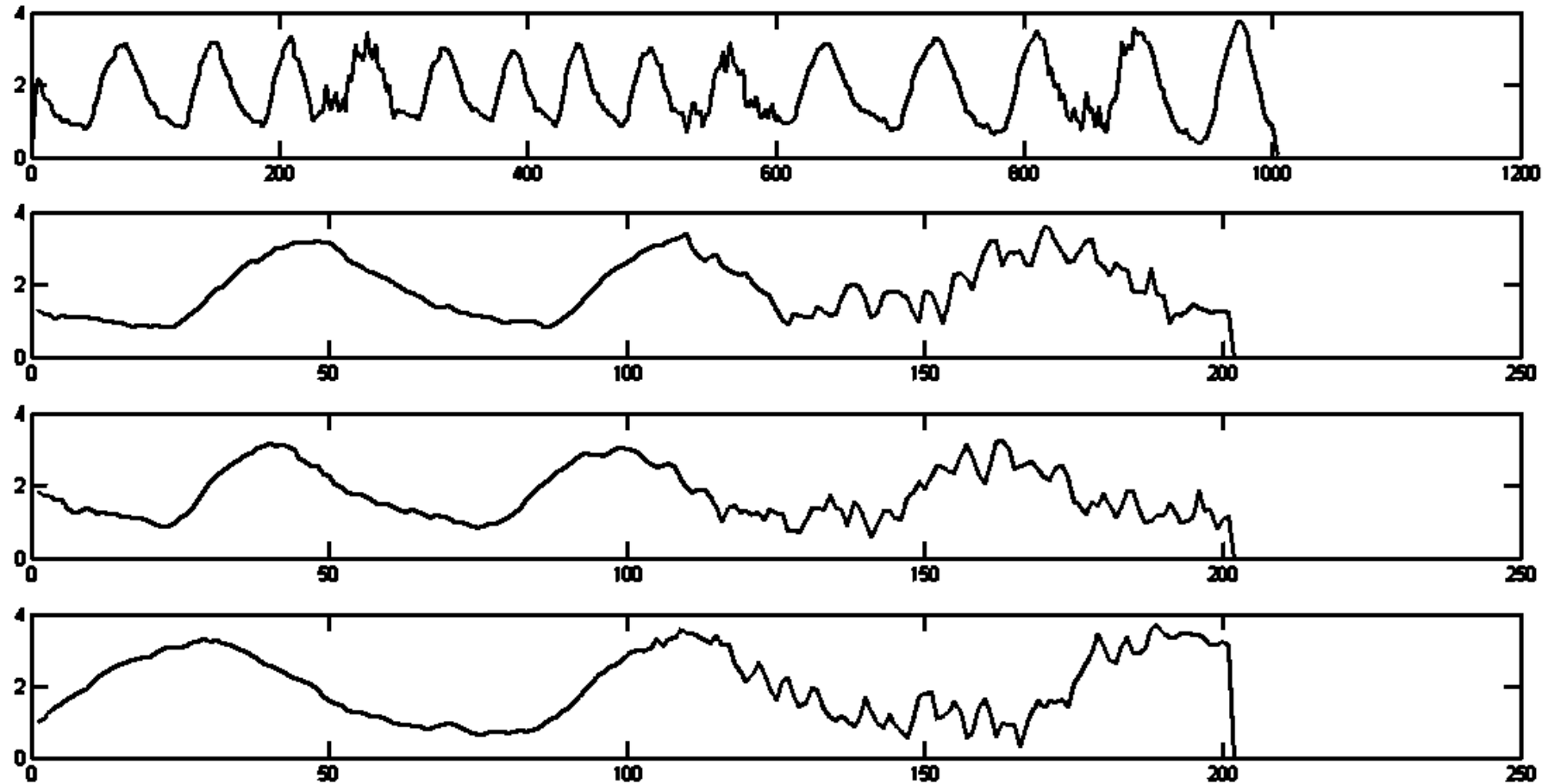
**Figure 12** Arduino EMG digital signal (strength)

# Results



**Figure 13** MATLAB digital signal 1

# Results



**Figure 14** Preprocessed, segment and compare EMG digital signal in MATLAB





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