Deep inspiration breath-hold technique using an Arduino

P.Gallego[1] ,J.Pérez-Alija[1] ,E.Ambroa[2], LM. Moya[1], S.Olivares,[1] S.Loscos[1],P.Agustí

[1]Radiation Oncology Department, Hospital Plató, Barcelona, Spain

[2]Medical physics unit, Radiation Oncology Department, Consorci Sanitari de Terrassa, Barcelona, Spain

Purpose/Introduction

* A large effort has been made in recent years to develop techniques to reduce the dose to normal tissue (especially heart dose) for patients receiving radiation treatment for breast cancer.

Materials and Methods

* Arduino is an open-source electronics platform based on an easy-to-use hardware and software. We plugged a tri-axial low-g digital acceleration sensor (Bosch's *BMA180)* to our Arduino board.

Materials and Methods

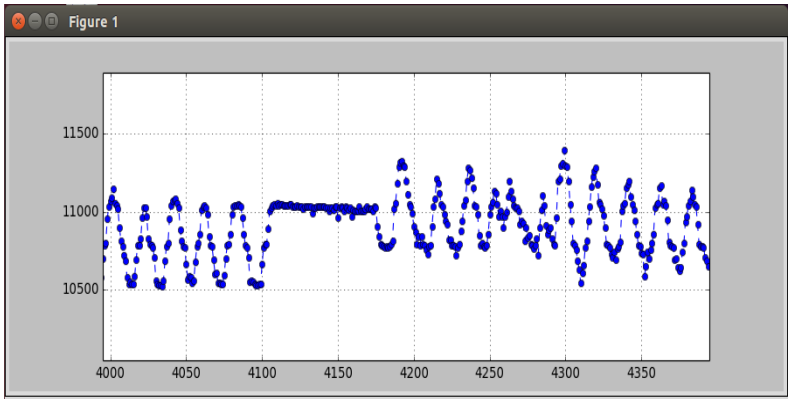
* This accelerometer is then placed on the patient and used as a surrogate to measure the expansion of the patient's thorax during breathing. We measure the orientation change in our BMA180 inside the gravitational field. However, this orientation change is good enough to accurately measure the changes in the patient’s breath cycle.

Results

* We were able to build a DIBH system using both an Arduino board and an accelerometer. We visualize the patient's breathe cycle with an In-house software and establish a threshold based on its amplitude.

Results

* We provide patients with a real-time breathe cycle visualization, so they can have a visual feedback mechanism in order to properly hold their breath when required.



Conclusion

* We have developed an In-house DIBH system with all the functionalities required to implement this technique in our clinic. Building this system is really cheap and amounts to nearly 60 Euros.

Conclusion

* Several DIBH methods are commercially available. These methods can decrease the radiation dose delivered to the heart. We have developed an In-house DIBH system with all the functionalities required to implement this technique in our clinic.

Conclusion

* Building this system is really cheap and amounts to nearly 60 Euros. We are more than happy to freely provide the software needed to implement this method.