

# Rheumatosphere AR: Public Engagement and Education with Interactive Print Posters

Timea Kosa<sup>1,2</sup>, Louise Bennett<sup>1</sup>, Daniel Livingstone<sup>2</sup>, Carl Goodyear<sup>1</sup> and Brian Loranger<sup>2</sup>

<sup>1</sup> University of Glasgow, UK

<sup>2</sup> The Glasgow School of Art, UK

**Abstract.** Rheumatoid arthritis (RA) affects around 1% of the UK population, places a heavy burden on society and has severe consequences for the individuals affected. Early diagnosis and treatment significantly increase the chance of long-term sustained remission. Raising awareness of RA amongst the general public is important to help decrease the time of diagnosis of the disease.

In this poster and demo we explore the use of Augmented Reality (AR) in the creation of interactive print posters for public engagement. Previous studies have shown that AR can be effective in a teaching and learning context, where the coexistence of real and virtual objects aids learners in understanding abstract ideas and complicated spatial relationships. It has also been suggested that it raises motivation in users through interactivity and novelty.

We explore the use of AR in public engagement, and outline the design, development and evaluation of an engagement experience utilising AR. For this, a set of informative printed posters was produced and these enhanced by an accompanying interactive AR application. Evaluation involved participants at a science outreach event at the Glasgow Science Centre. The poster includes a demo of the public engagement application: Rheumatosphere AR.

**Keywords:** Augmented Reality, Public Engagement, Interactive Print, Augmented Posters, Rheumatoid Arthritis

## 1 Interactive Print and Public Engagement

The combination of Augmented Reality (AR) with printed material appears to have significant potential in an public engagement setting. Print materials such as posters and leaflets are widely used in these settings, and familiarity of such materials combined with a more novel AR experience can potentially promote intrinsic motivation for exploration of a subject [1]. Further, such materials can also allow free exploration with learners able to take their time and make active choices over the amount of information they consume, helping manage the overall cognitive load [2]. Here we refer to such materials as *interactive print* [2].

The Rheumatosphere research groups at the University of Glasgow regularly organizes public engagement events to increase awareness of Rheumatoid Arthritis (RA) and promote early medical referrals. Outreach events are held across Scotland, including at

the nearby Glasgow Science Centre, and finding ways to make the materials more attractive and engaging is important to help improve engagement and outcomes. From an initial concept of creating an AR booklet, an interactive print poster format was decided on. This benefits from the larger scale, visual layout and the low requirement for strict narrative ordering further favours this approach.

A series of posters were developed, with a range of textual, 3D modelled, and animated AR content. These help explain what RA is, and to highlight how RA affected joints compare to healthy joints.

Rheumatosphere AR was shown at a 'Science Lates' public event at the Glasgow Science Centre in the summer of 2018. A set of posters were displayed and tablet computers with the companion app pre-loaded were made available for members of the public to use to explore the posters (see Fig. 1). Feedback was highly positive, supporting the initial hypothesis that interactive print can help promote public engagement with science.



**Fig. 1.** Visitors at the Glasgow Science Centre using the application to view augmented reality content over the posters. Image: Glasgow Science Centre.

Key advantages of the approach are improvements in engagement and the ability to place information into the companion app allowing for a reduction in the information contained in the posters themselves. Disadvantages are increased development time and costs and a possible decreasing return as AR becomes familiar or even routine.

## References

1. Liarokapis, F., Anderson, E.F.: Using Augmented Reality as a Medium to Assist Teaching in Higher Education. In: Eurographics 2010 - Education Papers. The Eurographics Association (2010).
2. Nadolny, L.: Interactive print: The design of cognitive tasks in blended augmented reality and print documents. *British Journal of Educational Technology*. 48, 814–823 (2017).