

# Multi-dimensional Data Visualisation using Mobile Augmented Reality

Rehman Ullah Khan<sup>a</sup>, Jacqueline Chen How Ting<sup>b</sup>, Yin Bee Oon<sup>c\*</sup>, Ahmad Sofian Shminan<sup>d</sup>, Lee Jun Choi<sup>e</sup>, Muh. InamUl Haq<sup>f</sup>,  
<sup>a,b,c,d,e,f</sup>Faculty of Cognitive Science and Human Development, University Malaysia Sarawak, Kota Samarahan, 94300 Sarawak, Malaysia, Email: <sup>c\*</sup>[yinbee@unimas.my](mailto:yinbee@unimas.my)

In the era of “The Internet of Things” (Rodriguez, Kaczmarek, & Depew) devices are becoming smart and each smart device generates data every second. This data is in multi-format, multi-perspective and multi-sectoral. Therefore, the handling of such multi-dimensional data is a significant challenge, as the normal display screen is two dimensional (2D) and data is multi-dimensional. This research proposes and develops a multi-display data visualisation algorithm using mobile augmented reality, as augmented reality (AR) is beyond the two-dimensional screen. Therefore, this algorithm uses AR to provide a multi-display solution for improved data visualisation after processing, summarising and classifying data. The results show that the AR-based multi-display is better than traditional 2D display. This algorithm is mobile based. Therefore, this system can provide rapid and easily accessible information to policy and decision makers.

**Key words:** *Augmented reality, Big Data, Data visualisation, Internet of Things, Multi-Dimensional data, Multi-Display.*

## Introduction

Electronic devices are becoming smarter and intelligent by the day. All smart devices generate data every second. Therefore, a huge amount of data is produced by these devices. According to Jeff Desjardins (2019), this large amount of data can only be shown using the 60 second time scale. Anything bigger and our brains couldn't process these massive quantities in any useful capacity. The following Figure 1 shows an illustration of an internet minute during 2019.