KnoWare: A System for Citizen-based Environmental Monitoring [Abstract]

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Abstract

Scientific research initiatives that require widespread sampling over geographic areas are increasingly relying on citizen participation for data collection. Despite various mutual benefits for such citizen science initiatives, there are also barriers that include: 1) difficulty maintaining user engagement with real-time feedback, and 2) the challenge of providing non-experts with the means to collect reliable data. We have developed a system that addresses these barriers by providing citizens with technologies that interface with their mobile devices. These technologies, KnoWare and InSpector, allow users to: collect reliable scientific measurements—specifically water quality measurements, map geo-tagged data in real-time, and facilitate the interpretation of the results. KnoWare is a system comprising a web portal and an iOS app that enables two core functions. First, users can generate scientific ‘queries’ that entail a specific question posed to a crowd with customized options for participant responses and viewing data. Second, users can respond to queries with their GPS-enabled mobile device, which results in their geo- and time-stamped responses populating a web-accessible map in real time. In order to broaden applicability, KnoWare can also interface with additional applications in order to diversify the types of data that can be reported. Here we also describe the use of KnoWare with an additional iOS application we designed called InSpector that interfaces with the iPhone camera and an add-on device to perform quantitative water quality measurements. When used in combination, KnoWare creates an engaging workflow to facilitate the collection and interpretation of environmental water quality data by non-expert citizen scientists.

Keywords: Citizen Science, Cell-phone Spectrometer, Water Contaminant Analysis, Web and Mobile Development, Visualization

[NOTE: Complete paper will be published later in an Informing Science Journal.]