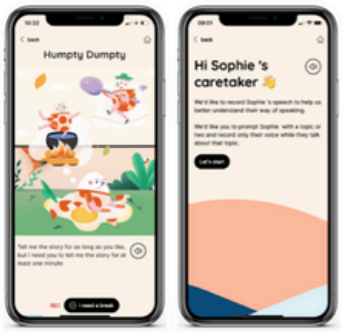
VERIS: TRANSFORMING AUTISM DIAGNOSTICS THROUGH DIGITAL BIOMARKERS

01/ VOICE

Following on research conducted on Healios' proprietary datasets, two voice activities designed to **mimic ADOS content** were created using DIGIT VERIS and are currently capturing data to support model development and evaluation.

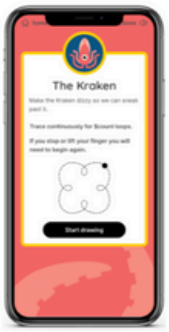


02/ EYE-TRACKING

Used Veris to capture and evaluate **heatmap data from static photo images**, with **additional / alternative activity forms** currently in discussion.

03/ KINETICS

Leveraging professional relationships with **sector-leading experts** in movement and autism research, **drawing activity** was developed to be followed by an **arm-movement activity** for autism diagnostics.



Purpose: Smartphone applications, such as Veris, offer a scalable solution for improving mental health diagnostics, for example, in the treatment of autism. As an open-source smartphone application framework, Veris enables scientists, clinicians, and designers to create applications without the need for extensive programming skills. Designed principally to address poor mental health outcomes in England (costing £300 million in 2022), Veris aligns with the United Nations Sustainable Development Goals targeting healthier lives and well-being for all at all ages.

Collaboration: Veris has been developed in collaboration with several stakeholders, including Healios LTD, a UK-based company specialising in mental health and neurodevelopmental services. Healios has employed Veris to create a series of digital biomarkers for autism diagnostics. According to Dr Sonia Ponzo, Vice President of Science at Healios, "Veris has allowed us to rapidly prototype and deploy innovative digital tools that enhance our clinical assessment processes, providing a more comprehensive understanding of autism in young people."

Mission: Veris is a cornerstone project within the DIGIT Lab, exemplifying the project's mission, and the EPSRC's broader goals. By providing a versatile application for use in research and clinical settings, Veris enhances scientific inquiry whilst also delivering beneficial healthcare outcomes.

Innovation: From a technical perspective, Veris requires fewer programming skills, reducing the barriers scientists and clinicians face when seeking to prototype smartphone based (m-health) research tools. In engineering terms, a JSON-based protocol file configures the main application, enabling rapid development without the need for advanced coding skills. Based on a modular design template, Veris supports text input, Likert scales, multiple choice questions, and video content, incorporating novel data collection techniques, such as voice, eye-tracking, and kinetics (see Figure 1).

> "Our primary objective was to enhance the efficiency and accessibility of research tools, initially in an autism diagnostics context"

Prof. David Plans
University of Exeter

Application in practice:

- The framework's adaptability allows Veris to be used in several research contexts, from cognitive neuroscience to clinical diagnostics, thereby promoting wider participation and equality in research.

- Over half the global population now have access to smartphone technology. Accordingly, Veris can be used by populations who want to volunteer in research studies remotely without entering a traditional laboratory environment.

Outcomes:

- The use of Veris has yielded significant academic and applied outcomes. Academically, it has facilitated the publication of peer-reviewed research articles and the development of digital biomarker tasks, enhancing the diagnostic process for autism.

- In an applied context, Veris has been used by Healios to develop digital biomarkers that provide objective data to support decision-making. This collaboration has not only advanced scientific knowledge but also improved diagnostic accuracy and efficiency in clinical settings.

- Veris has been employed at workshops and dissemination events. These activities have involved project stakeholders and the broader research community, highlighting the framework's capabilities and benefits. For instance, Healios conducted initial testing of the digital biomarker tasks, which involved self-selecting participants and collaboration with an ASD-focused charity to research the utility of these tasks across a wider UK sample.

Outcomes: *Veris has successfully transformed the landscape of smartphone application development for research by providing a user-friendly, open-source framework. The key outputs include the creation of digital biomarkers for autism diagnostics, enhanced research capabilities, and improved clinical outcomes.*

Looking forward, the next steps involve expanding the use of Veris to other healthcare applications, further refining the digital biomarker tasks, and exploring additional collaborations to maximise its impact.

Please email Dr David Plans (david.plans@rhul.ac.uk) for further information about Veris.

Healios
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