



Start-Up Spotlight: "Cheeky Tech" – How Binah.Ai Uses Math, Plethysmography And AI To Extract Vital Signs From A Person's Cheeks

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by Marion Webb | @medtechMarion | marion.webb@informa.com

Executive Summary

Israel-based start-up Binah.ai plans to file for US FDA approval of its video-based monitoring app that can detect vital signs in seconds with a simple scan of a person's cheeks.



With all the current safety measures to curb the impact of the coronavirus outbreak, imagine a technology that could measure a person's real-time body temperature within seconds simply by scanning their cheeks with a camera, smartphone, tablet or computer.

David Maman, co-founder and CEO of Israel-based Binah.ai, said by early 2021, his company will be able to do just that, by adding temperature to its existing bevy of vital signs monitoring – heart rate, oxygen saturation, respiratory rate, stress level and heart rate variability.

Binah.ai's technology is part of the wider push to move more health care outside the hospital and



Binah.ai

DAVID MAMAN, CEO BINAH.AI

into patients' homes or nursing homes through remote monitoring. It also has applications for decreasing health care-associated infections, whose societal cost burden exceeds \$200bn annually, Maman said.

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Maman said Binah.ai relies on a technology called plethysmography, which uses a camera to detect slight changes in facial coloring. He noted that while plethysmography has been in existence since 1937, Binah.ai has been able to optimize the technology by using signal processing, AI technologies and proprietary mathematical backend to analyze the blood flow of a person's skin and detect slight changes.

The company has conducted a 300-patient study at the Indira Gandhi Government Hospital comparing Binah.ai vital signs application with Indian company BPL Medical Technologies' Ultima Prime Intensive Care Unit Multipara cardiac monitoring system that is certified for measuring heart rate, oxygen saturation and respiratory rate. The results showed that the vital signs extracted by Binah.ai's app had an accuracy between 92% to 97%, as compared to the cardiac monitor used in the hospital.

Maman said the company is currently conducting clinical studies in Japan for measuring blood pressure. It plans to submit the trial results in an application to the Japanese Pharmaceuticals and Medical Devices Agency, in hopes of earning regulatory approval for this indication of the app. He also plans to file during 2020 for regulatory approval of the technology with the US Food and Drug Administration, followed by an application for the European CE mark in the third quarter of 2020.

The immediate aims are to win the seal of approval for medical accuracy of the app with Japanese and US regulators. "The focus is on starting to push in this direction. The goal is to decrease hospital-acquired infection. Oxygen saturation goes from patient room to patient room and room to room and floor to floor. With our technology, we can look at a tablet and camera, and it will be able to extract measurements."

Consumer App Versus Medical Grade

This March, the company also has plans to release a consumer-facing app in the Google Play and Apple Inc. store that would allow users to test their vital signs and stress levels. Heart rate monitoring will be offered for free, but the company will charge a nominal fee to monitor other vital signs, he said.

Today, the app can monitor a user's heart rate within seven seconds, oxygen saturation within ten seconds, respiration rate within 30 seconds, heart rate variability within 45 seconds and stress levels within 90 seconds.

Under Binah.ai's current business model, software development kit companies can imbed Binah.ai's technology into their platform.

So far, Binah.ai's technology has been imbedded into an app from Japanese insurance company Sompo Himawari Life that allows drivers of vehicles to monitor their stress levels while behind the wheel. The company is also currently working with car manufacturers to measure the vital signs of both passengers and drivers, Maman said. This will be especially critical when cars become autonomous, he said.

"In an autonomous vehicle, if something happens to the passenger, the car keeps on driving," he said. "All the different car manufacturers are looking at this [technology to monitor passengers, also for liability reasons]."

Health Care Focus

But the main focus will be to bring the technology into the health care space.

Binah.ai is Maman's 13th start-up company. An expert in cybersecurity, AI and computer networking, Maman has founded start-ups in Israel including HexaTier/GreenSQL, which was acquired by Chinese telecommunications company Huawei Technologies Co. and Teridion and Vanadium-Soft.

He started Binah.ai in 2016 with co-founders Michael Markzon and Konstantin Gedalin with their own money, then received \$4m in seed funding from Israel-based venture capital firm iAngels.

The company recently closed a series A round, which was led by Sompo, GIVI and Maverick Ventures Israel, raising a total of \$10m in funding. Maman said the funding will be used to add 13 more researchers to the team and to launch the technology in the US and UK.

"You can see a lot of different solutions for digital health," he said. "This kind of technology allows you to overcome the distance barrier when you cannot have a doctor next to you or a nurse to take your vital signs and everything can just be extracted from a video."

Binah.ai

Address: 125-127 Yigal Alon Street, Tel Aviv, Israel

Contact: info@binah.ai

Founded: 2016

Founders: David Maman, Michael Markzon, Konstantin Gedalin

Number of Employees: 35

Financing Total To Date: Seeds: \$4m, Round A: \$10m

Investors: iAngels, SOMPO, GITV

Board of Directors: David Maman, Michael Markzon, Michael Abadi, Shelly Hod-Moyal, Sheldon Elman