



HEALTHCARE TRANSFORMATION **START-UPS TECH MAP**

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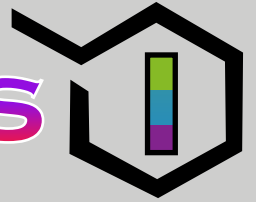
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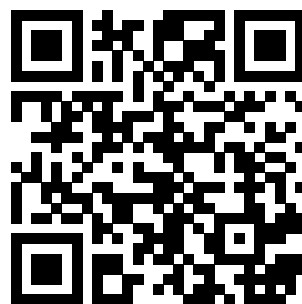
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MINDMAZE COMPANY'S INNOVATIONS

Mind Maze is led by Dr Tej Tadi, who specializes in the field of neuroscience combining virtual reality and motion capture with brain-machine interfacing. This innovation has helped alleviate symptoms of phantom pain in amputees. MindMaze, which is a start-up company, has also developed the MindMotion PRO and MindMotion Go technologies, which have revolutionized the healthcare sector through their capacity to repair broken neural connections and retrain the body's functions after a stroke.

By 2016, the company was valued at USD 1 billion, with the MindMaze VR (Virtual Reality) technology used by health care providers in hospitals across Europe and Asia. MindMaze also acquired Neuro Motor Innovations, a company that utilizes game therapy as a complementary component in the treatment of stroke patients. In this way, the company continues to revolutionize people's lives by forming new technology partnerships.

MINDMOTION PRO TECHNOLOGY

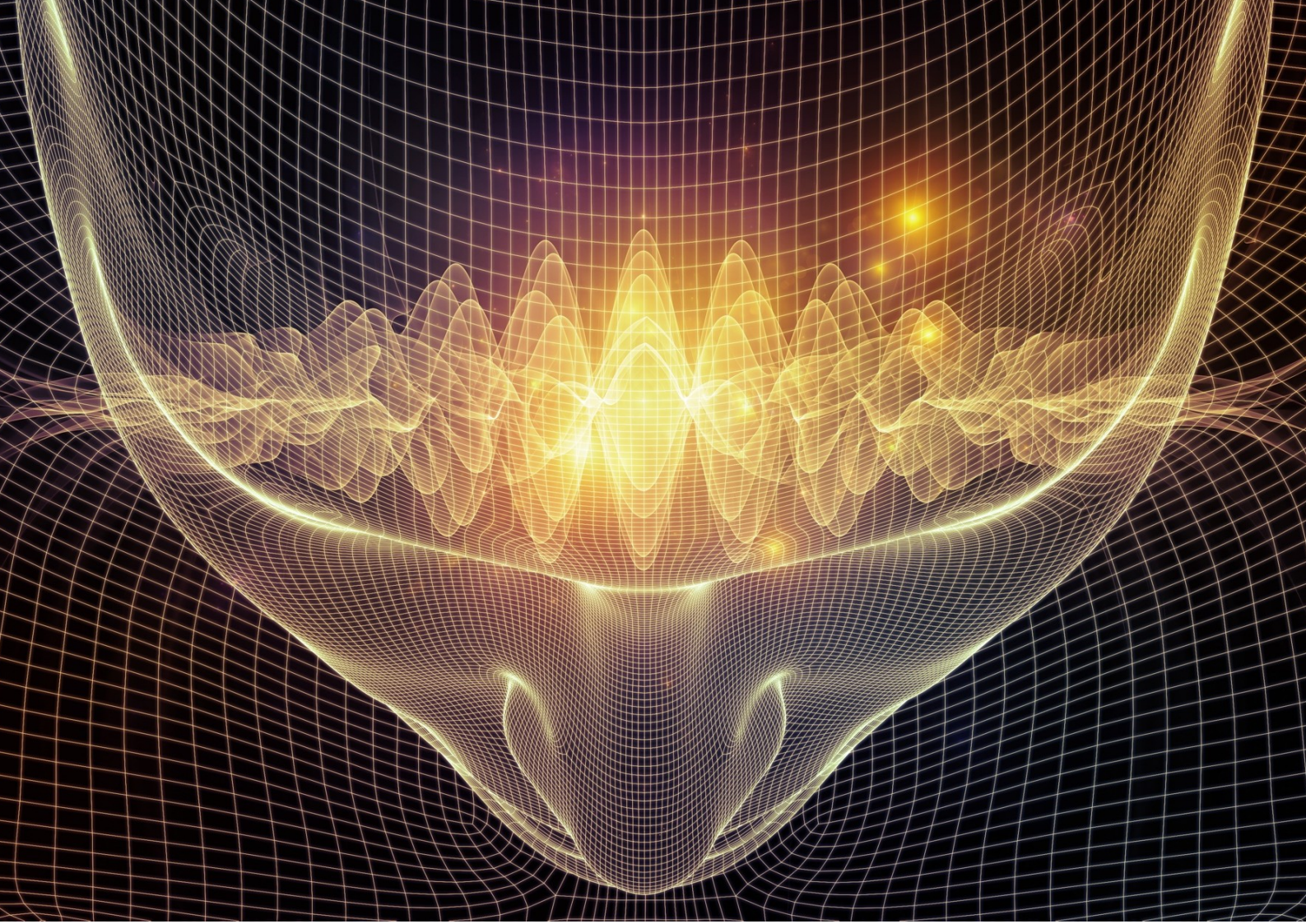
MindMaze has received FDA clearance for its MindMotion Pro platform, a motion-capture system, similar to the Microsoft Kinect gaming accessory, that can be used in the rehabilitation of stroke and traumatic injury patients. This portable neurorehabilitation product was launched in the United States in 2017. Virtual environments developed in Switzerland can be tailored according to the patient's preferences and needs, motivating them to get the most out of their therapeutic exercise and training regimen. With real-time multisensory feedback, patients can monitor their own capabilities and progress. MindMotion Pro combines medical technology, motion-capture cameras and sensors with AI computing in a virtual reality environment. Therapy starts with MindMotion Pro hospital sessions, while the MindMotion Pro system also assists patients in continuing with their condition care management at home¹. It offers more than 30 neurorehabilitation activities and game-playing elements to encourage patient engagement, rooted in evidence-based neurorehabilitation principles proven to enhance recovery (*Figure 1*).



Fig 1. A 3D Virtual Therapy for Upper Limb Neurorehabilitation.
Matt Hoffman. (2018). FDA Approves MindMotion GO, Mobile
Neurorehabilitation Product.

Patients recovering from a stroke can have difficulties in moving, sensing the environment around them and utilising their cognitive abilities which results in problems with everyday activities such as writing, walking and driving. A virtual reality environment is provided to people recovering from a stroke, through the therapeutic application of computer-based programs that simulate real life objects and events. The advantage of such procedures over traditional therapeutic approaches lies in the opportunity they provide patients to practise everyday activities that they are otherwise unable to perform within the hospital environment. In addition, the interactive features of virtual reality programs motivate patients more when compared to traditional interventions.

MindMotion Pro's technology provides intensive training and care management aimed at enhancing the neural activity of particular areas within the brain. Discussing this innovative approach, Dr Tadi elaborated on the potentially devastating long-term effects of strokes and mentioned that many patients had difficulty motivating themselves to practice every-day tasks during the recovery process. With the portable MindMotion GO device, patients are able to access their therapy program from home in just five minutes. Clinical research found patients motivated by a variety of goal-oriented games practiced up to 15 times more therapeutic exercises when compared to traditional treatments. Dr Tadi hopes that this technology will revolutionize the way patients relearn to move and think effectively. In addition, this program motivates patients to take their recovery into their own hands.



MINDMOTION GO TECHNOLOGY

This medical technology system utilises motion-capture cameras and sensors in combination with AI computing, through an integrated virtual reality environment. Therapy starts with MindMotion Pro hospital sessions, while the MindMotion GO system uses MindMaze's breakthrough technology to capture brain activity while interpreting brain signals via neural predication.'

MindMotion GO provides a large variety of engaging activities for patients. By keeping patients training over longer periods of time, the program increases the quantity of therapy received, strengthening recovery potential while enhancing physical functions. As the rate of strokes worldwide continues to increase, such a technology will give hope to many more people's lives. After 55 years of age, the risk of a stroke almost doubles every 10 years. According to the National Institute of Neurological Disorders and Stroke (NIC), some treatable risk factors are: Smoking, Heart disease, Diabetes, High blood pressure and Poor diet. Every 40 seconds, somebody in the US suffers from a stroke. Almost every 4 minutes, someone dies from a stroke, while 2 million brain cells are lost each minute a stroke patient is left untreated. Stroke patients treated within 90 minutes are three times more likely to recover with little to no disability. Neurological impairments are the main cause of long-term disability in the United States, with a recent study estimating direct and indirect costs associated with neurological diseases costing roughly USD 800 billion annually. For stroke alone, there are 800,000 cases each year, with direct annual costs estimated at USD 22.8

billion. More than 1,300 patients have been helped by MindMotion PRO and Mind Motion GO technology.

MindMotion GO induces patient motivation with 3D virtual environments and improves outcomes through the analysis of patients' neurological and physiological measurements. In the case of acute stroke patients; clinical studies show patients that are comfortable with 20-30 minutes of training do not need continuous supervision. MindMotion PRO exercises are developed based on standardized neurorehabilitation principles: upper limb rehabilitation & cognitive paradigms. Training games activate neurons in different body areas of the patients involved: shoulder, elbow, forearm, and wrist, and help induce movement. The PRO version differs from the recently approved MindMotion GO in that it is intended for use in patients with severe impairments as well as in early hospital care (in an inpatient setting) with therapeutic activities able to commence within 4 days after a neurological incident². The mobile MindMotion GO technology allows for real-time audio and visual feedback, aiding physicians in the assessment of progress and

tailoring therapy based on an individual patient's performance, according to the MindMaze program. Furthermore, it supports the patient's ability to check on and monitor their progress as well. The set-up and calibration can be done in less than 5 minutes, so patients can begin rehabilitation sessions immediately while physicians facilitate case management. Patients with movement, cognitive and eventually neurodegenerative deficits will be able to accelerate the rate of their recovery with the technological advances of VR and AR, across a wide range of diseases. The technology of MindMaze offers the potential to improve both the independence and the quality of life of stroke survivors³.



Fig 2. Mindmaze Equipment. Mind Maze (2019). Mc Laren racing and MindMaze announce 2019 Indianapolis 500 technology Partnership.

MCLAREN RACING PARTNERSHIP WITH MINDMAZE IN 2019

This is an innovative and strategic cooperation taking place in 2019. The technology partnership will see the companies collaboratively design and develop 'MindDrive,' as the next generation of safety and performance platforms tailored towards motorsport.

By combining MindMaze's award-winning programs together with McLaren Racing's world-class resources, both companies have been given the opportunity to develop driver safety through cutting-edge technology while capturing new performance data that can benefit motorsports as a whole⁴ and reduce accidents that cause brain injuries and cost lives.

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