

Digital Health Technology Innovations for Home Care

Fong-Chin Su^{1,2}, Chih-Chun Lin^{2,4}, Li-Chieh Kuo³, Yu-Sheng Lin⁵, Chia-Ming Chang⁶, Fang Wen Hu⁷

¹Department of Biomedical Engineering, ²Medical Device Innovation Center,

³Department of Occupational Therapy, National Cheng Kung University, Tainan, Taiwan

⁴Department of Physical Therapy, I-Shou University, Kaohsiung, Taiwan

⁵Department of Mechanical Engineering, Southern Taiwan University of Science and Technology, Tainan, Taiwan

⁶Department of Internal Medicine, ⁷Department of Nursing, National Cheng Kung University Hospital, Tainan, Taiwan

Abstract: Taiwan enters the super-aged society in 2025. More than one-third of hospitalized elderly patients have experienced functional declines in activities. Early intervention of exercise is known to have preventive effects. However, elderly patients lack health literacy and fear of injury from activities while most medical professionals focus on the treatment of current diseases, unavailable training equipment, and difficulty in controlling duration and intensity of training. Due to above-mentioned reasons, it is hard to keep getting out of bed during hospitalization and home, resulting in insufficient activity and functional decline.

The purpose of this project was to break through traditional medical care through smart technology, connect medical centers to community and home care with a key integrated smart health promotion system, connect information flow between various fields, and realize a people-oriented health management model. The research and development focus on the channel integration between the medical end, the nursing end, the industrial end, and smart technology. The AI Feedback Assistive Strengthening Ergometer (AIFASE) was developed and optimized, adding offline mode, voice prompt function, sports game interaction, and blood oxygen concentration detection in response to clinical needs. The advantage of AIFASE is to simultaneously monitor physiological indicators and record exercise parameters to provide frail elderly with safe and effective exercise training models. In addition, the integrated nostalgia therapy with VR 360° real video-style virtual reality technology was developed to meet the physical, psychological, and social needs of the elderly. We also conduct clinical trials from communities, long-term care institutions, and even medical centers to validate the effect of AIFASE. Our results show that elderly patients with sufficient training duration using AIFASE during hospitalization can improve muscle strength, especially the lower limb muscle strength among those who became frail recently, compared to those with long term or chronic frailty.

The innovative technologies developed in this project have related to the medical information system of NCKU Hospital. Two start-up companies have been launched to develop a successful innovative smart health care ecosystem and business model.



Biography of the Presenter: Fong-Chin Su served as NCKU Executive Vice President, President of the NCKU Research and Development Foundation, and President of the NCKU Education Foundation (2019–23). Dr. Su actively contributes to various professional organizations including Councilor, World Council of Biomechanics (2014–26), President, Academia-Industry Consortium for Southern Taiwan Science Park (2020–24), President, International Conference on Mechanics in Medicine and Biology (2018–22), President, Taiwanese Society of Biomedical Engineering (2011–14),

International Advisory Board Member, Hand and Wrist Biomechanics International (2021–present), Founding Councilor, AsianPacific Association for Biomechanics (2005–15), President, Taiwanese Society of Biomechanics (2002–03).

Dr. Su has authored over 360 peer-reviewed journal papers, ranking in the top 0.5% of scholars worldwide according to ScholarGPS 2025. Dr. Su has held key editorial positions, including Co-Editor-in-Chief, BioMed Engineering Online (Springer, 2015–2020), Co-Editor-in-Chief, Journal of Medical and Biological Engineering (Springer, 2015–2020), and Associate Editor, Journal of Mechanics in Medicine and Biology (2011–), etc.

Dr. Su has received numerous accolades, including Fellow, International Union for Physical and Engineering Sciences in Medicine (IUPESM) (2025), Fellow, International Association of Advanced Materials (2025), Sun Fang-Duo Mechanics Medal, Society of Theoretical and Applied Mechanics of the Republic of China (2025), Merit NSTC Research Fellow Award (2024), Distinguished Achievement Award, Phi Tau Phi Scholastic Honor Society, ROC (2023), Outstanding Research Award, Ministry of Science and Technology (2021 & 2011), Life Achievement Award, Taiwanese Society of Biomechanics (2018), National Industrial Innovation Award (2017), AIMBE Fellow (2016), Fellow, International Academy of Medical and Biological Engineering (IAMBE, 2013), Han Wei Medal, Taiwanese Society of Biomedical Engineering (2015), and You-Li Chou Medal, Taiwanese Society of Biomechanics (2007).