

Details on the project inventions are:

Predictive Calculator for Early Detection of Syndromic Craniosynostosis	
Summary of the Project	<p>Craniosynostosis syndromes are development disorders that effect the shape of skull which cause an abnormal shape due to premature fusion of cranial sutures. In Malaysia, the three common genetic syndromes related with craniosynostosis are Apert syndrome, Crouzon syndrome and Pfeiffer syndrome. The skull abnormalities of syndromic craniosynostosis (SC) patients can be commonly detected using linear measures from CT scan. However, there are cases whereby the syndrome cannot be detected using existing measures, causing severe complications such as brain damage and eye problem in the occurrence of late detection.</p> <p>A predictive calculator to identify abnormalities of skull growth using 12 angular measures for pediatric patient age 0-24 months was specifically designed for an early detection of SC condition. The calculator provides the angular descriptive statistics and graphical summaries of the patients' angular skull morphology and also enable comparison to the normal data for predictive purposes.</p>
Main contribution/Novelty	<p>The novelty of this research is the formulation of statistical procedure to determine abnormality in angular biomedical data, in particular for early detection of the syndromic craniosynostosis. Currently in Malaysia, the diagnosis is done via clinical findings and confirmed with expensive genetic study. From our systematic research, there is no predictive software focusing in skull abnormality thus making this project the first of its kind.</p>
Impact of the project	<p>The product has great potential to be commercialized, is marketable in any hospitals in Malaysia and can be implemented in other hospitals worldwide, by adding new data from the respective normal pediatric skull population.</p>
Benefit to practitioner	<p>For the healthcare segment, the predictive calculator will benefit a lot in medical diagnosis process to provide better treatment planning of craniosynostosis syndrome and other skull deformity condition for patients in Malaysia.</p>
Others achievement	<p>This project is a collaborative project within UMP and UM researchers. It has been awarded GOLD at CITReX 2021.</p>

Pandemic Preparedness Simulation Tool	
Summary of the Project	<p>Invention is the Preparedness Simulation Tool by modifying the susceptible, infectious (quarantine, ICU without ventilator and ICU with ventilator), death and recovery SIRD model based on the control measures of the non-pharmaceutical intervention (NPI).</p> <p>Predictive model in the form of deterministic and stochastic are coded into Python code and the predictive results are illustrated in the form of Graphical User Interface (GUI). Pandemic Preparedness Simulation Tool interface include:</p> <ul style="list-style-type: none"> ✓ Prediction of the active (quarantine, ICU without ventilator and ICU with ventilator), recovered and death cases under different types of NPI (Without, Loose or Strict) based on the user input. ✓ Real time reproduction number based on the user input date and mitigation plan.
Main contribution/Novelty	<p>Simulation the outbreak under without, loose and strict NPI as well as 3 categories of the illness can provide the required information for mitigation plan of the MoH, MITI, MoE, MoHE, industries, and all sectors.</p> <p>If the outbreak is longer than expected and NPI need to be extended, actions to ensure the readiness of the industries, academicians, students and others can be taken.</p> <p>The tool provides a better understanding to the society about the virus spreading and get ready mentally and physically if uncertainty happen.</p> <p>Government/NGO could prepare early prevention to help the society in term of other social issues for example violence in household, child abuse, and others.</p>
Impact of the project	<ul style="list-style-type: none"> - Industry and organization relevant. - Compatible - give prediction for future based on the selection of NPI. - Alarm the health sectors for their readiness and preparedness during pandemic.
Benefit to practitioner	<p>Help government/ company/ institution to plan better strategy or alternative prevention, set guideline, develop policies, create more efficient strategy during pandemic and for the transition from pandemic to endemic. The proposed simulator is transposable to any other epidemics or very specific pathology/diseases for which one is interested to know the required number of beds for specific wards and with a specific flow.</p>
Others achievement	<p>CITReX Gold Medal</p> <p>Copyright Granted LY2021W0027611/ February 2021</p> <p>Publications:</p> <ol style="list-style-type: none"> 1. Muhammad Fahmi, Norhayati Rosli, Noryanti Muhammad, The Transmission Dynamic of the COVID 19 Outbreak Model: A Predictive Dashboard, Sains Malaysiana (ISI Journal), COVID-19 Special Issue, WoS, Q4, IF 1.009.

	2. R Ullah, M Waseem, N Rosli, J Kafle. Analysis of COVID-19 Fractional Model Pertaining to the Atangana-Baleanu-Caputo Fractional Derivatives , Journal of Function Spaces, 2021, WoS, Q1, IF 1.896.
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