**25-12-2023**

**RESEARCH PROPOSAL**

**Design of Artificial Intelligence (AI) Framework to identify the new COVID -19 Variant Virus for Immigrant arrivals in Kingdom of Saudi Arabia.**

**by**

**SAINCUBE**

**Smart Artificial Intelligence Network**

**Center for Ubiquitous Engineering**

**M/S LYCEUMERCE PVT. LTD.**

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**PROJECT PROPOSAL SUMMARY SHEET**

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| **Name of the Project:** | **Design of Artificial Intelligence (AI) Framework to identify the new COVID -19 Variant Virus for Immigrant arrivals in Kingdom of Saudi Arabia.** |
| **Duration of Project:** | **24 months** |
| **Total Budget Requested** |  |
| **Domain of Proposed Research Project** | **Engineering and Social Sciences** |

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| **Company Full Name** | **LYCEUMERCE PRIVATE LIMITED** |
| **Company Address** | **3030, 3rd Floor, World Trade Center, Giga Mall, DHA-II, Islamabad, Pakistan** |
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| **Company Leader Address** | **Engr. Dr. Mudasar Latif Memon** |
| **3030, 3rd Floor, World Trade Center, Giga Mall, DHA-II, Islamabad, Pakistan** |
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**PROJECT TITLE:** Project Proposal on Design of Artificial Intelligence (AI) Framework to identify the new COVID-19 variant virus for Immigrant arrivals in Kingdom of Saudi Arabia.

**PROJECT LOCATION** Main City of Jeddah

**PROJECT PERIOD** TWO YEARS

**PROJECT BUDGET** USD $ 34222.32

**Name of Company** LYCEUMERCE PRIVATE LIMITED

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**FCRA Registration No.**

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**Date of Submission**

**Executive Summary**

The economy of the Kingdom of Saudi Arabia (KSA) has recently suffered due to negatively impacted by low oil prices, reduced oil production, rising trade tensions, and the slowdown in global economic growth. In the meantime, Saudi Arabia's government has been spending more money as of late, with an emphasis on economic diversification, private sector growth, and social benefits. Furthermore, the quick global spread of COVID-19 slowed down economic activity, prompting the government to announce stimulus packages and reduce planned spending. But because the number of cases reported each day decreased due to the KSA's wise efforts, the crisis's effects on the kingdom were lessened, which led to a gradual relaxation of restrictions and an improvement in economic activity. The virus swiftly spread throughout the country, with KSA reporting its first case in March 2020 and reaching 200,000 cases by the end of June 2020. Lockdowns and travel restrictions were swiftly put in place by the government to lessen the pandemic's economic effects. Although the virus's effects on the kingdom were most noticeable in 2Q20, the government was able to gradually relax all restrictions because of the strong social distancing and lockdown measures that helped slow down the virus's spread. In an attempt to improve its market share, the KSA announced a rise in crude production along with significant price reductions on its oil supply, in response to Russia's price war. But the oil price war drove oil prices even lower and caused a collapse in the energy markets at a time when the entire world is dealing with a pandemic and governments are imposing lockdowns to stop its spread. The Saudi Arabian authorities quickly imposed entrance restrictions on Umrah and Hajj pilgrims. Only 10,000 pilgrims were allowed to complete the Hajj, while pilgrims were forbidden from conducting the Umrah. But later in the year, as constraints loosened, the prohibition on Umrah was removed, enabling locals and citizens to make this journey.

1. **Introduction**

The global pandemic CoVid-19 affects human life drastically and being restored by vaccination programs initiated by developed countries of the world including USA, UK, China, Russia etc. The World Health Organization (WHO) has considerable interest in catering to the major challenge in organizing vaccination programs and its cold chain delivery in remote areas. Similar to most countries, Saudi Arabia also faced several challenges during the novel coronavirus disease 2019 (CoVid-19) pandemic, some of which were related to the religious position of the country. The main challenges were included deficits in knowledge, attitudes, and not available latest medical equipment’s as well as proper Artificial Intelligence (AI) algorithms to decide a COVID-19 patients in an early stage. In our proposal, we resolve these challenges based on evidence from previous studies involving Saudi Arabian populations. We outline the measures through which the Saudi authorities managed to minimize the negative impacts of these challenges in the context of international health regulations and recommendations. Additionally, it is usual for viruses to change and evolve as they spread between people over time. When these changes become significantly different to a previously detected virus, these new virus types are known as “variants.” To identify variants, scientists map the genetic material of viruses (known as sequencing) and then look for differences between them to see if they have changed. Since 2020, SARS-CoV-2, the virus that causes COVID-19, has been spreading and changing globally. These changes have led to the detection of variants in many countries around the world. The more significant of these variants are grouped in three different ways – variants under monitoring, variants of interest and variants of concern. A Variant under Monitoring (VUM) is a term used to signal to public health authorities that a SARS-CoV-2 variant may require prioritized attention and monitoring. The main objective of this category is to investigate if this variant (and others closely related to it) may pose an additional threat to global public health as compared to other circulating variants. A Variant of Interest (VOI) is a term used to describe a SARS-CoV-2 variant with changes that are known to affect how the virus behaves or its potential impact on human health. This can include, for example, its ability to spread, its ability to cause serious disease, or how easily it may be detected or treated. A VOI may also be identified because it has an increased ability to spread when compared with other circulating variants, suggesting a potential emerging risk to global public health. A Variant of Concern (VOC) is a term that describes a SARS-CoV-2 variant that meets the definition of a VOI. Our Research Group started working for reduce the spread of COVID-19 in the Saudi community which is normally affected by immigrants arrival. In this regard we designed and implement a simple and fast solution to identify the COVID patients at an early stage to save the whole community.

The broad research objectives of the proposed Covid-19 detection model are following.

* The initial phase of Covid-19 detection module is the “Conceptual Design” that will start from stakeholder requirements elicitation to finalize the desired wish list.
* The second phase is the “Design and Solution” that shall finalize the functional architecture to realize the complete layout of the Covid-19 deep CNN model detection.
* On the basis of above information, the mathematical model shall be derived to detect the COVID-19 patient at an early stage. Using a mathematical model after analytical analysis the achieved outcome shall be translated to software domain which will be based on schematics design of the proposed system. As per available resources, the simulation analysis shall be performed to verify and achieve the performance requirements of the proposed system.
* The last step of the design and solution for Covid-19 detection model is to develop a prototype that will address the electronic circuit design of the proposed system.

1. **Project Aims**

The main aim of this project is to accurately identify the COVID-19 patient at an early stage. Secondly, everyone used AI-enabled framework and easily identify his or her health status any time, and no need of doctors. Furthermore, proposed model is more feasible for doctors during decision, either patient has a COVID or not. The last objective of project is to design cost- and time-effective diagnosis tool.

1. **Project methodology**

We propose novel multi-modal based method using deep convolutional neural network technique to identify the COVID-19 symptoms at an early stage of the patient. Both sources of data are fed into AI-enabled two-stage detection method that predicts scores of the diseases separately for each data source in first stage and then, the score are combined in the second stage to associate finalized prognosis score with each case either COVID (+ve) or COVID (-ve). AI-framework gains the experience of predicting reliable prognosis score by learning over the data of large population. Initially, data would be de-noise and some portion of clean data would be fed into machine learning method to train it. Then, the trained method is validated over unseen data of patients.

1. **Scope of the Project**

The scope of this project is in line with guidelines and policy identified by the World Health Organization (WHO) to identify and detect the COVID-19 cases. Furthermore, project will enable the health department of the government of Kingdom of Saudi Arabia to omit their reliance on other countries for COVID-19 detection approaches by saving millions of dollars. The project can be easily compiled in any windows and Ubuntu-based operating system software package.

1. **Hypothesis**

The genetic chest X-ray images data carry distinct but complex patterns and changes that can be associated with neurodegenerative diseases at asymptomatic stage. Complex sequence of bad genes increases the risk for people to develop neurodegenerative diseases. Advanced chest X-ray images can exhibit some early subtle structural difference of chest of certain types of proteins. Thus, the chest images and genetic data combined to develop AI-framework for reliable prognosis of the diseases. The proposed method would provide reliable prediction to help clinicians and patients to take preventive measures against the deadly COVID-19 diseases.

1. **Applicant’s role in project**

The applicant would perform detailed analysis of COVID-19 patient data to investigate and discover the complex sequence of new variant cases of COVID-19 that causing health related problems for whole community. For find-grained analysis of long sequential COVID-19 data, we would design sophisticated AI-framework.