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# Development of an Early-Detection COVID-19 Diagnostic Pre-Testing System

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**Abstract**
The COVID-19 pandemic has highlighted the critical role of early detection in curbing disease transmission and reducing pressure on healthcare systems. This study presents the design and implementation of a COVID-19 Diagnostic Pre-Testing System that enables early symptom assessment and identification of high-risk individuals. The system allows users to input symptom-related information, which is analyzed using predefined diagnostic criteria to estimate infection likelihood. The front-end interface was developed using HTML, CSS, and JavaScript to ensure a responsive and user-friendly experience, while PHP and MySQL were employed for server-side operations and secure data management. By providing instant feedback and maintaining a database of user interactions, the system enhances the efficiency of preliminary COVID-19 screening and supports data-driven decision-making for public health interventions. The proposed solution demonstrates how expert system principles can be applied to improve pandemic response, promote awareness, and assist healthcare providers in prioritizing testing and resource allocation

**Keywords:** Early Detection, Development, COVID-19, Diagnostic, Pre-Testing System

## Introduction

The outbreak of the COVID-19 pandemic introduced unprecedented challenges to global healthcare systems. Since its emergence in Wuhan, China, in December 2019, the virus has spread rapidly across nations, infecting millions within a short period (Hui et al., 2020; Wang et al., 2020). COVID-19, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is primarily a respiratory illness that ranges from mild flu-like symptoms to severe respiratory failure (Hao et al., 2022). Although most infected individuals experience mild to moderate symptoms, vulnerable populations such as older adults and those with chronic diseases are at greater risk of developing severe complications (Aiyegbusi et al., 2021). One of the most effective strategies for mitigating the spread of COVID-19 is early detection, which facilitates timely isolation, treatment, and contact tracing. However, the massive global demand for testing has overwhelmed many healthcare systems, resulting in diagnostic delays and increased transmission risks. Consequently, there is a pressing need for innovative digital solutions that can support early diagnosis and public health awareness. Artificial Intelligence (AI) has shown remarkable potential in addressing such challenges by replicating human reasoning and providing data-driven decision support. In particular, expert systems—a branch of AI designed to emulate human expert decision-making—have been widely applied in medicine for diagnosis, treatment recommendations, and disease monitoring (Manta-Costa et al., 2024). These systems leverage structured knowledge bases and inference mechanisms to deliver accurate and consistent diagnostic guidance, even in the absence of direct human intervention. Within the context of the COVID-19 pandemic, expert systems can play a critical role in symptom-based pre-testing and awareness creation, especially in regions with limited access to healthcare resources. According to the World Health Organization (WHO, 2020), prevention and awareness remain the most effective measures for curbing the spread of the virus, given the absence of a definitive cure. In Nigeria, the first confirmed COVID-19 case was reported on February 27, 2020, in Lagos State, following the return of an Italian citizen from Milan, Italy (Nigeria Centre for Disease Control [NCDC], 2020). This event underscored the importance of technological interventions to enhance public responsiveness and self-assessment capabilities. This study proposes


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the development of a COVID-19 Diagnostic Pre-Testing System, an AI-driven expert system designed to assess infection likelihood based on user-provided symptoms. The system aims to serve as a first-level diagnostic tool that provides immediate feedback and creates awareness to encourage preventive behavior. Specifically, the objectives of this research are:

i. To provide a self-diagnostic interface for individuals to assess their risk of COVID-19 infection based on reported symptoms.
ii. To build a knowledge-based system containing comprehensive information on COVID-19 for educational and preventive purposes.

Given the increasing spread of the virus, coupled with inadequate medical facilities, limited manpower, and insufficient public awareness, the development of such a system is timely and necessary. Thus, early detection and awareness can be enhanced, thereby contributing to more effective disease control and improved public health outcomes.

Coronaviruses are a group of viruses known to cause respiratory infections in humans, such as pneumonia, the common cold, coughing, and sneezing, while in animals, they can lead to gastrointestinal and upper respiratory diseases. Transmission occurs primarily through airborne droplets from infected individuals or animals. The virus enters human cells via the angiotensin-converting enzyme 2 (ACE-2) receptor, which facilitates viral replication within host cells (Hao et al., 2022). The World Health Organization (WHO) and the European Centre for Disease Prevention and Control (ECDC) advised the public to avoid crowded places and limit contact with infected individuals and animals to curb transmission. The first case of the novel coronavirus (2019-nCoV) was isolated from the Wuhan seafood market in China on January 7, 2020 (Huang, 2020). Historical records show that coronaviruses were first identified as common cold pathogens in the 1960s, but their potential severity was not recognized until the 2002–2003 outbreak of Severe Acute Respiratory Syndrome (SARS). During that period, the virus spread to multiple countries, including the United States, Hong Kong, Singapore, Thailand, Vietnam, and Taiwan, infecting over 8,000 individuals and causing more than 1,000 fatalities. This global health crisis prompted extensive research into the virus's pathogenesis and transmission mechanisms. In response, the WHO and the U.S. Centers for Disease Control and Prevention (CDC) declared a global public health emergency in 2004.

In parallel with advancements in medical research, developments in Artificial Intelligence (AI)—particularly expert systems—have shown promise in supporting healthcare diagnostics. An expert system is a computer-based program that replicates the decision-making ability of human specialists in specific domains such as medicine, finance, or engineering (Tzafestas & Konstantinidis, 1992). These systems consist of two key components: a knowledge base, which stores facts and rules derived from human expertise, and an inference engine, which applies logical reasoning to generate conclusions or recommendations. Additional components, such as user interfaces and explanation facilities, enable interaction with users and the interpretation of system decisions. Research into expert systems has been active in Europe, notably in France, where efforts to automate reasoning and develop logical engines led to the creation of the Prolog programming language in 1972. Prolog, one of the earliest declarative AI languages, enabled efficient implementation of expert systems, though it was limited by its reliance on Horn logic, which differs from human reasoning patterns. Expert systems are generally classified into two main types: rule-based and case-based reasoning (CBR) systems. Rule-based systems encode expert knowledge as a series of "if–then" statements to infer conclusions, whereas CBR systems rely on previously solved cases to guide the resolution of new problems. Successful cases are stored alongside their explanations for future reference and learning. CBR has been applied across various domains, including manufacturing process design, knowledge management, fault diagnosis, and power system restoration.

In the medical field, expert systems have been widely adopted for clinical diagnosis, treatment recommendations, and health monitoring. They have also been applied in fields such as automotive repair, weather forecasting, and education serving as predictive, diagnostic, and instructional tools. These applications demonstrate the versatility and reliability of expert systems in replicating expert-level decision-making across complex problem domains.

**Application of Expert Systems and AI in Medical Diagnosis**

The growing demand for high-quality medical knowledge has prompted researchers to explore the use of computer programs to assist healthcare professionals in diagnosis, therapy, and treatment. One of the most prominent applications of artificial intelligence (AI) in medicine is the expert system, which emulates the decision-making ability


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of human specialists. Over the years, several notable medical expert systems have been developed. For instance, CALEX, designed at the University of California, was created for diagnosing peach and nectarine disorders (Tzafestas & Konstantinidis, 1992). Similarly, MYCIN, developed at Stanford University, was an early AI-based system capable of identifying bacteria responsible for severe infections such as bacteremia and meningitis, as well as diagnosing blood-clotting disorders. Another notable system, CADUCEUS, applied knowledge-based reasoning to support physicians in patient diagnosis and treatment. Developing an expert system requires extracting specialized knowledge from human experts and translating it into computational rules—a process known as knowledge engineering. This process typically involves three major phases: knowledge acquisition, knowledge representation, and system testing. The professionals responsible for this process are referred to as knowledge engineers.

In the context of COVID-19, expert systems and AI-driven tools have gained increasing attention due to their potential to facilitate rapid and cost-effective diagnostics. The conventional gold standard for COVID-19 diagnosis—the reverse transcription polymerase chain reaction (RT-PCR) test—is highly sensitive and specific but remains time-consuming, expensive, and infrastructure-dependent. Consequently, there is a growing need for alternative diagnostic methods that are accessible, affordable, and capable of supporting large-scale testing, particularly in low- and middle-income countries. Recent studies have explored various AI-based approaches for COVID-19 detection. Shen et al. (2021) proposed an edge-deployable detection algorithm utilizing a pre-trained ResNet18 model to extract features from chest X-ray (CXR) images. To enhance computational efficiency, a discrete social learning particle swarm optimization (DSLPSO) algorithm was employed to select the most relevant features, thereby reducing redundancy and improving detection speed without compromising accuracy. This lightweight model demonstrated suitability for implementation on Internet of Things (IoT) and edge computing devices—technologies increasingly essential in real-time epidemic monitoring.

Similarly, Sethy et al. (2020) developed a diagnostic framework combining deep feature extraction from CXR images using 11 pre-trained models with Support Vector Machine (SVM) classification. Their results showed that the ResNet50+SVM configuration achieved the highest accuracy for COVID-19 image-based detection. Beyond medical diagnosis, AI has also been instrumental in studying broader societal impacts of the pandemic. Ballatore et al. (2024) investigated how the COVID-19 crisis affected cultural institutions in the United Kingdom, leading to the temporary closure of over 3,300 museums. Their project, Museums in the Pandemic, utilized web analytics, natural language processing (NLP), and machine learning to analyze online content from museum websites and social media. By applying convolutional neural networks (CNNs) to extract behavioral indicators such as closures, fundraising, and staffing activities, the study provided new insights into institutional responses during and after the pandemic. In a related study, Blandford et al. (2025) examined the integration of human-computer interaction (HCI) methods into agile digital health development for managing Long COVID. Their project produced Living with COVID Recovery, a clinically supported self-management application. The research contributed to understanding user-centered design in healthcare technology, highlighted challenges in engaging patients with chronic conditions, and emphasized the importance of interdisciplinary collaboration in digital health innovation. These studies collectively demonstrate that AI and expert systems have played an essential role not only in COVID-19 diagnostics but also in mitigating the broader impacts of the pandemic through intelligent data analysis, health support tools, and adaptive system design.

**Broader Applications of Artificial Intelligence and Data Analytics During the COVID-19 Pandemic**

Beyond clinical diagnosis, artificial intelligence (AI) and data-driven technologies have been employed to examine the wider social, psychological, and operational consequences of the COVID-19 pandemic. Haroon et al. (2023) applied a gender lens to analyse disparities in healthcare workers' (HCWs) personal and professional experiences in Pakistan before and during the pandemic. Their analysis, structured around four central themes—household responsibilities, hospital duties, psychological burden, and financial impacts—revealed the disproportionate challenges faced by female HCWs. The authors advocate for policy- and technology-based interventions grounded in humanistic and inclusive principles to address gender inequities, particularly during crises such as pandemics. In the realm of scientific communication, Efstratiou et al. (2024) investigated how COVID-19-related science was discussed on Twitter. Their findings indicated that public debates frequently misrepresented scientific consensus, with users often citing research selectively to reinforce preexisting viewpoints rather than to engage in balanced discourse. The authors suggested that enhancing the visibility of genuine scientific consensus could mitigate misinformation and support evidence-based policy-making.


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AI and sensing technologies have also been leveraged to manage public mobility and safety. Pilato et al. (2023) developed a modular social sensing system designed to generate personalized travel itineraries while minimizing exposure risk during the pandemic. By integrating user-specific parameters—such as risk perception, sociability, and awareness of COVID-19 conditions—the system recommended routes that reduced crowding at points of interest (POIs). This approach illustrated how social sensing can support safe and satisfying travel experiences in times of public health crises. The pandemic's psychological toll has likewise drawn attention to the potential of AI and social media analytics in mental health monitoring. Dhelim et al. (2023) provided a comprehensive survey of contemporary research utilizing social media data for mental distress assessment. Their work expanded on prior studies by incorporating recent machine learning and deep learning techniques capable of detecting multiple mental health conditions from online behavior. The study classified psychological features extractable from user-generated content and reviewed emerging models that effectively predict signs of mental distress during COVID-19.

Similarly, Hertel et al. (2022) presented an extensive survey of deep learning applications in diagnosing and prognosticating COVID-19 cases. Their analysis filled a gap in existing literature by systematically categorizing approaches according to imaging dimensionality, system purpose, and methodological techniques. The authors discussed the benefits and limitations of current models and identified future research directions for improving diagnostic accuracy and computational efficiency. Finally, Ajoor and Al Mubarak (2023) explored the role of AI and robotics in enhancing healthcare operations and safeguarding healthcare workers during the pandemic. Their review highlighted the deployment of AI-driven tools for diagnostic and administrative functions, as well as for minimizing human exposure to infection. They emphasized the relevance of AI to achieving the United Nations' Sustainable Development Goals (SDGs) and noted its growing importance in healthcare, education, and economic resilience across Bahrain and beyond. Collectively, these studies demonstrate that AI's contributions during the COVID-19 pandemic extend far beyond diagnostics. From supporting gender-equitable healthcare policies to mitigating misinformation, optimizing mobility, addressing mental health concerns, and improving occupational safety, AI has emerged as a multifaceted tool for enhancing resilience in times of global crisis.

The aim of this project is to design and implement a system capable of supporting COVID-19 pre-testing and preliminary diagnosis through the assessment of user-reported symptoms. The objectives are as follow:

i. To develop a self-assessment tool that enables individuals to perform an initial evaluation of their symptoms and determine the likelihood of COVID-19 infection.
ii. To create a system that provides users with accessible and comprehensive information about COVID-19, offering deeper insight into the virus and its associated symptoms.

**Methodology**

This section presents the methodological framework and software development model adopted for the proposed COVID-19 Diagnostic Pre-Testing System. To achieve the study's objectives, relevant literature on COVID-19 diagnostic systems, artificial intelligence (AI), and expert systems was systematically reviewed. A database was designed using MySQL to facilitate efficient data storage and retrieval. Data collection was conducted through direct interviews with medical practitioners and healthcare personnel, complemented by secondary data obtained from online sources. These formed the foundational knowledge base of the expert system. The system's functionality was implemented using PHP as the server-side scripting language, while HTML, CSS, and JavaScript were utilized to develop the user interface and enhance interactivity. Several software development models such as the Spiral, Agile, Iterative, Big Bang, and Waterfall models were evaluated for suitability. The Waterfall model was selected as the most appropriate for this study due to its structured, phase-based approach, which aligns well with the system's sequential development requirements. The Waterfall model follows a linear progression through the stages of conception, initiation, analysis, design, implementation, testing, deployment, and maintenance (see Figure 1).


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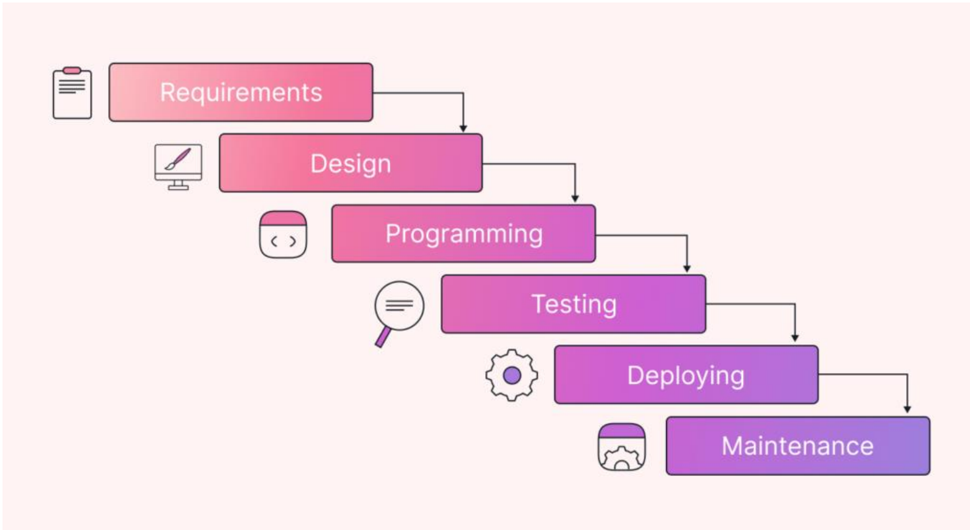


**Figure 1:** Water fall model

**System Design**: The system design defines the architecture, components, modules, interfaces and the data for a system to satisfy specific requirements. The system design consists of the following steps: Output design; The input design; Database Design and the program Design.

**Output Design:** The output was designed and presented in a way that is easily understandable and interpretable. The output includes; Real-time update on COVID-19 (*Figure 2*), Fact about COVID-19 (*Figure 3*) and the result of the pre-test (*Figure 4*). These are shown below:

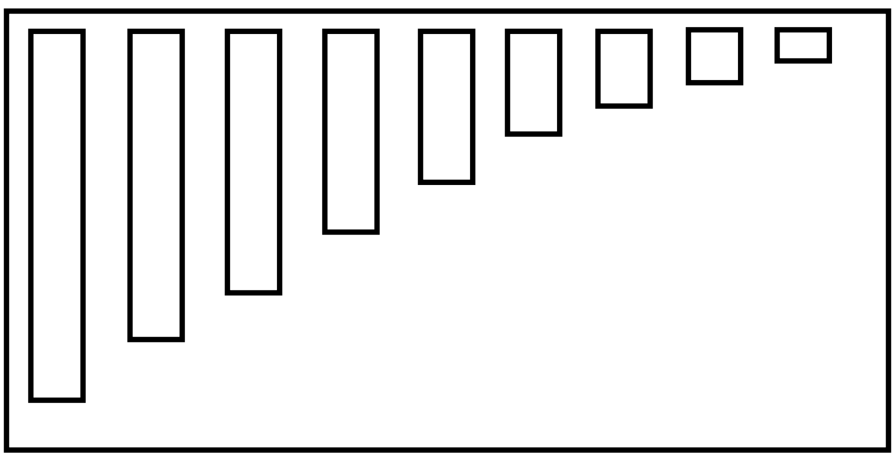

**Figure 2**: Real-time Design of Update on COVID-19


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***What is COVID-19?***

COVID-19 is a disease caused by a new strain of coronavirus. 'CO' stands for corona, 'VI' for virus, and 'D' for disease. Formerly, this disease was referred to as '2019 novel coronavirus' or '2019-nCoV.' The COVID-19 virus is a new virus linked to the same family of viruses as Severe Acute Respiratory Syndrome (SARS) and some types of common cold.

**Figure 3: Fact about COVID-19**

**Dear Bob Alice**

You are At Risk For Contacting COVID-19. Kindly Visit any COVID-19 testing Center for complete test procedure, OR Dial 080222233322 for NCDC attention.

**Figure 4:** Output Design of Pre-test Diagnosis Test

**Input Design:** Input design includes the login page (*Figure 5*), Sign up page (*Figure 6*), and pre-test diagnosis test page (*Figure 7*).

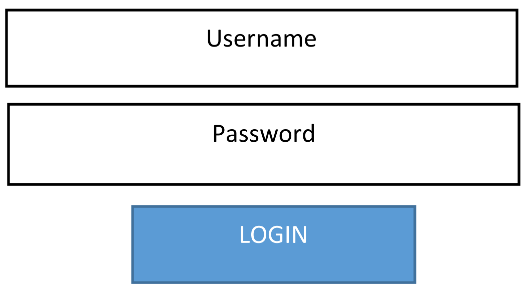


**Figure 5:** Login Page

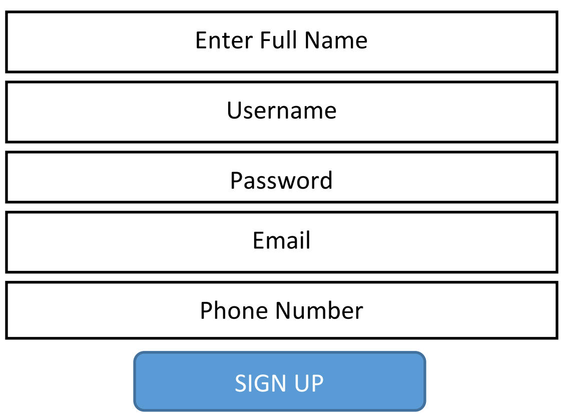


**Figure 6:** Signup Page


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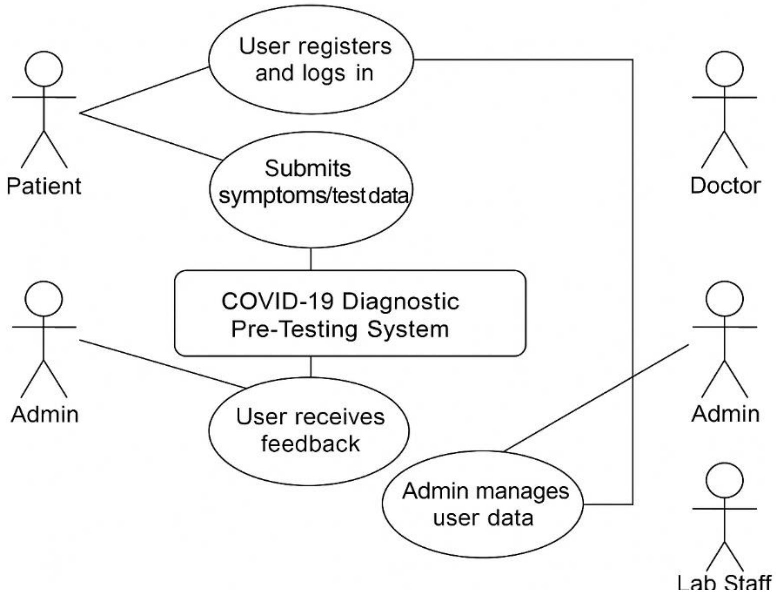


**Figure 7:** Use case Diagram of the Proposed System

**Expert System Architecture:** An expert system comprises three core components: (i) knowledge of facts, (ii) knowledge of the relationships between these facts, and (iii) appropriate techniques for acquiring, organizing, and storing this knowledge. Given the inherent limitations of computational and informational resources, the expert system must effectively navigate and search within its knowledge space to deliver accurate inferences.

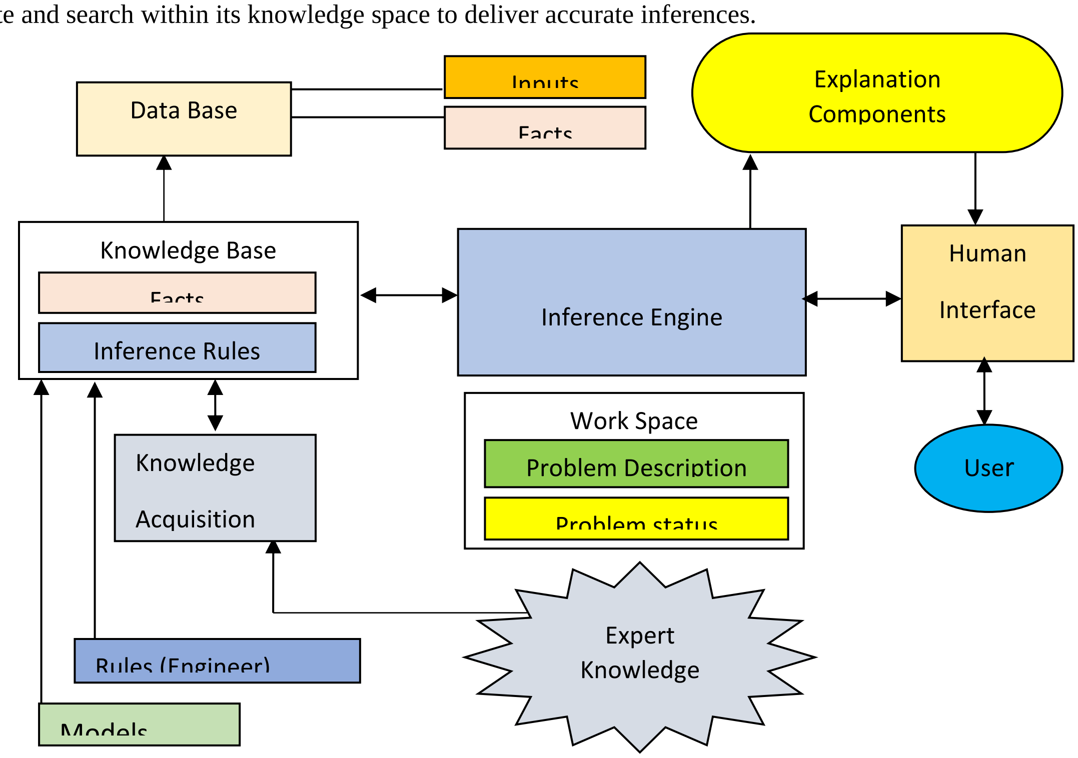


**Figure 8:** Expert System Architecture


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The embedded expertise within the system enables it to extract and apply relevant information efficiently, emulating human reasoning during diagnostic processes. The role of the knowledge engineer is pivotal in this context—responsible for eliciting domain-specific knowledge from medical experts and encoding it within the system's knowledge base. The resulting architecture thus integrates human expertise with computational reasoning to support early diagnosis and informed decision-making in COVID-19 pre-testing (see Figure 8).

**Entity Relationship Model (ER Model):** A data is built and populated with data for specific purpose. The following entities are identified: admin_login, form_patient, answer_patient, patient questions in the ER model (*Figure 9*).

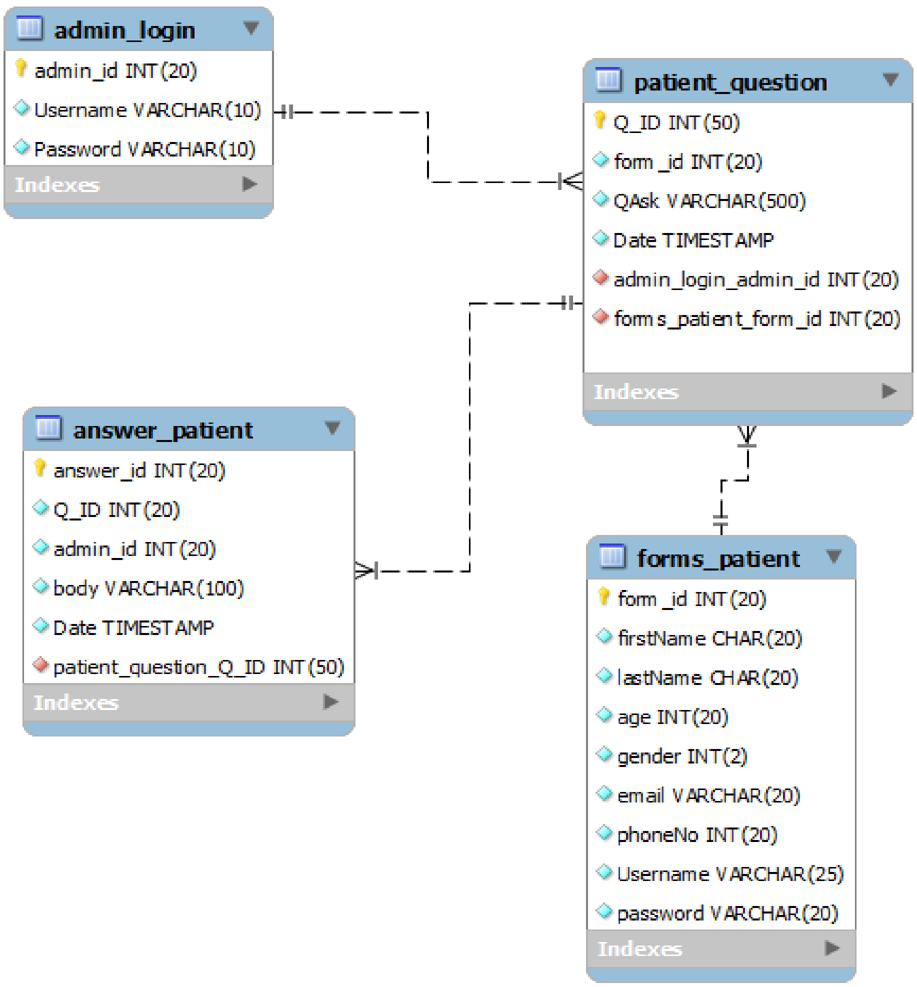


**Figure 9:** Entity Relation Model

## Results

This section presents the detailed implementation process, including system requirements, component design, and testing outcomes. The developed COVID-19 Diagnostic Pre-Testing System was designed with an emphasis on usability, ensuring that the interface is intuitive and accessible even to users with minimal computer literacy. The system requires only basic user inputs—such as form entries and button clicks—within clearly structured, unambiguous pages. The system architecture is composed of two main modules: the Front-End and the Back-End.

**Front-End Design**: The front end represents the user interface and serves as the interaction point between the user and the system. It allows users to access and utilize the system's features and diagnostic functionalities. The interface was designed to ensure simplicity and clarity in navigation and data entry. Development of the front end was carried out using HTML, CSS, and JavaScript, with Visual Studio Code serving as the Integrated Development Environment


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(IDE). These tools provided the flexibility to create a responsive and user-friendly interface that effectively communicates with the back-end components.

**Back-End Development**: The back end supports the logical and database operations of the system. It manages user input, performs diagnostic computations, and stores relevant data. The back-end module was implemented using PHP as the server-side scripting language and MySQL as the database management system. The system was hosted locally using the XAMPP server environment. This setup ensures seamless communication between the user interface and the database, providing fast and reliable performance during diagnostic operations.

**System Testing and Validation**: The COVID-19 pre-testing system underwent several phases of testing to ensure functional reliability and user satisfaction. Functional testing evaluated the correctness and stability of the system's operations in accordance with predefined design standards. Structural testing verified the logical flow and integration between different modules to confirm that all components operated as intended. Usability testing assessed user interaction and accessibility, ensuring that individuals from different educational backgrounds could use the system efficiently. Testing was conducted on computers running the Windows operating system with active Internet connectivity. The system performed efficiently under these conditions, producing accurate diagnostic results and maintaining stable performance. To further ensure quality, validation testing was carried out to identify and correct any residual errors that might have been overlooked during development.

The proposed system requires the following minimum hardware and software specifications for optimal performance: for hardware requirements, it include RAM: Minimum 1 GB, Hard Disk: Minimum 80 GB, Display Resolution: 1280 × 800, and Computer System, while the Software Requirements: Windows Operating System, Web Browser (for system access), Visual Studio Code or Sublime Text Editor, and XAMPP Localhost Server. The system interface outputs are illustrated in *Figures 9 –14* where selected outputs of the developed system are demonstrated: Figure 9: The Home Page provides a brief overview of the application, its objectives, and navigation links for various user categories based on defined access privileges; *Figure 10*: The Login Page allows registered users to securely access their accounts. *Figure 11*: The Registration Page facilitates new user enrollment into the system


**Figure 9:** Home Page

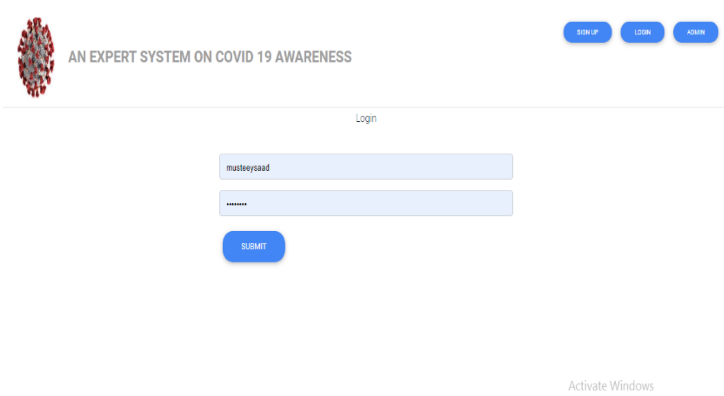


**Figure 10:** User login


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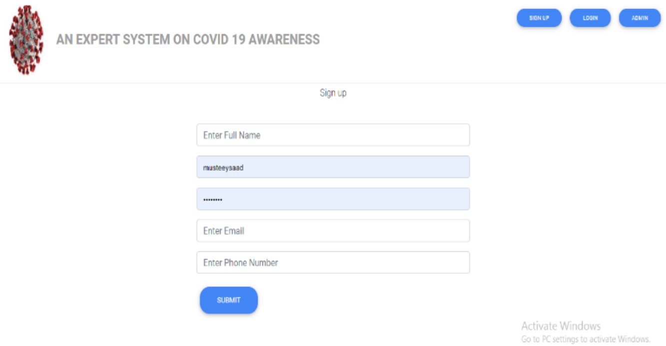


**Figure 11:** Registration Page

The *Administrator* shows were an administrator (doctor) logs in using a default username and password,which takes the administrator to a different page from that of patient,in this page,a doctor can view patients that have registered so far and can also answer questions asked by patient by clicking on Reply (*Figure 12*).

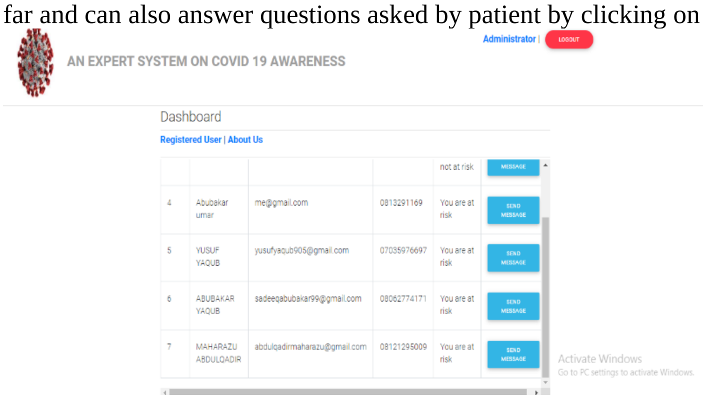


**Figure 12:** Admin Page

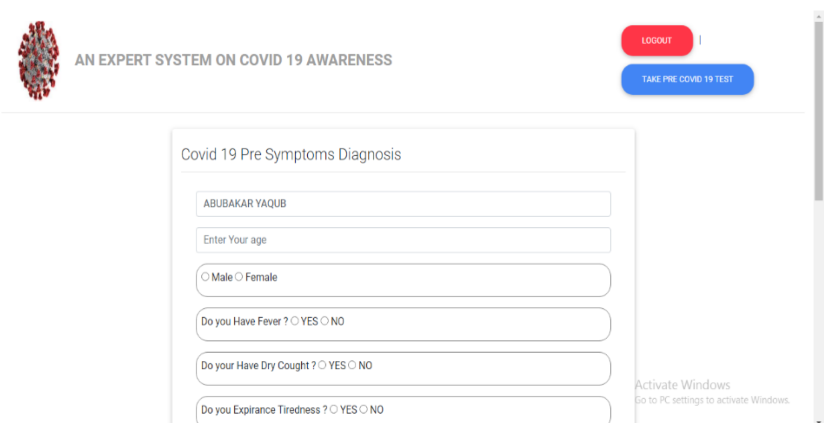


**Figure 13:** Symptoms Page

**Discussion**

The developed COVID-19 Diagnostic Pre-Testing System performed effectively and produced results consistent with expectations, particularly given its novelty as one of the first of its kind. The system demonstrates how rapid technological advancement can be harnessed to address pressing public health challenges. As industries increasingly adopt data-driven approaches, mobile technology continues to play a vital role in extending access to essential services especially for individuals with limited access to medical facilities or diagnostic tools. By leveraging mobile and web-based technologies, the proposed system simplifies the process of preliminary COVID-19 assessment, allowing users


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to input basic symptom data and receive instant feedback on potential infection risks. This design supports early intervention and reduces the burden on healthcare facilities by filtering non-critical cases before laboratory testing.

While similar diagnostic automation technologies have faced criticism for potentially reducing human involvement in healthcare processes, such systems are best viewed as complementary rather than replacement tools. They augment clinical efficiency, enhance accessibility, and support health workers in managing large patient volumes during public health emergencies. Future development efforts should focus on improving system adaptability, integrating real-time data analytics, and expanding predictive accuracy through continuous model training. Enhancements in these areas will ensure that the system evolves in alignment with advances in artificial intelligence, medical informatics, and public health practices.

## Conclusion

This study presented the design and development of a medical expert system aimed at facilitating the early detection, pre-testing, diagnosis, awareness, and control of COVID-19. The system captures and encodes expert medical knowledge to support decision-making and enhance public understanding of the disease. It enables users to assess their risk level, determine whether testing is necessary, and access relevant health information and professional guidance in an interactive environment. The developed COVID-19 Diagnostic Pre-Testing System demonstrates the potential of expert system–based approaches in strengthening public health responses during pandemics. By leveraging artificial intelligence and expert knowledge, the system provides a scalable and cost-effective means of supporting early screening and public awareness, particularly in regions with limited healthcare infrastructure. The system was implemented using the WAMP stack comprising Windows, Apache, MySQL, and PHP with HTML for interface design, MySQL for data management, and PHP as the server-side scripting language. The software includes two main access interfaces: an administrator interface for authorized system management, and a user interface that allows users to interact with the expert system through a simple, intuitive design. The system effectively queries the database to deliver appropriate diagnostic insights and feedback, ensuring a user-friendly experience while maintaining the reliability expected of expert systems in healthcare.

## Recommendations

The development of the expert system for COVID-19 pre-testing, diagnosis, and awareness represents a significant step toward empowering individuals with accessible health information and early detection tools. Given the public's increasing reliance on digital platforms, deploying such systems widely would serve as an effective mechanism for raising awareness and supporting preventive healthcare practices. The following recommendations are proposed:

a) Encouraging the adoption of this system will enhance early case identification and intervention, improving patient outcomes and reducing mortality rates.
b) By automating pre-screening and initial diagnosis, the system can alleviate the workload of healthcare professionals and public health agencies, enabling more efficient allocation of medical resources.
c) Communities and individuals should adopt this system to lower barriers to testing and healthcare access, empowering users through personalized risk assessments and health education.
d) Governments and policymakers are encouraged to integrate this system into national health strategies, as it supports early detection and containment—thereby contributing to economic recovery and stability.
e) Broad adoption of such expert systems contributes to early outbreak detection and rapid response mechanisms, reinforcing preparedness for future pandemics and enhancing global health resilience.

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**APPENDIX: Code Snippet**

```
<?php
```


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```
session_start();
//echo $_SESSION['username'];
?>
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
  <meta http-equiv="x-ua-compatible" content="ie=edge">
  <title>COVID-19 | Home</title>
  <!-- MDB icon -->
  <link rel="icon" href="lg.png" type="image/x-icon">
  <!-- Font Awesome -->
  <link rel="stylesheet" href="https://use.fontawesome.com/releases/v5.11.2/css/all.css">
  <!-- Google Fonts Roboto -->
  <link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Roboto:300,400,500,700&display=swap">
  <!-- Bootstrap core CSS -->
  <link rel="stylesheet" href="css/bootstrap.min.css">
  <!-- Material Design Bootstrap -->
  <link rel="stylesheet" href="css/mdb.min.css">
  <!-- Your custom styles (optional) -->
  <link rel="stylesheet" href="css/style.css">

  <link
    rel="stylesheet"
    href="https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.css"
  />
</head>
<body>
<header>
  <div class="container-fluid mt-3">
    <div class="row justify-content-center">
      <div class="col-md-9 ">
        <h4 class=" font-weight-bold "><img src="images/corona.jpeg" /><a class="grey-text" href="index.php">COVID-19 DIAGONISTIC AND PRE-TEST SYSTEM</a></h2>
      </div>
      <div class="col-md-3">
      <?php if(isset($_SESSION['username'])){

        ?>
          <p><a style="border-radius:19px" class="btn btn-danger" href="logout.php">Logout</a>  | <a style="border-radius:19px" class="btn btn-primary" href="index.php?page=home">Take Pre COVID-19 Test</a></p>
        <?php
      }else{
        ?>
         <p>
        <a href="index.php?page=signup" style="border-radius:19px;"  class="btn btn-primary btn-sm">Sign up</a>
        <a href="index.php?page=login" style="border-radius:19px;" class="btn btn-primary btn-sm"> Login</a>
        <a href="/covid19/admin" style="border-radius:19px;" class="btn btn-primary btn-sm">Admin</a>
        </p>


        <?php
      }
```


*Cite this article as*:
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```
      ?>

      </div>
    </div>
    <hr class="my-1"/>
  </div>
</header>

<main>

19 DIAGONISTIC AND PRE-TEST SYSTEM</a></h2>
      </div>
      <div class="col-md-3">
      <?php if(isset($_SESSION['username'])){

        ?>
          <p><a style="border-radius:19px" class="btn btn-danger" href="logout.php">Logout</a>  | <a style="border-
radius:19px" class="btn btn-primary" href="index.php?page=home">Take Pre COVID-19 Test</a></p>
        <?php
      }else{
        ?>
         <p>
        <a href="index.php?page=signup" style="border-radius:19px;"  class="btn btn-primary btn-sm">Sign up</a>
        <a href="index.php?page=login" style="border-radius:19px;" class="btn btn-primary btn-sm"> Login</a>
        <a href="/covid19/admin" style="border-radius:19px;" class="btn btn-primary btn-sm">Admin</a>
        </p>
        <?php
      }

      ?>

      </div>
    </div>
    <hr class="my-1"/>
  </div>
</header>

<main>

    <?php
    if(isset($_GET['page'])){
      $page = $_GET['page'];
      include($page.'.php');
    }else{
      include('landing.php');
    }
    ?>
</main>
  <!-- Start your project here-->
  <!-- End your project here-->
```


*Cite this article as*:
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