Canine Care Meets Technology: The MyDog Virtual Assistant Website Project

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ABSTRACT
This paper presents the development of a virtual assistant website designed to provide dog owners with accessible information regarding canine health. The web-based application offers a user-friendly interface to explore potential diseases based on symptoms, learn about various dog breeds, and access general care and training tips. Emphasizing ease of use and clarity, the assistant aims to support dog owners in making informed decisions about their pets' well-being. While providing valuable information, the application explicitly advises users to consult veterinary professionals for diagnosis and treatment. The system is built using HTML, CSS, PHP, and SQL, demonstrating a practical application of web technologies to address a common need in pet care. This project was completed as an undergraduate capstone project.

Keywords
Virtual Assistant, Dog Health, Pet Care, Web Application, Symptom Checker, Disease Information, User-Friendly Interface

1. INTRODUCTION
The relationship between humans and dogs is a deeply rooted and is a globally prevalent phenomenon, with dogs holding significant positions as companions, working animals, and integral members of families [1][2]. This widespread presence of dogs within human society naturally leads to a crucial need for readily available and reliable information pertaining to canine health and overall well-being. Ensuring the health of these animals is paramount not only for their own quality of life but also for strengthening the human-animal bond and promoting responsible pet ownership [3]. However, dog owners frequently encounter a range of challenges when seeking information about their pets' health. These challenges can stem from various factors, creating obstacles in accessing timely and accurate guidance [4][5]. One significant hurdle is the sheer volume of information available, often from sources of varying credibility. Owners may find themselves overwhelmed by conflicting advice online, making it difficult to discern trustworthy and evidence-based recommendations.

While consulting a veterinarian is the cornerstone of responsible pet care, it may not always be feasible for every inquiry. Scheduling appointments, transportation logistics, and associated costs can present barriers to immediate access, particularly for routine questions or when owners are simply seeking preventative care advice. The emotional aspect of pet ownership amplifies the need for reliable information [1]. Owners are deeply invested in their dogs' well-being and often experience significant stress when their pets exhibit signs of ill-ness [3]. Access to accurate and easily understandable information can empower owners to feel more in control and better equipped to navigate health concerns, reducing anxiety and promoting proactive care. It's like having a helpful guide during a stressful situation, it doesn't replace the expert but provides valuable support and direction.

This project addresses these challenges by exploring the development of a user-centered interface specifically designed to enhance access to canine health information. By consolidating information on various aspects of dog health, encompassing breed-specific predispositions, common diseases and their symptoms, and practical care and training tips. The work aims to create a valuable resource for dog owners. The core objective is to empower owners to become more informed and proactive in managing their dogs' health, ultimately contributing to improved animal welfare and a stronger foundation for the human-animal partnership. Importantly, this research emphasizes that the interface is intended to supplement, not replace, professional veterinary care, and it advocates for responsible use in conjunction with expert guidance.

2. RELATED WORKS
This section explores the existing body of work relevant to the development of a virtual assistant website for dog health.

2.1 Virtual Assistants/Chatbots
The development of virtual assistants and chatbots has seen significant growth in recent years. These systems are designed to interact with users through natural language, providing information, completing tasks, or offering support. [6] provides a survey of prominent virtual assistants such as Google Assistant, Siri, Cortana, and Alexa, highlighting their capabilities and functionalities. These general-purpose assistants demonstrate the potential of voice and text-based interaction for accessing information and services.

In the educational domain, virtual assistants have been explored to support students in various aspects of their university life. [7]

presents a smart virtual assistant specifically designed for students, showcasing the application of this technology to enhance the learning experience. Similarly, [8] details the design of LiSA, a chatbot aimed at assisting students within a campus environment. A systematic literature review by [9] further explores the use of virtual assistants in learning contexts, analyzing their effectiveness and potential benefits.

Beyond education, virtual assistants are being developed to aid individuals with disabilities. [10] and [11] discuss virtual assistants designed to assist the visually impaired, demonstrating the technology's capacity to improve accessibility and independence. The application of virtual assistants extends to customer service, where chatbots are employed to provide support and handle inquiries, as discussed in [12].

Several works also delve into the technical aspects of chatbot design. [13] and [14] offer surveys on chatbot design techniques in speech conversation systems, providing insights into the methodologies and technologies used to create conversational agents. [15] and [16] examine the ALICE chatbot, analyzing its architecture, capabilities, and performance. Furthermore, [17] explores the use of conversational user interfaces for software visualization, highlighting the potential of chatbots in specialized applications.

In summary, the literature reveals a diverse range of applications for virtual assistants and chatbots, spanning general-purpose assistance, education, accessibility, and customer service. This body of work provides a strong foundation for the development of the proposed dog health virtual assistant, drawing upon established design principles and technological advancements in the field.

2.2 Human-Computer Interaction (HCI)

Human-Computer Interaction (HCI) is a critical field that focuses on the design and use of computer technology, with a particular emphasis on the interfaces between people and computers. Effective interface design is paramount for ensuring usability, accessibility, and user satisfaction. [18] emphasizes the importance of interface design, although in the context of material science, the principles of clear and effective design are universally applicable. [19] provides a comprehensive overview of user interface design, covering concepts, methods, and tools essential for creating user-centered systems. The principles and guidelines outlined in this work are crucial for developing an intuitive and user-friendly virtual assistant for dog owners.

The design of the "MyDog Virtual Assistant" directly benefits from the established knowledge base in HCI, particularly in creating interfaces that are easy to navigate and understand.

2.3 Veterinary Informatics

Veterinary informatics, an emerging field, focuses on the application of informatics to veterinary medicine. While the field may not be as mature as medical informatics for humans, there's a growing recognition of the importance of information technology in improving animal health care. Several research areas within the broader scope intersect with the proposed virtual assistant. For instance, understanding the factors influencing dog health is crucial. [20] discusses the concept of psychological well-being in dogs, an often-overlooked aspect of overall health. [21] addresses the challenges of inherited diseases in pedigree dogs, highlighting the genetic predispositions that owners should be aware of. Environmental factors also play a significant role, as discussed in [22], which explores how urban environments can predispose dogs to allergic symptoms. Furthermore, [23] examines the relationship between dogs, diseases, and wildlife, emphasizing the broader ecological context of canine health.

While the previous works don't explicitly focus on established veterinary informatics systems, they underscore the importance of understanding canine health issues, which is fundamental to the knowledge domain of a virtual assistant. The development of the proposed system contributes to the growing intersection of informatics and veterinary care by providing a digital tool for owners to access relevant health information.

2.4 Using Human-Computer Interaction principles in developing undergraduate capstone projects

Using Human-Computer Interaction (HCI) principles in developing undergraduate capstone projects offers a range of benefits that enhance both the quality of the product and the learning experience for students. Nex are some benefits:

- Improved Usability: applying HCI principles ensures the product is intuitive and easy to use which helps reduce user frustration, minimize learning curves and increase adoption and engagement.
- Enhanced User-Centered Design Thinking: students learn to focus on the needs, goals, and behavior of real users instead of just technical functionality. This encourages empathy for users and shifts mindset from how a system can be built to what the users need.
- Better Testing and Iteration: HCI promotes usability testing, which helps students gather feedback and iterate more effectively. This will lead to fewer errors and help refine interface design based on real feedback.
- Increased Collaboration and Communication: involving users in design encourages team collaboration as students often work in multidisciplinary teams and need to communicate with stakeholders and users strengthens interpersonal skills.
- Industry Relevance: employers highly value developers who can build user-friendly systems. Also, knowing HCI principles makes students more competitive in UX/UI, product development, and software roles.
- Better Integration of Functionality and Design: HCI bridges the gap between back-end functionality and front-end design which means that projects are more holistic, and students will better understand the balance between performance and usability.
- Higher Project Quality and Impact: projects grounded in HCI are more likely to succeed in real-world deployment and in competitions, showcases, or commercialization.

3. METHODOLOGY

This research employed a user-centered approach to develop a virtual assistant aimed at providing dog owners with accessible and understandable information about canine health. The methodology was guided by a set of functional and nonfunctional requirements derived from the identified problem statement and analysis of user needs.

3.1 Problem Statement and Requirements

The primary goal of this research was to create a virtual assistant website that addresses the challenge of dog owners needing easy access to reliable information on potential diseases, health

conditions, and general care for their pets. As the development team does not include licensed veterinarians, a crucial aspect of the problem statement was to ensure that the assistant provides information sourced from credible sources and includes a clear disclaimer advising users to seek professional veterinary help when necessary.

To achieve this goal, the following functional requirements were defined:

- The virtual assistant must be compatible with all major web browsers.
- The system should not require users to create an account, ensuring ease of access.
- The interface must be intuitive and user-friendly, eliminating the need for a user manual.
- The information provided by the assistant should be clear, concise, and easily understandable.
- The system should effectively guide users towards potential diseases or health problems relevant to their dog's condition.
- A clear disclaimer must be present, emphasizing that the assistant is not a substitute for professional veterinary advice, especially in life-threatening situations.
- The assistant should have the capacity to reduce unnecessary traffic to veterinary offices by addressing common inquiries and concerns.
- The system should be able to help with a wide range of cases, including minor health issues.
- The system must allow for straightforward updates to the database and user interface to maintain accuracy and relevance.

The following are the quality and usability requirements of the virtual assistant:

- Reliability: Users should be able to consistently find the information they need.
- Performance: The system should be lightweight and fast, providing quick responses.
- Flexibility: The assistant should be adaptable to various user needs and queries.
- Visual Appeal: The user interface should be easy to navigate and visually appealing.

3.2 Use Case Diagrams and Business Model

The system's functionality and user interactions were further defined through use case diagrams, which helped to clarify the roles of the actors and the system's capabilities.

For use case actors, two primary actors were identified:

- End User: A dog owner who uses the virtual assistant to find information about dog health, potential illnesses, or general care.
- MyDog Virtual Assistant website: The system itself provides information, attempts to predict ailments based on user input, and educates the user.

For end user use cases, and as shown in Fig 1, the end user can perform the following:

- Select: The user can select information based on dog breed, symptoms, or perceived disease.
- Learn: The user can check resources to learn more about a specific topic.

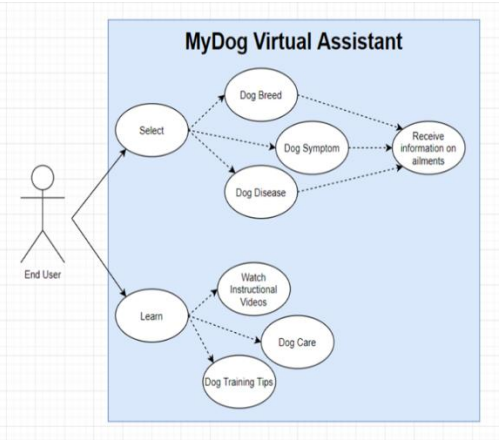

Fig 1: Use case diagram for the participant doing multiple operations.

The MyDog Virtual Assistant performs the following use cases (as depicted in Fig 2):

- Receive info about dog breed and symptoms: The system receives input from the user.
- Predict Dog Ailment: The system attempts to predict the dog's potential health issue.
- Suggest steps to help dogs improve their health: The system provides resources and suggestions.
- Provide: The system offers various resources, including information, videos, and care/training tips.

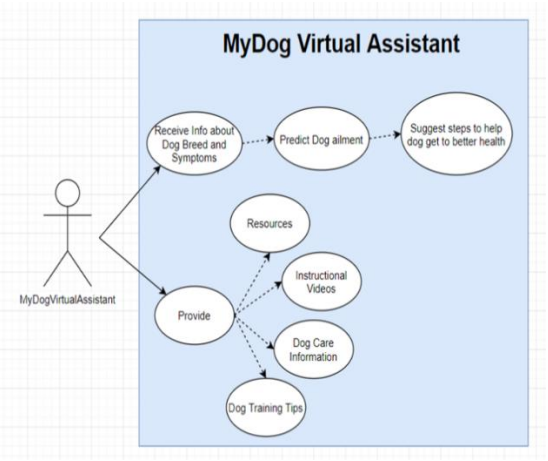

Fig 2: Use case diagram for MyDog Virtual Assistant

These use cases, along with the functional and nonfunctional requirements and analysis scenarios, provided a solid foundation for the design and development of the MyDog Virtual Assistant.

3.3 Design Considerations

The design of the virtual assistant was guided by several key goals to ensure positive user experience:

- Easy to Navigate: The interface should be intuitive, allowing users to quickly understand how to find the information they need.
- Simple Data Types: The system should minimize complex data manipulation to ensure efficient search functionality.
- Limited Text: The interface should prioritize visual elements, using text sparingly and only when necessary.
- Visual Text: When text is used, it should be presented in a clear and easily readable format, akin to an image.

- Clean and Modern Look: The overall design should be uncluttered and visually appealing, with a high-quality color palette and layout.

To ensure optimal performance, the following performance criteria were established:

- Efficient and Seamless Operation: The system should run smoothly with minimal loading times.
- Smooth Transitions: Navigation between pages and activities should be fluid and seamless.
- Resource Efficiency: The system should minimize resource consumption, including animations and unnecessary elements that could hinder performance.
- Minimized Server Load: The system should be designed to reduce the load on the web server.
- Error-Free Operation: The software should be thoroughly tested to minimize errors and bugs, with a system in place for updates and bug fixes.
- Cross-Browser Compatibility: The system should function consistently across all major web browsers.
- Consistent Performance: The system's performance should be consistent across all pages and functionalities.

4. SYSTEM ARCHITECTURE AND IMPLEMENTATION DETAILS

4.1 Implementation Details

To achieve a visually consistent design and simplify CSS management, the system's model was restructured with the following considerations:

- A unified color scheme and font were adopted across the web application.
- A consistent navigation bar and footer were implemented on all pages, promoting ease of use.
- Reusable components were created to avoid redundancy and improve maintainability.
- Pages that display dynamic content were designed as templates, with information retrieved from the database.

This restructuring facilitated efficient development and ensured a cohesive user experience.

Persistent data, such as Breed_ID, was identified as crucial for representing the data schema. Although not frequently accessed, these data elements are essential for maintaining the integrity and relationships within the database.

The MyDog Virtual Assistant website employs an event-driven control flow. This means that actions are triggered by events such as user clicks, form submissions, or hyperlink activations. This control flow was chosen for its suitability for graphical user interfaces and its flexibility in handling user interactions. Given the web-based nature of the application, it does not rely on threads or procedures like some other control flow models.

The application utilizes information from several online resources to ensure accuracy and comprehensiveness. Veterinary information was primarily sourced from professional veterinary resources, while images were obtained from stock image platforms.

The following information sources were used:

- Veterinary information was obtained from VCA Hospitals, a large network of animal hospitals providing a wide range of veterinary services and pet health information [24].
- Additional veterinary information was sourced from the Merck Veterinary Manual, a comprehensive resource for animal health information covering various diseases, treatments, and management strategies [25].
- General pet care and wellness information was gathered from Wag! Walking, a platform that provides pet care services and educational content for pet owners [26].

The following image sources were used:

- A significant portion of images were obtained from Pixabay, a platform offering a vast collection of free stock photos, illustrations, and videos [27].
- Additional images were sourced from Pexels, another platform providing free stock photos and videos with a focus on high-quality visuals [28].
- Further image resources included Unsplash, known for its collection of free, high-resolution photos contributed by photographers worldwide [29].
- Specific images, particularly those related to medical conditions or treatments, were also used from the VCA Hospitals website where appropriate [24].

The development leveraged the following off-the-shelf components and programming languages:

- Bootstrap: CSS framework for responsive design
- jQuery: JavaScript library for DOM manipulation and interactivity
- WebKit: Browser engine
- HTML: Markup language for web page structure
- CSS: Stylesheet language for web page design
- PHP: Server-side scripting language
- SQL: Language for database management

5. SYSTEM OVERVIEW AND FEATURES

The MyDog Virtual Assistant website provides a user-friendly platform for dog owners to access information and resources related to canine health and care. The system's key features are organized into several distinct pages, each designed to fulfill specific user needs.

5.1 Home Page

The Home Page (Fig 3) serves as the application's landing page, providing users with initial guidance and navigation options. Users are presented with a navigation bar at the top for direct access to specific sections. Additionally, the Home Page allows users to explore information about different dog breeds (Fig 4 and Fig 5).

The Symptoms Page (Fig 6, Fig7, Fig 8 and Fig 9) enables users to input their dog's symptoms. The system then analyzes the information provided to offer potential diagnoses and a list of relevant diseases

Fig 3: Home page

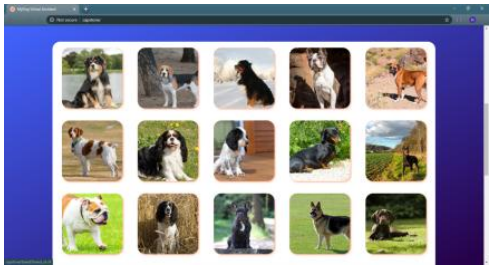

Fig 4: Different types of dogs available on home page

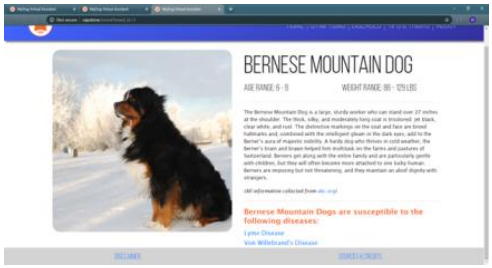

Fig 5: Brief description of a dog when selected

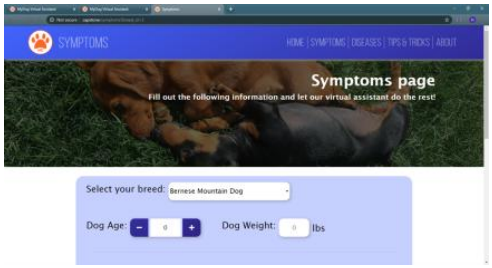

Fig 6: Symptoms page

Fig 7: Symptoms page expanded

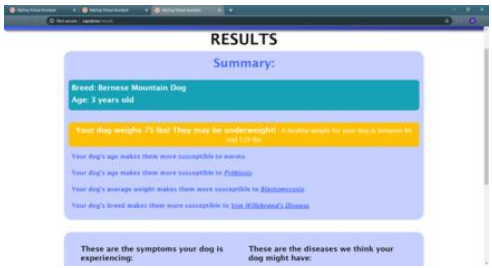

Fig 8: Summary of symptoms result page

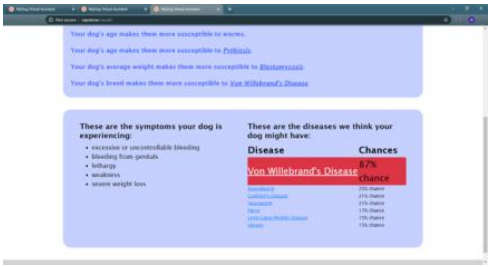

Fig 9: Summary of symptoms result page expanded

The Diseases Page (Fig 10) provides a comprehensive list of potential diseases. Each disease is presented with a brief outline of its main symptoms, which can be expanded upon by the user. Selecting a disease directs the user to the Clicked Disease Page for more detailed information.

The Clicked Disease Page (Fig 11) offers in-depth information about a specific disease selected by the user. This page includes vital information and a descriptive image to aid in user understanding.

The Tips and Tricks Page (Fig 12) provides dog owners with valuable resources and advice on various aspects of dog care and training.

Fig 10: List of diseases

Fig 11: When the user clicks on a specific disease, they get to look at the description of that specific disease

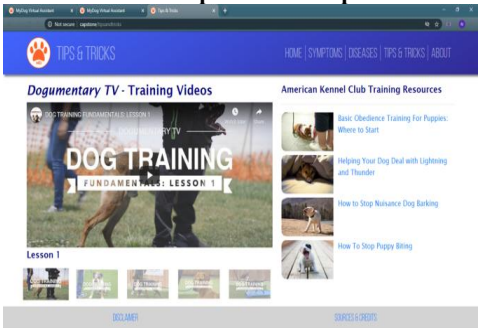

Fig 12: Tips and Tricks Page

6. DISCUSSION

The development of the MyDog Virtual Assistant website presents a valuable contribution to the growing field of veterinary

informatics and offers a practical tool to assist dog owners in navigating canine health concerns. By providing a user-friendly interface with easily accessible information on dog breeds, symptoms, and diseases, this research addresses a significant need for readily available pet care resources. The system's design emphasizes several key principles, including ease of navigation, visual appeal, and clarity of information presentation. The use of consistent language design, intuitive navigation, and a glossary of terms contributes to a positive user experience, making the application accessible to a wide range of users, including those with limited technical expertise. As you often do when explaining things, think of it like creating a well-organized library – easy to find what you need, even if you're not a librarian.

The implementation of an event-driven control flow proves to be a suitable choice for this web-based application, allowing for flexible and responsive interactions. The selection of development tools and technologies, including HTML, CSS, PHP, SQL, Bootstrap, and jQuery, demonstrates a practical approach to web development, leveraging established and widely used technologies. However, it is important to acknowledge certain limitations and potential areas for future improvement. While the virtual assistant website provides valuable information, it is explicitly designed to supplement, not replace, professional veterinary care. The disclaimer prominently displayed within the application reinforces this crucial point. Future work could explore integrating features that facilitate direct communication with veterinarians, such as a chat function or appointment scheduling tool, while adhering to ethical guidelines and privacy considerations.

Another potential area for development lies in enhancing the system's diagnostic capabilities. While the current symptom checker provides potential diagnoses based on user input, incorporating more advanced algorithms and machine learning techniques could improve the accuracy and reliability of these predictions. This would require a larger and more comprehensive dataset of canine health information and rigorous validation to ensure responsible and ethical use.

Furthermore, expanding the application's knowledge base to include a wider range of dog breeds, diseases, and care topics would increase its overall utility. Localizing the application for different languages and cultural contexts could also broaden its reach and impact.

In conclusion, the MyDog Virtual Assistant website represents a significant step towards improving the accessibility of canine health information. Its user-centered design and practical implementation demonstrate the potential of technology to empower dog owners and support responsible pet care. By acknowledging its limitations and outlining potential avenues for future development, this research lays the groundwork for further advancements in veterinary informatics.

7. CONCLUSION

This research successfully developed a virtual assistant website designed to provide dog owners with a user-friendly and informative resource for canine health information. The MyDog Virtual Assistant website offers features such as breed information, a symptom checker, a disease database, and tips for dog care and training. The system was built using web technologies like HTML, CSS, PHP, and SQL, and its design prioritizes ease of use and clarity.

The application addresses the challenge of dog owners seeking reliable and accessible information, offering a convenient way to learn about potential health concerns and general pet care. As you know, just having a quick reference guide can help you navigate a new city. While this website is a valuable tool, it is crucial to reiterate that it is not a substitute for professional veterinary care. The system includes a clear disclaimer emphasizing this point, and future development could explore ways to integrate the application with veterinary services to enhance its support capabilities. Future research could focus on improving the accuracy of the symptom checker, expanding the knowledge base, and increasing the application's accessibility to a broader audience. Despite its limitations, the MyDog Virtual Assistant website demonstrates the potential of technology to positively impact pet care and strengthen the bond between humans and their canine companions.

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