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**ELECTRONICS AND COMMUNICATIONS ENGINEERING**



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**SMART FARM**

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## 1. ENTRANCE

### 1.1.The goal of the project

Our primary goal is to put an end to traditional methods based on muscle power in animal farms and to produce a technological solution to this. We have four objectives. Our first goal is to ensure that animals are fed regularly and in moderation. For this, there are feeders that we control remotely. By providing control over the web, we pour baits into the troughs at certain rates. Our second goal is to ensure the integrity of the herd. Thanks to the sensor at the door at the entrance of the barn, the counting of the animals entering the barn will be made. If the current herd number is not reached, an alarm system will be set up to warn the farm owners. Our third goal is to protect animals from adverse weather conditions. In case of rain or snow, the user will be warned and the top of the barn can be remotely controlled and closed upon request. Our fourth and final goal is to ensure the safety of animals. Thanks to the sensor in the farm, the user will be warned in case of possible fire and the user will be offered the opportunity to intervene remotely. In this way, we hope to make farm life easier.

## 2. WEB APPLICATIONS

### 2.1.What are web apps?

Applications that use websites as interfaces are called web applications. More precisely, systems that use dynamic web pages and usually a database are called web applications. A user surfing the Internet is very likely to encounter a web application. Especially search engines, forum, electronic commerce, entertainment, document management, library services etc. Many sites are designed as web applications. Commonly used interfaces in the world are designed using php , asp , cgi application, java or .net. It would not be wrong to say that php is used more than other programming languages, even if they are not different from each other in terms of what they do . Before web applications, there were systems where server- client software was used. Using an application was in the form of accessing a program running on the server through a special program installed on the client computer. However, with web applications, only a server-side application and a client accessing it via the Internet or Intranet via a browser is sufficient. Every request made on the client computer is interpreted by the server, and the result is sent to the browser with the help of a dynamic page containing html codes. In 1995, Netscape company announced Javascript , a client-side scripting language . This language is used by the programmers to create dynamic pages using some components by the client. It cannot qualify as a web application as no data is interpreted by the server. [\[one\]](#)

### 2.2. History of Web Applications

Since 1990, when the Internet was invented and began to be widely used, many developments and changes have occurred in the Internet and related technologies. When it comes to web technologies, HTML ( Hyper text Markup Language) was understandable. Like everything else, web technologies have evolved, changed and changed our lives. As the name suggests, HTML was a structure that contained only monologue texts and aimed to offer the texts to the users as one side. However, over the years, the HTML language has been developed to versions such as XHTML and HTML 5, and it has started to offer many conveniences by using it with CSS3 ( Cascading Style Sheets ) style templates . Web technologies, Web 1.0, Web 2.0 and Web 3.0 have experienced developments called. While its development over the years

was Web 1.0 between 1995-2000 and Web 2.0 between 2000-2010, it is seen that Web 3.0, which started to be developed and implemented in 2010, will affect our lives in practice until 2020 . It is possible to say that Web 1.0 allows one-way communication on the Internet, Web 2.0 technology brings democracy to the virtual world with its user-oriented structure, and Web 3.0 will make the Internet smarter. In the next 1-2 years, knowing who knows whom and making sense of it will gain importance. Openness at the application level, social graphics applications, and user recognition and personalization will gain importance . While Web 1.0 means "reading" flat data on the WWW (World Wide Web), Web 2.0 means "writing" interactive data, Web 3.0's On the other hand, it is possible to say that dynamic applications, interactive services and machine-to-machine interactive applications can "run".

### Development Process of Web Applications

#### WEB 1.0

The concept of Web 1.0 is used for the early period of the internet. During this period, users visit websites for information purposes, get the information they want and leave the site. As a user, they would not have the opportunity to comment, contribute or produce content. The concept of the internet of this period was generally based on this. Whatever the site owner wrote, users would read it.

In Web 1.0, users were only readers and only in a position to receive information. Because there was a technology that allowed this much, all control was in the hands of the website. The web was used to obtain existing text-based information, read content provided to them mostly by various web servers, and download programs and files. There was no human interaction. Individual web pages, on the other hand, were generally very poor due to lack of design and technical knowledge. There wasn't even a design, it just looked like the texts were lined up in order. In addition to their needs such as reading and getting information, users also had natural needs such as sharing their experiences, adding comments, exchanging information, contributing, seeing themselves as a member of a group, and gaining social status. But web 1.0 could not provide this due to its features. Maybe there was no such need in those years, maybe we analyze it this way today because we look back and see it as a vested right. In short,



Web 1.0 means the passive and unilateral acquisition of mostly text-based information published on the Internet.

## WEB 2.0

Web 2.0 was born because Web 1.0 could not adequately meet the needs. Web 2.0 can be described as web technologies that provide web-human interaction. It refers to the system created by Internet users jointly and by sharing. It allows the content offered on the Internet to be created by users and shared with others. Social networking sites, blogs, free encyclopedias such as web-based wikipedia , communication tools, etc. occurs through interaction and sharing with online tools. As a result of efforts to meet socialization needs, blog, wiki, podcast, RSS, API AJAX, XML etc. technologies and applications have emerged and their use has become widespread. With the development of Web 2.0 applications, developments have also occurred in the field of design. With the creation of blogs and similar sites by users, the need for aesthetics and elegance in design has increased. In this context, the features of web browsers have been improved. People were now able to have their own web space within 5 minutes and they were able to do this without having any technical knowledge. They could share pictures, audio, videos, add comments, and interact with other people in multimedia. Web 2.0 is a concept that was started to be used by O'Reilly Media in 2004, and it is used for second generation internet services (social communication sites, wikis, communication tools, folksonomies ) . defines the system created by internet users jointly and by sharing. The exact meaning of the concept is open to debate. Technologists such as Tim Berners -Lee have also questioned what the full meaning of the term web 2.0 is . Web 2.0, which is tried to be explained with technological terms such as AJAX , SOA, and widgets, is actually a technological understanding. Technological tools consist of auxiliary tools that will serve this approach. Web 2.0 is a movement based on the idea of ensuring the participation of visitors to the site in order to improve the web service , and collaborating with other sites and visitors for the same purpose . Technologies such as AJAX, whisk, social sharing links and RSS can be used in order to be informed and facilitate participation. Sites use technologies such as SOA, XML, WebService to cooperate with each other . In this movement, all kinds of big and small contributions are encouraged and welcomed, from the classification (tagging- tagging ) of the content to the enrichment

( eg : Wikipedia) . Ekşi Sözlük, Facebook, Twitter, Pinterest, Instagram etc. Social networking sites are the most popular internet sites visited by users. Today's internet users use Web 2.0 technology. However, even though they had not fully grasped and adapted to this, now they had to meet the new internet technology Web 3.0.

### WEB 3.0

Web 3.0; It is a web world where internet control is out of the hands of people and self-directed. Web 3.0 will be a web world where the internet will create itself through interaction between devices. All information and its relationships on the Internet will be understood not only by humans but also by machines. Machines, like humans, will memorize information and present it to humans in many areas where it is most appropriate. Control will be left to artificial intelligence technologies, and by processing the produced inputs and making meaningful inferences, it will also be able to detect the whole of applications that make independent applications and databases talk to each other. The ideal point to reach web 3.0 applications, also called semantic or ontological web (semantic web), will be at a level that means being a personalized learning smart robot. Because these robots first read, then understand what they read, then interpret, and all this happens in a matter of seconds. The smart robot learns by itself and presents it by making logical inferences according to the behavior of the users on the web on the basis of individuals or groups . Moreover, the learning curves of these smart robots increase by accelerating vertically as they learn from people and internet browsing. Web 3.0 in short ; It is defined as making sense of the contents transferred to the virtual world with the Web 2.0 revolution in the light of the developments in the field of internet in Turkey and the world . This period is the period when the concept of semantic web emerged. Today, the use of the Internet has become quite common all over the world, many businesses have started to be done over the Internet, everything is searched on the Internet; however, it is sometimes difficult to find useful results in searches and a lot of time is lost. Web 3.0 with semantic search; It will be a period that will make it easier to find what you are looking for. In this period, the change process will continue in the form of semantic search first on texts and then on images and videos. The foundations of this period have started to be laid in the past years, and the sites that have started to implement it are already available.

## WEB 3.0 and the Semantic Web

For Web 3.0 technologies; It can be said that the internet that understands chickpeas without saying leeb. Although only 20% of the world's population has web access, web technology continues to develop at a dizzying pace. Web 3.0 stands for semantic web. The literal meaning of Semantik is “semantics” or “semantic”.

- Some words on Web 3.0 are as follows:
- Bill Gates: "Web 3.0 is artificial intelligence"...
- Famous IT writer Nicholas Carr : "Web 3.0 will think like a human"...

Many experts; “Web 3.0 is a revolution in mobile technology,” he says. In summary; There is a huge database created by users from all over the world, and Web 3.0 accesses this database with "semantic" technology, by making use of "intuitive artificial intelligence" applications thanks to the high-speed internet, and the user is directed directly to the topic being researched . If he wants to watch a movie of the genre, eat a delicious kebab on the way out, and then return home without getting stuck in traffic, it will be enough to state in the search options "I want to watch an action movie at this time, eat kebab and return home as soon as possible". The computer will understand this sentence and bring the sites related to it. It will offer only relevant options without information pollution. This means that the computer offers personalized options. With Web 3.0, the internet will no longer act like a robot, but like a human. By asking personal questions, it will be possible to find the desired topics . While robotized computers offer such conveniences, it should be paid attention that people do not give up learning and become robots. [\[2\]](#)

### 3. WEB APPLICATION DEVELOPMENT LIFECYCLE

#### 3.1. Lifecycle

##### 3.1.1. Requirements Specification and Analysis

The most primary stage during the execution of web development services, called the Software Requirements Specification or SRS, provides a comprehensive detail of the functions and features that must be recognized in the software design and development process. This first and most important step provides information about the general

requirements of the proposed software to be developed. The requirements analysis of the software is divided into several purposes to gather information about the following. [\[3\]](#)

Resources needed for web development

- Scope of the system
- The purpose of the system
- Limitations of the proposed system

At this stage, a very mature and self-explanatory Software Requirements Specification Document is prepared to encompass and list all the necessary guidelines to run the web development services process.

#### 3.1.2. System design:

After the needs analysis phase is completed, the analysis results are evaluated and examined for accuracy and efficiency measurement of the proposed web development system. Stage identifies the efficiency targets received during the requirements analysis process. Describes the system design process, features, and specifications in detail. [\[3\]](#) Detailed elaboration of various software design issues includes:

- Compact screen layouts
- Defined business rules
- Complete process diagrams of web development services process
- Possible pseudocodes and other necessary documents

#### 3.1.3. Coding and System Test Phase:

Next come the software coding phase comes, where the application logic for the software functions and user interface is developed. All coding is written in strict accordance with the coding standards followed by the industry. The codes have been developed to conserve system resources and optimize system efficiency.

#### 3.1.4. System Distribution:

In the next stage of setup at the web development company, the final system kits are live installed where they need to be implemented. The phase decides on the shortcomings of all installed software and makes recommendations to accommodate the changes that occur in the post-implementation period.

#### 3.1.5. System maintenance:

During the system maintenance phase, a number of things related to web application development are taken into account, including:

Changes to be made in the system

- Any correction
- Some necessary additions
- Computer platform settings

### 4. SOFTWARE AND PLATFORMS USED

#### 4.1. Software Used

##### 4.1.1. C

Ken Thompson and Dennis Ritchie at AT&T Bell laboratories to develop the UNIX Operating System. Although it was developed in 1972, it became widespread Brian It accelerated after the book "C Programming Language" published by Kernighan and Dennis M. Ritchie . Today, it has been used up to 95% in the construction of almost all operating systems (Microsoft Windows, GNU/Linux, BSD, Minix ), and it is still a very common and very sharp tool with uncertain boundaries that is still used wherever system, driver software, operating system modules and speed are required. It is a language. With the development process of programming, the complexity of programming, the increase in requirements and the emergence of object- orientedness in application programs, C programmers have switched to C++ language, which largely supports object- orientedness . [\[4\]](#)

#### 4.1.2. C#

C#; It is a modern programming language developed by Microsoft for .NET Technology. The syntax provides a C- like experience.

Although it was developed by Microsoft, it is under ECMA and ISO standards. [\[5\]\[6\]](#)

To increment an integer variable by 1 in the C programming language, the suffix "++" is used after the variable. The name of the C++ language, the ability to do Object Oriented Programming with the C language (C with It is "C++" as it provides plugins for Classes ). Similarly, the C++ language has been taken one step further by making new additions ((C++)++) and C# Major, which is a melody key, has been used in the naming of the C# language, which is completely object- oriented . [\[7\]](#)

The design of this language was led by Anders Hejlsberg , known for his designs for Pascal, Delphi compilers and the J++ programming language. [\[7\]](#)

It takes Java as an example in many areas, and C# has a code structure similar to C and C++ code syntax like Java. It is necessary to have a compatible library and interpreter on the computers where the programs written to use .NET libraries are running. This can be Microsoft's .NET Framework , or any library and interpreter that conforms to ECMA standards. Examples of other common libraries are Portable.Net and Mono.

It is one of the active programming languages that contributed to the development of the concept of object-oriented programming. [\[8\]](#)

C#, .NET is one of the intermediate programming languages. In other words, it is equal to both machine language and human perception. The expression middle here does not show the power of the language, but the distance between machine language and everyday spoken language. For example; If we say that Visual Basic .NET (VB.NET) is a high-level language, it means that the language is written close to the way people speak in their daily lives. Hence VB.NET, C#. We cannot say that it is a more powerful language than NET .

Framework must be installed on the computers where the program is desired to run. (Windows 7 and Windows Vista have .NET Framework installed)

#### 4.1.3. javascript

JavaScript [\[9\]](#) (often abbreviated as JS) is a programming language that, along with HTML and CSS, is one of the core technologies of the World Wide Web. [\[10\]](#) More than 97% of websites use client-side JavaScript for web page gestures [\[11\]](#), and the code used often includes third-party libraries. [\[12\]](#) All major web browsers have a special JavaScript engine to be able to execute the source code on users' devices.

JavaScript is a high-level language that conforms to the ECMAScript standard, often compiled simultaneously. [\[13\]](#) It has dynamic typing, prototype-based object orientation, and world-class functionality. It is a multi-paradigm that supports event-driven, functional, and imperative programming styles. It has application programming interfaces ( APIs ) for working with text, dates, regular expressions, standard data structures, and Document Object Model (DOM) .

The ECMAScript standard does not include any input/output (I/O) such as networking, storage, or graphics facilities. In practice, the web browser or other runtime environment provides JavaScript APIs for I/O.

JavaScript engines were originally only used in web browsers, but today they are also essential components of some servers and various applications. The most common runtime system for this use is Node.js.

While Java and JavaScript have similarities in name, syntax, and related standard libraries, the two languages are different from each other and also vary greatly in design.

### 4.2. Software Platforms Used

#### 4.2.1. Microsoft SQL Server Management Studio

Microsoft SQL Server Management Studio (SSMS) is a **software application** developed by Microsoft that is used to configure, manage and manage all components within Microsoft SQL Server. Originally launched with Microsoft SQL Server 2005,

it is the successor to the Enterprise Manager of SQL 2000 or earlier . The tool includes both script editors and graphical tools that work with the server's objects and properties. [\[14\]](#)

of SSMS is the Object Explorer , which allows the user to browse, select, and act on any object within the server . [\[15\]](#) It also shipped a separate Express version available for free download; however, recent versions of SSMS have the ability to fully connect and manage any SQL Server Express instance. Microsoft has also included backward compatibility for older versions of SQL Server, thus allowing a newer version of SSMS to connect to older versions of SQL Server instances. It also comes with Microsoft SQL Server Express 2012 or users can download it separately.

Visual Studio 2010 shell using WPF for the UI . Versions 18 and later are based on Visual Studio 2017 Isolated Shell . [\[16\]](#)

#### 4.2.2. Visual Studio

Microsoft Visual Studio is an integrated development environment (IDE) developed by Microsoft. Console and graphical user with native code and Windows Forms applications, websites, web applications and web services with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight The interface is used to develop applications.

Visual Studio Besides IntelliSense " code Includes a code editor that supports " refactoring ". The integrated debugger works at both the source-level and machine-level. Other built-in tools include a form designer to be able to create GUI applications, web designer, class designer, and database schema designer. Almost any functionality It accepts plug-ins that offer support for source control systems ( such as Subversion and Visual SourceSafe).

Visual Studio supports various programming languages, which enables the code editor and debugger to support almost all programming languages. Internal languages include C/C++ (C++ via Visual), VB.NET (via Visual Basic .NET), C# (via Visual C#), and F# (as of Visual Studio 2010). [\[17\]](#)



#### 4.2.3. Visual Studio Code

Visual Studio Code is a source code editor developed by Microsoft for Windows, Linux and MacOS. It includes support for debugging, embedded Git checking, syntax highlighting, smart code completion, snippets , and code refactoring. It's also customizable so users can change the editor's theme, keyboard shortcuts, and preferences. [\[18\]](#) It is free and open source, although the official download is under a proprietary license.

Visual Studio Code is based on Electron , a framework for deploying Node.js applications for desktop running on the Blink (Web engine) layout engine .[2] Despite using the Electron framework, the software does not use Atom and instead uses the same editor component (codename "Monaco") used in Visual Studio Team Services (formerly Visual Studio Online).

Visual Studio Code Build 2015 by Microsoft on April 29, 2015 It was announced at the conference .[3] A Preview build was recently installed. On November 18, 2015, Visual Studio Code was submitted to GitHub according to the MIT License and its source code . Extension support has also been announced. Visual Studio on April 14, 2016 Code has finished its public preview phase and has been released to the web. [\[18\]](#)

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#### 4.2.4. Hosting

You need a certain amount of storage space to store your data on computers. This also applies to website setup. In order to store documents and similar files on your web page, you need an area that serves you 24/7. This is also called "server" in the technical literature.

Hosting is a system that allows websites belonging to individuals or institutions to provide uninterrupted service. By means of this service, data entry is made to the website, domain definitions are provided and the website is ready for publication. The other name of the hosting service is the "hosting" service. Thanks to the hosting service you will receive, you can keep the files of your website in a secure area. Thus, individuals can reach your website at any time of the day.

#### 4.2.5. API

An API is a link within computers or computer programs. It is a type of software interface that serves other pieces of software. A document or standard that describes how to create or use such a connection or interface is called an API specification. A computer system that meets this standard is said to have implemented or made available an API . The concept of API can refer to specification or implementation. Unlike a user interface that connects a computer to a person, an application programming interface connects computers or pieces of software. It is not intended for direct use by any person (end user) other than a computer programmer who incorporated it into the software. An API is often made up of different parts that function as tools or services that the programmer can use. A program or programmer using one of these parts is said to call this part of the API . The calls that perform the API are also known as subroutines, methods, requests, or endpoints. An API specification defines these calls, that is, explains how to use or implement them. One purpose of APIs is to hide the internal details of how a system works, revealing only the parts that a programmer would find useful, and keep such things consistent even if the internal detail changes afterwards. An API may be built specifically for a particular pair of systems, or it may be a shared standard that allows interoperability across many systems. The concept of API is often used to describe Internet APIs that allow communication within computers to which the web connects. There are also APIs for programming languages, software libraries, computer operating systems, and computer hardware .

#### 4.2.6. MSSQL Server

Prior to version 7.0, the "codebase" was sold to Microsoft by Sybase SQL Server, which was Microsoft's entry into the enterprise-grade database market. The first version, essentially identical to Sybase SQL Server 3.0, teamed up with Microsoft, Sybase , and Ashton- Tate to create and market SQL Server 1.0. Microsoft SQL Server 4.2 was shipped in 1992 . Later, Microsoft SQL Server 4.21 was released at the same time as Windows NT 3.1. Microsoft SQL Server 6.0 was the first version designed for Windows NT and was released without instructions from Sybase .

SQL Server 7.0 became a "rewrite" version written in legacy Sybase code, and was replaced by SQL Server 2000. SQL Server 2000 was the first version written differently from the IA-64 architecture.

Ten years after SQL Server 2000, performance gains were seen, and SQL Server 2005 was released, which included IDE tools and other complementary systems. [\[19\]](#)

#### 4.2.7. STM32Cube IDE

STM32CubeIDE is an advanced C/C++ development platform with peripheral configuration, code generation, code compilation and debugging for STM32 microcontrollers and microprocessors. It is based on the Eclipse® /CDT™ framework and the GCC toolchain for development and GDB for debugging. It allows the integration of hundreds of existing plugins that complement the features of the Eclipse® IDE.

STM32CubeIDE integrates STM32 configuration and project creation functions from STM32CubeMX to provide an all-in-one tool experience and save installation and development time. After selecting an empty STM32 MCU or MPU or preconfigured microcontroller or microprocessor from a board selection or sample selection, the project is created and the initialization code is generated. At any time during development, the user can go back to the initialization and configuration of peripherals or middleware and regenerate the initialization code without any impact on the user code.

STM32CubeIDE includes build and stack analyzers that provide the user with useful information about project status and memory requirements.

The STM32CubeIDE also includes standard and advanced debugging features, including CPU core registers, memories, and environmental registers, as well as live variable monitoring, Serial Cable Viewer interface, or fault analyzer views. [\[20\]](#)

## 5. LIFE CYCLE OF SMART FARM WEB APPLICATION

The Smart Farm web application lifecycle typically includes the following steps:

### 5.1.Planning

The development process of the Smart Farm web application first begins with a planning phase. At this stage, the purpose and objectives of the application are determined, requirements and functional features are listed, and technological solutions are reviewed.

### 5.2.Design

After the planning phase of the application, the user interface (UI) and user experience (UX) design is carried out. At this stage, the design of the application includes many elements such as colors, fonts, user interactions, interface and layout.

### 5.3.Development

The application development process includes coding and testing the application. At this stage, the database of the application is created, the features are coded and the application is tested.

### 5.4.Test

After the development phase, the application is tested. At this stage, different tests are done to test the quality and performance of the application. In particular, the security, functionality, speed and user-friendliness of the application are tested.

### 5.5.Distribution

After the tests, the application is ready and the distribution phase is started. At this stage, the application is installed on the servers and made available.

### 5.6.Care

After the Smart Farm web application is made available, the maintenance phase begins. At this stage, the operation, performance and safety of the application are monitored and corrective and preventive maintenance performed as needed.

As a result, the lifecycle of the Smart Farm web application includes the stages of planning, design, development, testing, deployment and maintenance. Each stage is important for the successful development and rollout of the application .

## 6. WEB APPLICATIONS IN THE LIVESTOCK INDUSTRY

The livestock sector has an important place in the world. This sector plays an important role in food production and job creation. Today, with the development of technology, the livestock sector has also started to digitalize. In this thesis, the use of web applications in the livestock sector will be discussed and the benefits of these applications to the livestock sector will be examined.

### 6.1 Definition of Web Applications in Livestock Industry

Web applications are software that can be accessed over the Internet and consist of one or more web pages. Web applications used in the livestock sector are designed to make the activities of livestock enterprises more efficient. These applications facilitate the management of many processes such as animal tracking, health status monitoring, control of feed and drug stocks, production planning and sales management.

### 6.2 Benefits of Web Applications in Livestock Industry

The use of web applications in the livestock sector provides many benefits. These can be listed as follows:

#### 6.2.1 Efficiency

Livestock businesses can make their operations more efficient thanks to web applications. These applications enable businesses to save time and costs by automating processes such as animal tracking, health status monitoring, and control of feed and drug stocks.

#### 6.2.2 Speed

Web applications help livestock businesses make fast and accurate decisions. Thanks to these applications, instant information about the condition of the animals is accessed and business owners can make a quick decision.

### 6.2.3 Traceability

Web applications allow livestock businesses to easily monitor their activities. Thanks to these applications, business owners can monitor the status of animals, feed and drug stocks, production plans and sales management.

### 6.2.4 Data Analysis

Web applications allow livestock businesses to easily analyze their data. These apps analyze the data of business owners.

## 7. DESIGN OF SMART FARM WEB APPLICATION

Smart animal farm design is a modern approach to using technology to improve the health, welfare and production efficiency of animals. Smart farm technologies can monitor many factors such as protection of animals from environmental conditions, nutrition, herd integrity and protection of animals from possible accidents, and can help make more informed decisions in farm management by presenting this information to managers.

### 7.1. Database Design

A database design was carried out to save data from sensors for use in the web application. All collected information was transferred to a table designed as seen in Figure 7.1. When this table is created alone, it has a very large size with the information in it. It was decided to create a structure with more than one table instead of a single table, so that access would be faster and easier.

Id	BuzzerActivity	Date	Id	isFire	date	Id	AnimalNumber	Date
1	1	2023-06-21	1	1	2023-06-21	1	45	2023-05-03
2	0	2023-06-21	2	0	2023-06-21	2	23	2023-05-03
3	1	2023-06-21	3	1	2023-06-21	3	34	2023-05-03
4	2	2023-05-08	4	0	2023-06-21	4	1	2023-05-20
5	1	2023-05-08	5	1	2023-06-21	5	1	2023-05-20

Figure 7.1 Some Sections from the Database

### 7.2. Screen Designs

#### 7.2.1 Home

Here is the screen that our customers encounter when they log in to the website.



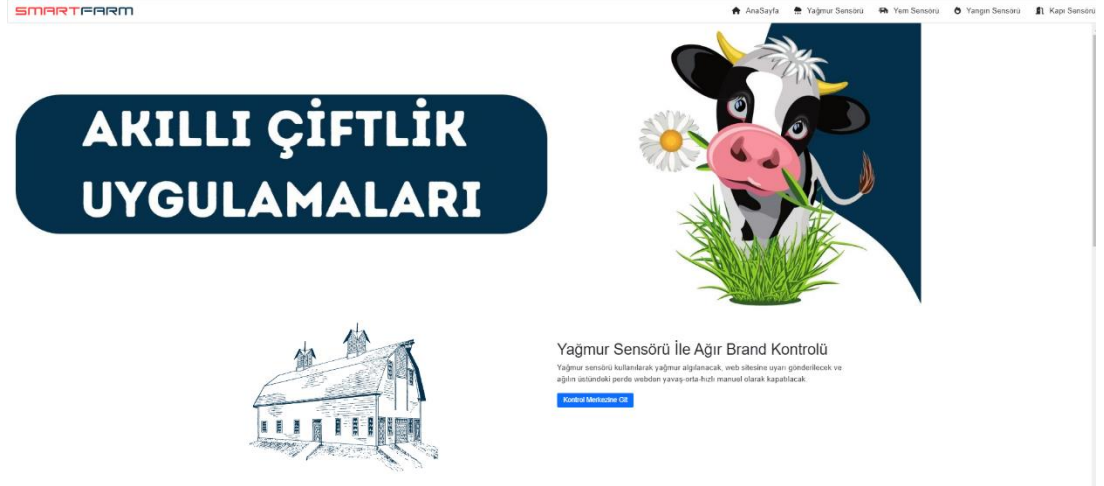


Figure 7.1 Welcome Screen

### 7.2.2 Rain Sensor Control Panel

On this screen, we update the weather with instant data from our rain sensor and support it with visuals. At the same time, we list the data we have saved in the database with the table on the left.

there is a roof control panel depending on the user's request. This operation is carried out with the roof control button at the bottom left. Depending on the selected options, the speed at which our roof is displayed is also tabulated on the left side of our site.

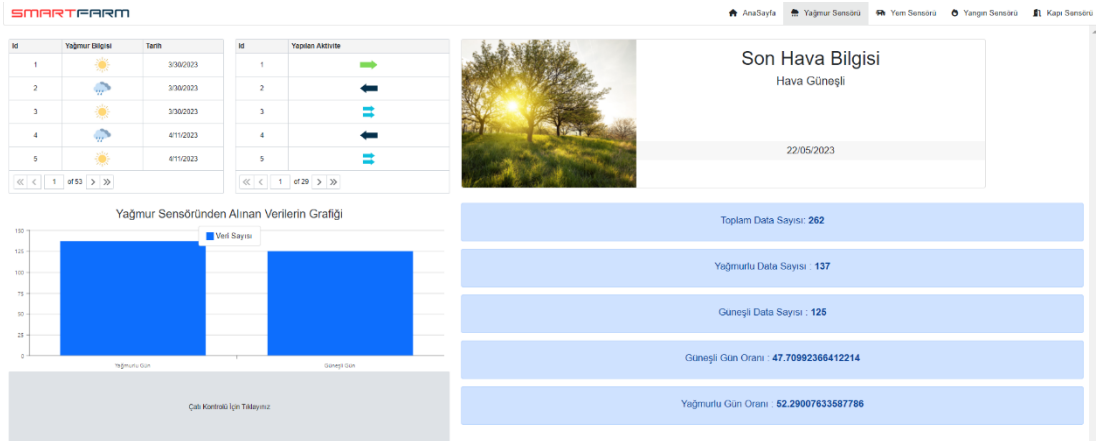


Figure 7.2 Rain Sensor Control Panel

### 7.2.3 Feed Sensor Control Panel

On this screen, we measure and show the feed occupancy rate of the troughs in our barn. At the same time, we ensure that the feed is poured into the troughs at the specified rate.

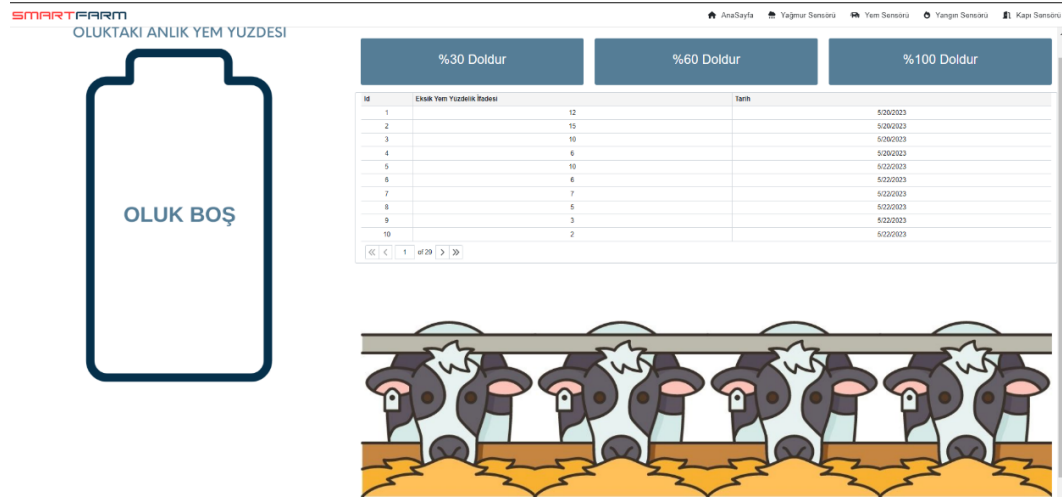


Figure 7.3 Feed Control Panel

### 7.2.4 Fire Sensor Control Panel

This is a screen where we determine whether there is a fire with the data coming from our smoke sensor in our farm and convey this information to the user. At the same time, in case of fire, the buzzer and fan in our farm work according to the user's request.

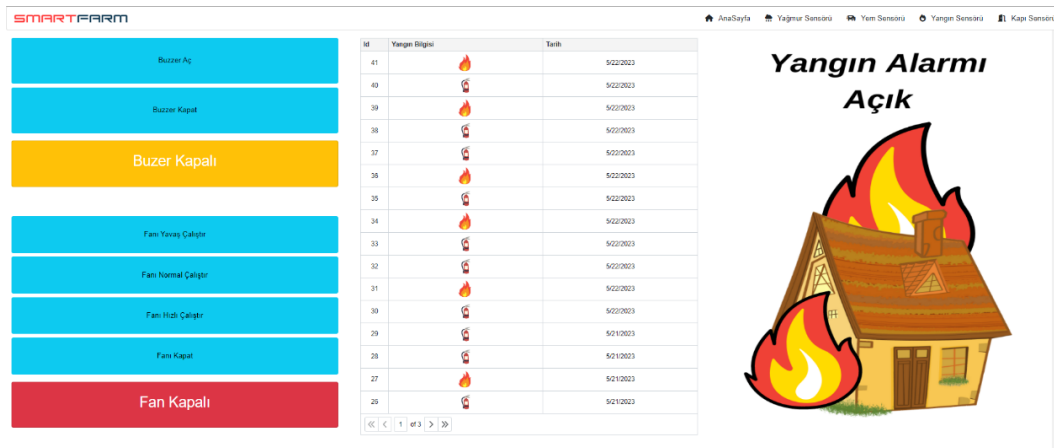


Figure 7.4 Fire Sensor Control Panel

### 7.2.5 Door Sensor Control Panel

we can open and close the door of our farm upon request. At the same time, we can count the number of animals inside, thanks to the touch sensor. Thus, we can count the number of animals inside and outside the farm. And we can activate our alarm in case of missing animals.

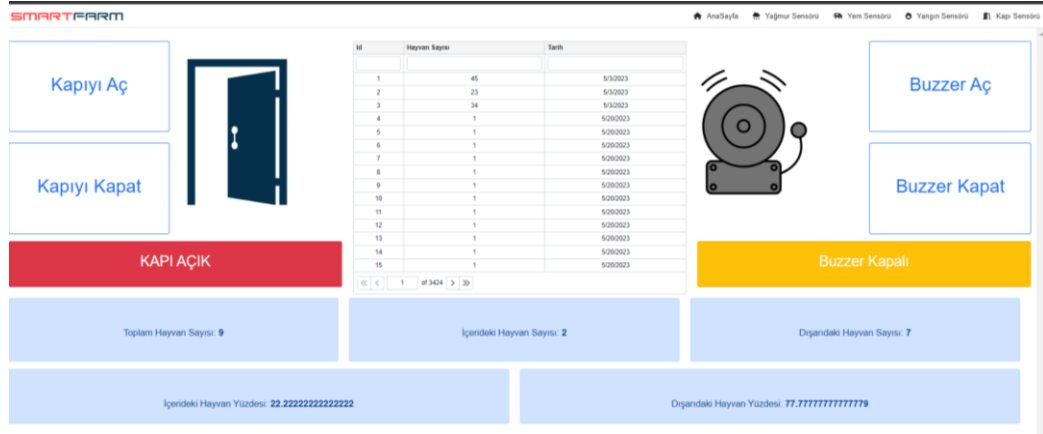


Figure 7.5 Door Sensor Control Panel

## 7.2.Hardware Designs

### 7.2.1. Used materials

- STM32F407

The STM32F407 is a microcontroller series developed by STMicroelectronics , based on the ARM Cortex-M4 core . this microcontroller offers a high-performance processor , amp memory , various peripheral , and low power consumption features .



Figure 7.6 STM32F407

- IRF540 MOSFET Driver

IRF520 is a power MOSFET (Metal Oxide semiconductor field Effect Transistor) driver . this integrated circuit is commonly used for high-power switching applications , such as DC motors , relays , and applications requiring high current and voltage .



Figure 7.7 IRF520 MOSFETs

- Touch Sensor

A touch sensor, also known as a touch detector or tactile sensor, is a type of input device that detects physical touch or contact with its surface . It is designed to convert the tactile input into an electrical signal that can be interpreted by a microcontroller or other electronic system .



Figure 7.8 Touch Sensor

- Rain Sensor

A rain sensor, also known as a rain detector , is a device that detects the presence of rain and converts this information into electrical signals . these sensors are commonly used in automatic rain-sensing wiper systems for vehicles , garden irrigation systems , and other applications where showers detection is required .



Figure 7.9 Rain Sensor

- Gas Sensor

A gas sensor is a device that detects the presence or concentration of various gases in the surrounding environment . these sensors are used in a wide range of applications , including industrial processes \_ \_ monitoring , safety systems , and indoor air quality monitoring .



Figure 7.10 Gas Sensor

- Buzzer

A buzzer is an electronic device that produces a continuous or intermittent sound or tone \_ it is commonly used for audible alerts , notifications , or alarms in various applications . buzzer devices typically consist of a piezoelectric element or an electromagnetic coil that vibrates when an electrical signal is applied .



Figure 7.11 Buzzer

- Stepper Motor

A stepper motor is a type of electric motor that converts digital pulses into precision mechanical rotation . Unlike traditional DC or AC motors , stepper motors move in discrete steps or increments , making them ideal for applications that require precision positioning or control .

the operation of a stepper motor is based on the principle of electromagnetism . it typically consists of a rotor, stator, and coils \_ The rotor is the rotating part of the engine while the stator contains the coils or windings \_ By energizing the coils in a specific sequence , the magnetic field generated causes the rotor to move in small angular increments or steps .



Figure 7.12 Stepper Motor

- Servo Motor

A servo motor is a type of rotary actuator that provides precision control of angular or linear position , velocity , and acceleration . it is commonly used in applications that require accurate and controlled movements , such as robotics , RC vehicles , industrial automation , and aerospace systems .



Figure 7.13 Servo Motor

- Distance Sensor

An ultrasonic distance sensor emits high-frequency sound waves and measures the time it takes for the sound waves to bounce back after hitting an object . By calculating the time-of- flight , the sensor can determine the far away to the object .



Figure 7.14 Distance Sensor

### 7.2.2. Testing the Circuit with the Breadboard

The operability of the system was checked by combining the codes and hardware components on the breadboard.

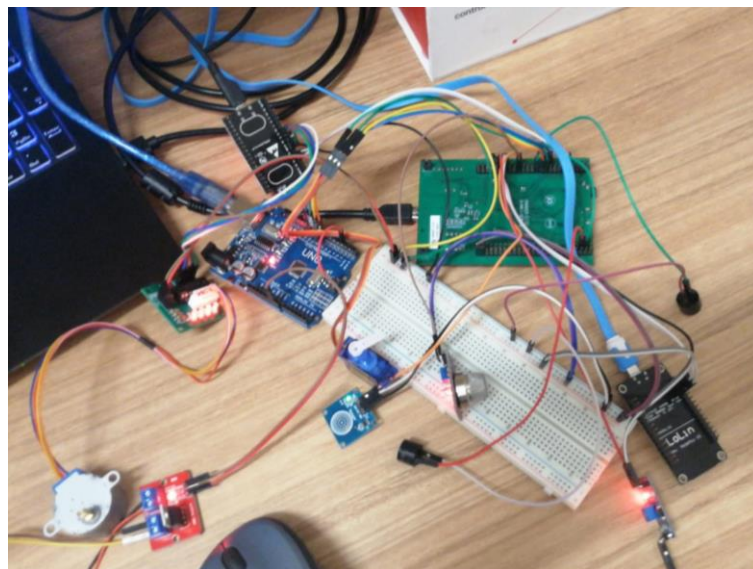
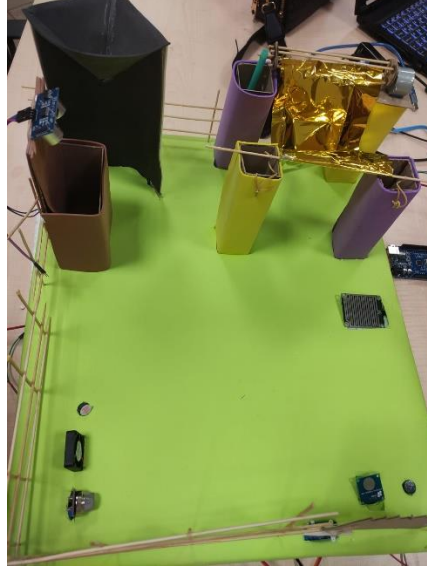


Figure 7.15 Testing the Circuit with the Breadboard

### 7.2.3. Modeling Smart Farm



Şekil 7.16 Modeling Smart Farm



## 8. PUBLISHING PROCESS OF THE WEBSITE

The process of publishing a website consists of many stages. Each of these stages is extremely important to the quality and success of the website. The website publishing process usually includes the following steps:

### 8.1 Content Creation

The main components of the website are its content. The contents should be prepared in accordance with the purpose and target audience of the website. Content can be in visual or text format. The contents of the website should be updated regularly.

### 8.2 Design

The design of the website determines the image of the website in the eyes of the visitors. Website design should be done in accordance with the purpose and target audience of the website. It includes many factors such as design, color harmony, typeface, visual elements.

### 8.3 Development

The website development phase is the preparation of the technical infrastructure of the website. At this stage, the coding processes necessary for the website are carried out. Development of the website, the user of the website

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