Software Requirements Specification

for

<Project>

Version <X.X>

Prepared by

Group Name: <*place your group name here*>

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Revisions

| Version | Primary Author(s) | Description of Version | Date Completed |
| --- | --- | --- | --- |
| Draft Type and Number | Full Name | Information about the revision. This table does not need to be filled in whenever a document is touched, only when the version is being upgraded. | 00/00/00 |

# 

*<In this template you will find text bounded by the "<>" symbols. This text appears in italics and is intended to guide you through the template and provide explanations regarding the different sections in this document. There are two types of comments in this document. These comments are in black intended specifically for that course. These comments are blue are more general and apply to any SRS.*  *Please, make sure to delete all of the comments before submitting the document.*

*The explanations provided below, do not cover all of the material, but merely, the general nature of the information you would usually find in SRS documents. It is based on the IEEE requirements and was adapted specifically for the needs of Software Engineering courses. Most of the sections in this template are required sections, i.e. you must include them in your version of the document. Failure to do so will result in marks deductions. Optional sections will be explicitly marked as optional.*

# Introduction

*<TO DO: Please provide a brief introduction to your project and a brief overview of what the reader will find in this section. Also give some Historical detail: past to today usage area, current works in the literature>*

## Project Purpose and Scope, and Objectives

<Identify the product whose software requirements are specified in this document, including the revision or release number. Describe the scope of the product that is covered by this SRS, especially if these SRS describes only part of the system or a single subsystem. Provide a short description of the software being specified and its purpose, including relevant benefits, objectives, and goals.

TO DO: Write 1-2 paragraphs describing the purpose and scope of this document as explained above. Make sure to describe the benefits associated with the product >

## Roles and responsibilities

<Define organizational structure and roles.

TO DO: Please provide a list of team members and their responsibilities.>

## Technical Assumptions and Constraints

<List your tech constraint. These may include user interface style guides, standards, system requirements specifications, use case documents, or a vision and scope document.

TO DO: describe supported operating system, platform, coding language, extra tool... etc.>

## Naming Conventions

<List your naming conventions. These may include user interface style guides, standards, or coding style.

< TO DO: Describe any standards or typographical conventions that were followed when writing this SRS, such as naming that special significance. Sometimes, it is useful to divide this section to several sections, e.g., Formatting Conventions, Naming Conventions (CamelCase ...), etc.>

# Requirements

## Functional Requirements

1. **Record Management of Our Drone Project**

The image taken with the drone camera and its associated attributes, etc. data will be recorded on a regular basis. First, the data will be processed and made available, and then it will be stored regularly with the necessary database management systems. The data will be stored in two ways;

* **Local Registration Storage Unit:** Data SD card etc. units that can be mounted on the drone device will be used.
* **Storage with** Cloud **Technology:** The data will be hosted in the most affordable, fastest and most reliable presentation to the database management system used in our project with the connection of the drone device to the internet network.

Note: We consider it necessary to store it in two places due to data loss.

1. **Drone's Camera Recognizes People, Living things and Objects (Computer Vision)**

Thanks to the camera on the drone, it can videotape those around it. By leding this existing feature, image processing technologies will allow the image to recognize and distinguish between people, living things and objects.

1. **What The Drone Sees With Its Camera**

After the Drone camera recognizes and distinguishes the assets it sees (computer vision), it is time for the allocation module to its attributes. The purpose of this module is to try to measure the attributes of human, living and objects that can be measured with a camera.

For example, if you want to use It's like reading a car license plate.

1. **Drone's Tracking Feature**

The drone will attempt to track where the person goes by pulling the drone camera of a person previously recorded with image processing data into the database.

1. **Ensuring** **The Drone's Voice Command**

Communication with the drone will take many different forms. One of them is that it can be controlled by voice. Voice and commands will be sent to the device with the help of a microphone from the phone or web. These commands will be processed with the software we have written

1. **Use** **of Drone in The Dark Environment**

The drone must also be able to perform all its tasks in dark environments, so a special lighting prompt will be set up for the drone. Especially in dark environments, the camera needs to take images as if it were light.

1. **Drone's Measurement of Weather Information**

With the device integrated on top of the drone, you can monitor the air temperature, weather, humidity , etc. information will be measured according to the drone's environment.

## Non Functional Requirements

### Performance Requirements

#### Record Management of Our Drone Project

In the drone project, our records held with the database management system can be kept in a local data storage. The most commonly used type is Micro SD cards. Because they are so fast and small, we can comfortably mount them on our drone.

We will use a Sandisk disc with a write speed of 120 MB/s with a capacity of 256 GB.

Below is the database server information for cloud-based retention of our records held with the database management system in the drone project. We can store video recordings with unlimited disk space. We can create database tables on Mssql or Mysql platforms.

**Database Server**

|  |  |
| --- | --- |
| **Properties** | **Values** |
| Disk Size | Boundless |
| Ram Size | 2048 MB |
| Core Cpu Quantity | 2 |
| MSSQL Quantity | 10 |
| MYSQL Quantity | Saatte 11 miles |
| Server Platform | Windows/Linux |
| Control Platform | cPanel / Plesk Panel |

#### Giving The Drone's Camera Vision, Separating What It Sees according to Its Characteristics, Tracking Feature

The drone camera will be used with its own original camera, which is supplied with the drone. Drone camera features are indicated in the table below;

**Drone Camera**

|  |  |
| --- | --- |
| **Properties** | **Values** |
| Camera Range | 50 meters |
| Camera charging usage time | Max 12 sec |
| Camera Resolution | 720p |
| Camera Average Speed | Saatte 11 miles |

#### Ensuring Drone's Voice Command

Almost every module of our Drone Project will be controlled by voice as well as control from web and mobile environments. By installing the software we program on the computer with IDE technology and linking the software we program on the computer with microcontroller devices such as ardinuo, raspery pi etc. to be integrated into the drone, and by connecting it to our mobile application, the audio coming from the mobile application to the mobile application via the phone microphone will be translated into writing with the Google Voice API, then the text will be processed and the command will be detected and fulfilled by the drone with the software algorithms I mentioned about the necessary.

#### Use of The Drone in the Dark Environment

We will use strip LEDs so that we can also use the features of our drone project in the dark environment. With the light sensor, we will measure the light level of the environment. Then we will ensure that it continues to be used in a healthy way.

Therefore, drone lighting should be lit as soon as it enters environments where RGB LED lights do not receive enough light. In the precision of this , a module that can measure quality is needed; This [module](https://www.direnc.net/arduino-ldr-modul) can be called Ardinuo LDR.

We will constantly check this instantly thanks to the software we have already installed with ardinuo. Since these LEDs will be ARGB LEDs, they can be adjusted according to the desired color. Leds will be available on our web and mobile-based app and can be controlled by voice.

#### Drone's Measurement of Weather Information

Our drone project can measure weather, humidity etc. information instantly with the module we will integrate connected to ardinuo. If the environment is too cold, we can give warnings such as 'Ambient Temperature Is Too Low'. These warnings can be shown both audibly and with the LED indicator that we will install on ardinuo, which can also be shown on the web and mobile application.

### Safety and Security Requirements

The drone is a drone, so it can only be used in our country within the framework of certain rules. The use of drones can only be made possible when legal obligations are met and within the framework of these obligations. Otherwise, it is not possible to use drones freely.

#### General Use of Our Drone Project

In order to fly in open areas of our Drone Project, we need to meet the following requirements;

##### **Property Administration Permit Transactions Process**

• Persons who will fly by unmanned aerial vehicle (drone) within the scope of the SHT-UAV Directive of the General Directorate of Civil Aviation must first open individual or commercial registration to the SHGM (General Directorate of Civil Aviation) UAV Registration System.

• The DRONE Owner or pilot registers his or her UAV with a Maximum Takeoff Weight above 500 g, assigns the defined pilot and sends it for approval to SHGM.

• After SHGM has given its approval, the system produces automatic square code, this framecode is printed and glued to the drone.

##### **Flight Permit Requirements**

• For the flight, the application is made on the website of the General Directorate of Civil Aviation.

• Once all the information has been filled in completely and accurately, it is sent for confirmation to SHGM.

• The applicant who will fly for sporting/amateur purposes can only fly in green areas without the need for permission.

• Only applications to SHGM with FR19 form are made in red areas

• In other regions, commercial flight is obligatory to apply to SHGM from the commercial account. UAV insurance information is entered.

• The Property Administration may approve flight permit requests below 400 feet (120 meters) of flight height.

• In flight permit requests over 400 feet, the application is approved if the General Staff and DHMI give compliance.

• The applicant is informed about the result of the flight permit application by e-mail.

##### **Iha Restricted Zones**

Without risk analysis and without permission from SHGM in the following regions, with drones of any class ;

• At airports, regardless of altitude, at a distance of less than 5 NM (9 Km) from the edge of the nearest runway,

• Navigation auxiliary devices, heliport, heliped, air park, sea/landing areas published on the official website of the General Directorate, etc. regardless of altitude. in a radius of 5 NM (9 Km),

• On very crowded areas and crowded areas, regardless of altitude,

• In the "Forbidden, Threatened and Dangerous Sites" section of ENR 5.1 of the Turkish AIP,

• Around critical structures, facilities and assets such as military and security buildings and facilities, prisons, fuel tanks and stations, weapons/flare factories and warehouses;

##### **Sanctions**

• Even if the device is registered and has a flight permit; the person who does not fulfill his /her responsibilities before, during and after the flight is processed by the relevant article of the Law on Misdemeanors (Md. 32-Contrary to Order ).

• For the flight requiring permission from SHGM, if a drone flight is made without permission and if a flight is made outside the airspace determined by the given authorizations, the relevant persons and businesses; Section 5 of law no. 2920 by SHGM . The penalty provisions in the section apply.

• IN UNAUTHORIZED (ILLEGAL) FLIGHTS WITH UAV (DRONE), THE DRONE IS GROUNDED AND LEGAL PROCEEDINGS ARE INITIATED BY OUR SECURITY UNITS REGARDING THE NECESSARY INTERVENTION.

Adverse situations may occur depending on the place and shape of use of the drone, let's take turns to look at the safety and security requirements within the scope of the modules allocated to me;

#### Record Management of Our Drone Project

* Circuits mounted on the drone are very sensitive to liquid and temperature. The most important thing is that the local recording disk that the drone device records becomes unusable. Therefore, environments suitable for drone use should be preferred as much as possible.
* To store drone data securely, we must opt for leading quality and reliable brands, Sandisk, Samsung brands. In this way, we almost eliminate bad situations such as data corruption and loss.
* Since all the information of our project will be hosted on the server of a server company, care should be taken to take care of how good the relevant company is. It should be selected by paying attention to how many customers the company has and how many active projects are hosted in the company. Otherwise, the security of the data may be in doubt.
* The data storage units used by the company selected for the project on its servers must be in the SSD structure. Data should be recorded and read at high speeds. In this way, the problems caused by server-based transitions that may occur on the project are eliminated. ,
* The wifi module integrated on the drone so that it can connect to the internet network and communicate with the server;
  + Support at least 2.4 Ghz with long and powerful shooting network
  + SmartLink Support for Android and iOS devices
  + Data sending time must be less than 2 milliseconds after Wifi wakes up
  + In case of standby, it should consume less power than 1.0mW power consumption so that it does not tire the ardinuo device. Ardinuo
  + In a state of deep sleep, the project is powered but wifi is not used
  + TCP/IP stack Support Must Be Available. This allows the connection to be provided automatically easily. Rope mismatches often cause problems with manual connections. Especially when you turn it on and off, there is a conflict if the ropes you assign always remain the same, so we need to ensure that the TCP/IP protocol assigns automatic ip.
  + Minimum 4MB SPI flash (program memory)

It must have minimum system requirements.

#### Gaining Vision to drone camera, Separating What You See according to Their Characteristics, Tracking Feature

The drone camera is one of the main parts of our project. Let's consider the negativity that may occur with our camera in the form of a list;

* The camera may be damaged in a slightly severe impact (impact, fall, hit), so we can protect the camera against impacts in a protective mold.( E.g. Hard Plastic box)
* The camera may not be resistant to liquid contact, so it can still be inserted into the box to protect against liquid contact.
* The camera lens can be contaminated, scratched, so it will show the image damaged. However, when not in use, the camera can be protected with a protective cover.
* The camera can receive current that can form a short circuit from the device from which it is powered by ardinuo or direct power, although the necessary 5-12 Volt Relay, 1k resistance must be properly protected.

#### Commanding the Drone by Voice

It needs some safety and security requirements when controlling the drone by voice, let's list them;

* When trying to control our Drone Project with sound, external (noise) sounds without human voices may interfere. When the drone project is dangerously high above ground, the drone is given the wrong commands, so the drone's fulfillment of the wrong command may compromise the safety of the drone . E.g. The drone can hit and take a hit, the drone cannot do what is desired because it cannot understand whatever is desired, so it poses a security risk.
* There may be a disconnect between our Drone Project and our mobile or web-based application , which we connect via Bluetooth connection to control it. That's why we need to use a high-range Bluetooth module. Voice control is disabled in case of possible disconnection.
* Our Drone Project can be controlled by clicking/weaving with our application by web and mobile, as well as by pressing and talking to the voice control button from the same place and quickly the user is expected to be logged on within the commands we send. Anyone who wants to speak to the press must introduce himself before he can speak;

E.g.

* User :"Hey, Drone Username: Enes KILIÇ, my password: enes1234 I want permission to log in. "I'm going

The system; Mr. Enes, your access has been confirmed. You're welcome..

In this way, the person who wants to dominate the drone by voice must first introduce himself to the system by voice. If anyone wants to give a command with a voice, the system says, "I don't know you. Please introduce yourself to me."

In this way, the security of the system will be protected.

* In the commands given by voice, the sound coming to the web or mobile application should be clear and understandable. The command to be given to the drone must be clearly stated;

What time is the drone? How Much Does a Drone Charge Have? but if it doesn't

Commands such as "How many times has the drone been at this hour" may not be clearly understood in the algorithm. Already necessary voice processing algorithms will be developed against these situations. As much as possible , it can be studied to make the drone as human brain-like.

It is a requirement of engineering not to stay to certain standards.

#### Use of The Drone in the Dark Environment

The drone may face many security challenges in the dark environment. A drone camera is his vision. He can't see a drone camera in a dark environment. Therefore, because it loses the ability to see with the computer, it cannot perform the corresponding commands; This causes a large vulnerability . Therefore, the measurement of darkness should be done very well.

The values that come to Ardinuo should be analyzed well , calculated well and the limit value determined for the light perception value should be well calculated. Otherwise, the weather darkens step by step, a good measurement should be made depending on it well.

He shouldn't expect it to be too dark or when the light level is better. It should not turn on led lamps.

#### Drone's Measurement of Weather Information

The drone should measure weather information well. It should not give incorrect values. It should not mislead the user accordingly. Integrated circuits on the drone are damaged in very hot and very cold environments. ; The drone must give warning in very hot environments; ' +70 Degree Dangerous Temperature Value ! Please remove the drone from its location' siren sounds can be ensured by berki escape manoeuvres or the temperature value that is not measured correctly can mislead the user. Actually, the temperature is normal, but because the drone cable came off, it could have been read too high. This will reduce the user's availability quality, and accordingly, the user may panic and engage in behaviors that endanger drone security.

### Software Quality Attributes

Our Drone Project should be developed in a controlled manner , adhering to Software Quality Qualifications;

#### Availability

Our Drone Project will be developed to standards that will not tire the user;

* In computer vision studies with drone camera, human, object and other living perceptions will be provided almost without passing, the results of the algorithm will be provided in a short time, will be taken into consideration. Incorrect data will ensure that the user is not misled.
* The network connection between the Drone Project and the server will be provided quickly and quickly. Attention will be paid to the network connection distance. Network quality and gravity will be emphasized. Net ruptures will not happen as long as possible
* Voice commands to be sent to the Drone Project will be taken without passing, passing through a well-programmed algorithm and then returning without passing again.
* The Drone Project will soon know that it has entered the dark environment and will turn on the lighting lights with it. The lighting data will be measured well. It won't tire the user. The necessary tests will be carried out in different locations, locations and locations. The drone will perform its tasks comfortably in any environment in which it flies.
* Project Drone should measure the weather well. He shouldn't notice the environment he's in. The user should be able to use the weather feature comfortably wherever they want to use it. Accordingly, drone testing should be carried out and tested in different environments and user availability should be tested.

#### Reliability

* The data obtained in computer vision studies with Drone Camera should be reliable. E.g. If a man has long hair, he should not understand her as a woman. The user should comfortably rely on and use the camera applications in the project. Attention should be paid to the structures that make up the module such as various software (programming language), device (camera) view, location (forest, home), etc.; E.g. A long-haired male requires a high-resolution camera, and when there is a camera angle to block the view, the user is given the necessary warnings and directed to the most accurate and reliable the features to be used in computer vision should be fulfilled. I mean, I don't know

E.g. In reality, the long-haired male stands in the woods snowing , and if the system is sure and tells the user, 'You are a man with long hair', then he can safely our project is available.

* The network connection between the Drone Project and the Server must be secure and stable. It must be prepared for external threats, ensure user data security and the same availability. Data exchange queries must be extremely secure. It should not be conclusive during the connection or allow malicious devices to access or block information between the server and the drone.
* Voice commands sent to the Drone Project need to be well understood, filtered and disassembled by the algorithm. Operations must be performed after receiving the 'current command' of the commands. The benefits from the procedures should be correct. Gain the user's trust.
* The Drone Project should turn on its lights immediately as soon as it enters the dark environment, the user should trust the drone fully in this regard.

#### Portability

* Drone Project and image processing equipment should be able to be transported comfortably when not in use. If operational, the drone must be able to carry the necessary integrateds during the flight.
* Network devices made between the drone and the server must be portable by the drone. Likewise, the local storage device must be invisible on the drone and able to lift the weight
* Devices that send and receive voice-sent commands in the Drone Project must be transported and available anywhere on any mountain; E.g. Long-lasting phone and laptop so they can use it without the need for electricity

# Other Requirements

<This section is **Optional.**  Define any other requirements not covered elsewhere in the SRS. This might include database requirements, internationalization requirements, legal requirements, reuse objectives for the project, and so on. Add any new sections that are pertinent to the project. >

# System Architecture and Architectural Design

<Architectural design is concerned with understanding how a software system should be organized and designed the overall structure of that system.

*TODO: Describe the system architecture, how the application* *interacts with other component. Also* *provide a short description about* *software development approach*>

Ex:

The Model View Controller (MVC) design pattern is used..... Parts.....

Or

N-tier architecture is used.....

## Logical View

<The logical view is concerned with the functionality that the system provides to end-users. UML Diagrams used to represent the logical view include Class diagram, Activity diagram, State Diagram

TODO: Choose one of them, draw logical view of your system and give brief description ...

## Deployment View

<*Describe the physical network and hardware configurations on which the software will be deployed. This includes at least the various physical nodes (computers, CPUs), the interaction between (sub)systems and the connections between these nodes (bus, LAN, point-to-point, messaging, etc.).*

TODO: Draw deployment view of your system and give brief description ... >

## Use Case View

<A use case defines a goal-oriented set of interactions between external actors and the system under consideration.

TO DO: Provide a use case diagram which will encapsulate the entire system and all possible actors. Do not include detailed use case descriptions (these will be needed when you will be working on the Test Plan), but make sure to include a short description of what every use-case is, who are the actors in your diagram.>

### Use Case Scenarios

<A use case scenario is made up of a number of simple, discrete steps that are designated as being

performed by either the "System" or a "User".

TO DO: Provide a brief user story explaining who is using the system and what they are trying to accomplish for each use case>

# Design and Implementation

< This section provides guidelines and information about your project

*TODO: User Interfaces, Required code blocks(not all of them)... >*

# Other Supporting Information

< They may include:

(a) Sample I/O formats, descriptions of cost analysis studies, results of user surveys

(b) Supporting or background information that can help the readers of the SRS

(c) A description of the problems to be solved by the software

(d) Special packaging instructions for the code and the media to meet security, export, initial loading, or other requirements

....>

# References

< Identify each document by title, report number - if applicable - date, and publishing organization.

Specify the sources from which the references can be obtained. >