

# FRONTLINE SQUADRON

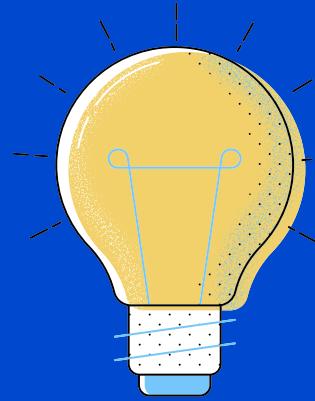
# THE HAWK EYE

Ministry/Organization :  
Govt. Of Bihar(DOA)

- **Problem Statement:** Real time land usage monitoring tool using satellite data and Artificial Intelligence.
- **Problem ID:** PK413
- **Team name :** Frontline Squadron
- **Team leader name :** Anupam Ghosh



# Our Idea

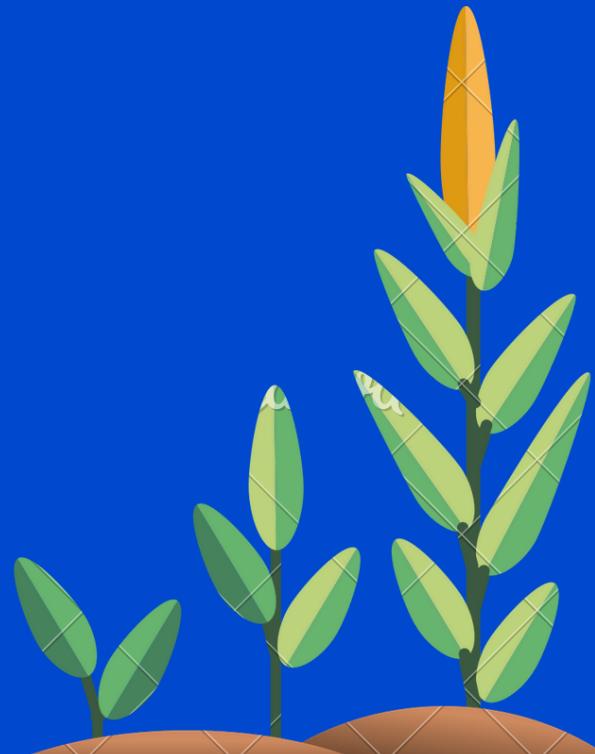


## PROBLEM BEING FACED :

India, although being an agricultural country, largely faces acute shortages of food in some regions and also crop failures due to unsuitable environmental conditions, which leads to numerous problems both to the consumers and the farmers.

## SOLUTION :

To overcome the above problem, it is therefore important to have a tool to monitor environmental variables, and thus crop production during the agricultural season. Satellite remote sensing can contribute significantly to such a system by collecting information on crops and environmental variables at a sub-continental geographical scale, with a high temporal frequency.



## Problem

India, although being an agricultural country, largely faces acute shortages of food in some regions and also crop failures due to unsuitable environmental conditions, which leads to numerous problems both to the consumers and the farmers.

## Existing Alternatives

Currently there is no digital system or softwares for crop prediction in India . It is mostly done by scientific methods and carrying out various test of the land and climatic conditions.

## Solution

To overcome the above problem, it is therefore important to have a tool to monitor environmental variables, and thus crop production during the agricultural season. Satellite remote sensing can contribute significantly to such a system by collecting information on crops and environmental variables at a sub-continental geographical scale, with a high temporal frequency.

## Key Metrics

The key metrics used in our product are the environmental variables like humidity, soil moisture, Nitrogen content, colour from remote sensed data ,etc.

## Unique Value Proposition

This project helps the farmer understand more about his farm and what's required for him to get a better Yield.

## High Level Concept

Our product gives accurate outputs . Predictions made from our model give very accurate results when provided the correct data.



## Unfair Advantage

We have a product which is efficient in terms of performance and requires less man power with lower resource requirements.

## Channels

Direct marketing, social media, ads, partnerships and our own website and a mobile application which will act as an interface for the customers.



## Cost Structure

Currently we are working on the programs using open source python libraries and other open source software's but in order to create a high-end properly working software's we need good computation power and some paid software's so that the total cost of the project upon combining all the figures and factors can be estimated upto INR 1-2.5 lakh.

# USE CASES

## CLIMATE MONITORING

Probably the most popular smart agriculture gadgets are weather stations , combining various smart farming sensors.The provided measurements can be used to map the climate conditions, choose the appropriate crops and take the required measures to improve their capacity (i.e.precision farming).



## CROP HEALTH INDICATION

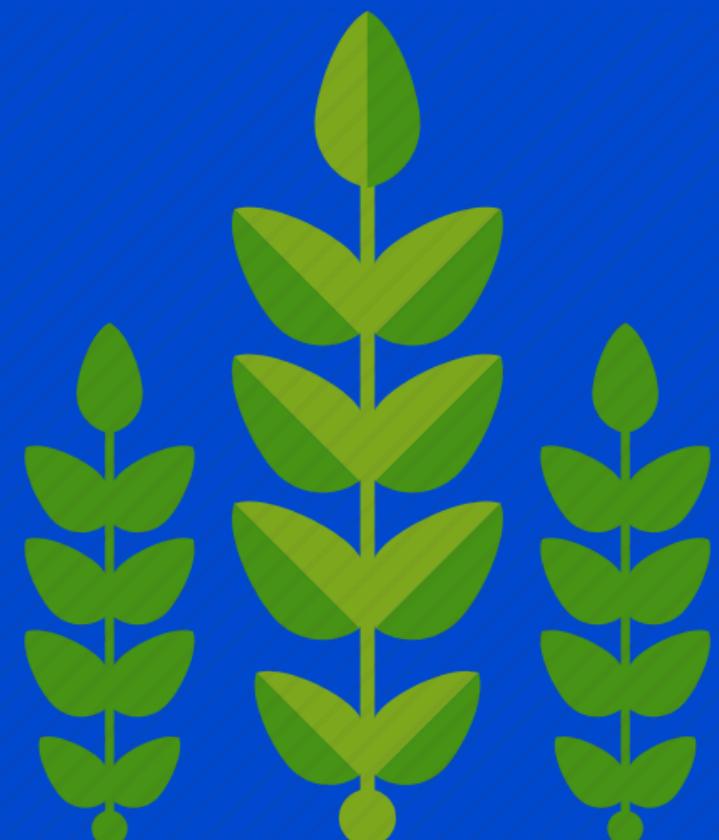
The program analyses the high resolution images from the satellite and breaks down the the different colours present in the image to provide us with percentage of different colours which combined other factors help us to determine crop health.





## CROP MANAGEMENT

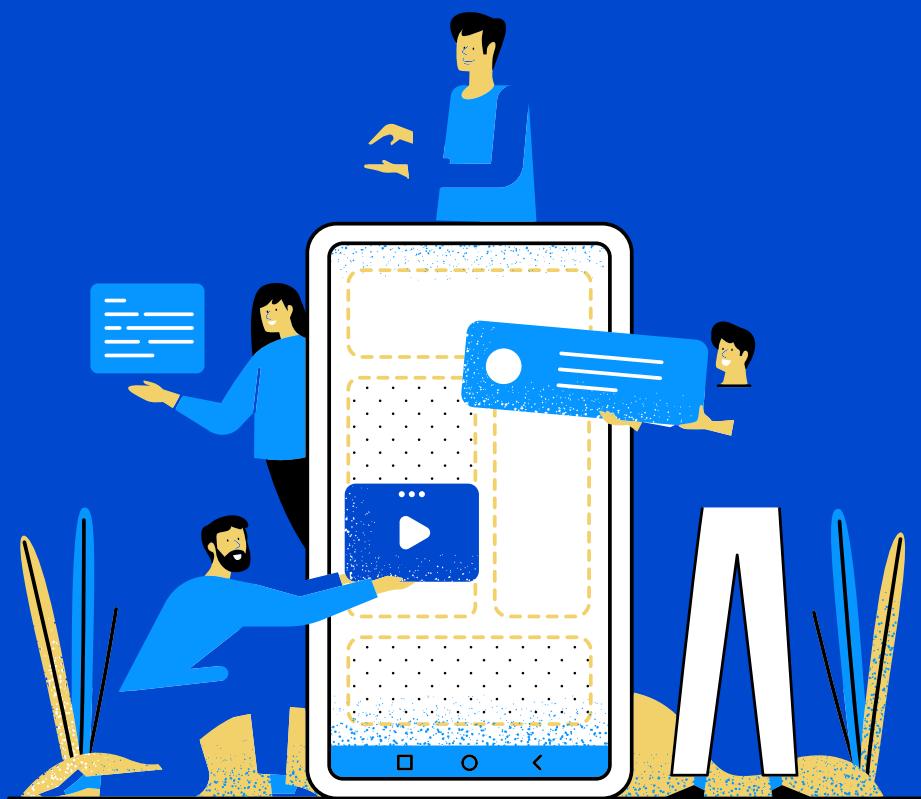
Just like weather stations ,they should be placed in the filed to collect data specific to crop farming ; from temperature and precipitation to leaf water potential and overall crop health.



## CROP SUITABILITY PREDICTION

The program will combine all the factors like weather conditions, moisture, humidity, nitrogen content, soil type etc. to predict the crop type suitable for that particular area of land.

# PLANNING AND IMPLEMENTATION



## Step 1

COLLECTION OF GEOREFERENCED INFORMATION BY USING REMOTE-SENSING VIA SATELLITE AND SENSORS AND OTHER SOURCES.

## Step 2

PROCESSING THE DATA ,ESTIMATION OF CROP YIELDS , ANALYZING THE HEALTH OF THE CROP

## Step 3

VISUALIZING OF CROP GROWTH MODEL AND LAND ACREAGE FOLLOWED BY RESEARCH TO GENERATE ANALYIC DATA. DISPLAYING THE OUTPUT OF OUR PROGRAM TO THE WEBSITE

## Step 4

DELIVERY OF DATA TO DOA TO CREATE A PROCUREMENT PLAN

# OUR MODEL

## SATELLITE IMAGE PROCESSING



```
In [5]: rgb = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
plt.figure(figsize=(20,8))
plt.imshow(rgb)

Out[5]: <matplotlib.image.AxesImage at 0x24275c98eb0>
```

```
In [9]: hsv = cv2.cvtColor(rgb, cv2.COLOR_RGB2HSV)
lower = np.array([0,50,50])
```

```
img = cv2.imread("D:\\hres2.jpeg")
plt.figure(figsize=(20,8))
plt.imshow(img)

Out[4]: <matplotlib.image.AxesImage at 0x24275ac0c10>
```

The Image Here Represents The Graphical Overview Of a Farm. This Program Uses Python Libraries Like **OpenCV** , **Pandas** , **Numpy**.  
**This is made possible via computer vision .**

# SAMPLE DATASET

state_name	district_name	postal_code	latitude	longitude	area_owned	pH	nitrogen	humidity	rainfall	Temperature	last_image_taken	name	crop
Andaman and Nicobar Islands	NICOBARS	744101	11.7401° N	92.6586° E	120ha	5.6	240	82.00274	202.0355	21.77046169	25-07-2020	Anupam ghosh	Wheat
Andhra Pradesh	ANANTAPUR	510051	14.6819° N	77.6006° E	20ha	6.9	200	80.15836	251.0549	24.51588066	20-07-2020	Abhishek verma	Rice
Jharkhand	BASTAR	494223	19.2073° N	81.9339° E	5ha	5.4	485	82.78837	291.2986	26.98603693	26-07-2020	Garvit jain	Potato
Karnataka	CHIKMAGALUR	577101	13.2031° N	75.4341° E	50ha	5.1	342	82.6784	213.3564	23.24342347	01-07-2020	Harshana	Tomato
Kerala	ERNAKULAM	682011	9.9720° N	76.2841° E	68ha	6.5	233	80.64416	224.6757	25.23435545	20-07-2020	Aphni	Coffee
West Bengal	PURULIA	713324	23.6649° N	86.7969° E	110ha	6.8	362	81.63895	197.9791	27.34343347	15-07-2020	vigneshwaran	Sugarcane
Uttarakhand	HARIDWAR	249401	29.9457° N	78.1842° E	165ha	5.1	443	84.47963	196.9562	19.23453678	25-07-2020	Sal Mahesh	Rice
Rajasthan	BARMER	344001	25.7521° N	71.3967° E	70ha	5.8	260	83.0631	266.5083	20.23455454	26-07-2020	Bharath	Wheat
Arghyllaya	EAST JAITIA HILLS	793200	25.3101° N	92.5000° E	80ha	6.1	239	83.29115	192.3197	25.58585035	26-07-2020	Logeshwaran	Maize
Jharkhand	AMBALA	133001	30.2216° N	76.5101° E	78ha	6.5	452	81.78597	262.7173	33.45088375	24-07-2020	Pevithra	Potato
Gujarat	VILSAD	396001	20.3637° N	72.5548° E	84ha	5.4	339	82.14004	224.0581	29.45999082	26-07-2020	Gayathri	Tea
Assam	KAMRUP	781001	19.1901° N	91.4456° E	108ha	5.8	345	52.15672	185.4975	45.45454544	15-07-2020	Yamini	Coffee
Odisha	RAYAGADA	761017	18.1850° E	104ha	5.2	236	58.24318	271.3586	26.45245233	26-07-2020	Ram prasath	Tomato	
Puducherry	KARAIKAL	609602	10.9254° N	79.8380° E	125ha	6.7	345	52.10621	224.6757	23.34556654	12-07-2020	Sujith	Coffee
Tamil Nadu	PERAMBALUR	621212	11.2342° N	78.8807° E	45ha	4.9	227	51.1997	270.4417	23.43422343	22-07-2020	Sowndharya	Rice
Tripura	NORTH TRIPURA	799250	24.0797° N	92.2630° E	44ha	5.9	453	50.50983	193.3474	24.34234344	22-07-2020	Preethi	Sugarcane
Uttar Pradesh	SONBHADRA	231216	24.4570° N	82.9932° E	120ha	5.8	421	56.05224	248.7183	23.34234234	30-07-2020	Harini	Wheat
Haryana	HAZARIBAGH	625301	23.9925° N	85.3637° E	150ha	6.7	224	84.34163	298.5601	27.23432423	24-07-2020	Maansi	Coffee
Punjab	BATHINDA	151001	30.2110° N	74.9455° E	50ha	5.8	244	86.45193	298.4018	26.23425532	20-07-2020	Sanjana	Rubber
Sikkim	WEST DISTRICT	737113	27.3032° N	88.2072° E	12ha	6.3	387	87.93724	193.3474	29.23464343	22-07-2020	NithyaSri	Jute

It is the data set displaying the parameters required to make an accurate prediction which is used in our model



# STATISTICAL VISUALIZATION

The screenshot shows the Frontline Squadron dashboard. On the left, there's a sidebar with icons for Dashboard, Farm analysis, Alerts, Store, Resources, and Weather. The main area features a map of a farm with various colored fields. To the right of the map is a user profile card for 'Anupam Ghosh' (ID: 0207ALPHA). The card displays information such as 'Area Owned: 2.28 hectares (ha)', 'Primary Crops: Maize, Rice', 'Status: Active', 'Soil Type: Red', 'Soil Test Done: Yes', and 'Markets supplied: Vellore, Other'. Below the map and card is a large blue button labeled 'Card'. At the bottom of the dashboard, there's a footer with the text 'The FrontlineSquadron' and links for Home, About us, Analysis, Alert, Fix, and Contact.

# DASHBOARD

This screenshot shows the Frontline Squadron dashboard under development. A large aerial view of a road with cars is displayed, overlaid with a white banner containing the text 'UNDER DEVELOPMENT!' and 'RESPONSE // REVIEW' with a 'KNOW MORE' button. Below the banner, there's a search bar with the placeholder 'Type to search'. To the left of the map is a sidebar with the same set of icons as the first dashboard. On the right side, there are two data visualization sections: 'Market price of Fruits and Vegetables' (a table) and 'Monthly analysis' (a bar chart). The 'Market price' table shows prices for various fruits and vegetables across three months (May, June, July). The 'Monthly analysis' chart shows the monthly price trends for items like apples, carrots, onions, and tomatoes.

ITEM	May	June	July
apple	₹ 80.00	₹ 85.00	₹ 80.00
carrot	₹ 40.00	₹ 45.00	₹ 35.00
onion	₹ 20.00	₹ 25.00	₹ 20.00
cabbage	₹ 45.00	₹ 50.00	₹ 48.00
grapes	₹ 60.00	₹ 55.00	₹ 40.00
mango	₹ 100.00	₹ 105.00	₹ 95.00
onion	₹ 42.00	₹ 45.00	₹ 40.00
potato	₹ 30.00	₹ 35.00	₹ 38.00
tomato	₹ 20.00	₹ 24.00	₹ 22.00

# PLANNING PHASE

- **Target customer** : Farmers /Govt
- **Gathering User Needs** : Acquiring needs of the farmer and make the software comfortable to use.
- **Planning Our Model** : Our Model has been planned in such a way that it will have a simpler interface With accurate results.

Product

Coding /Testing

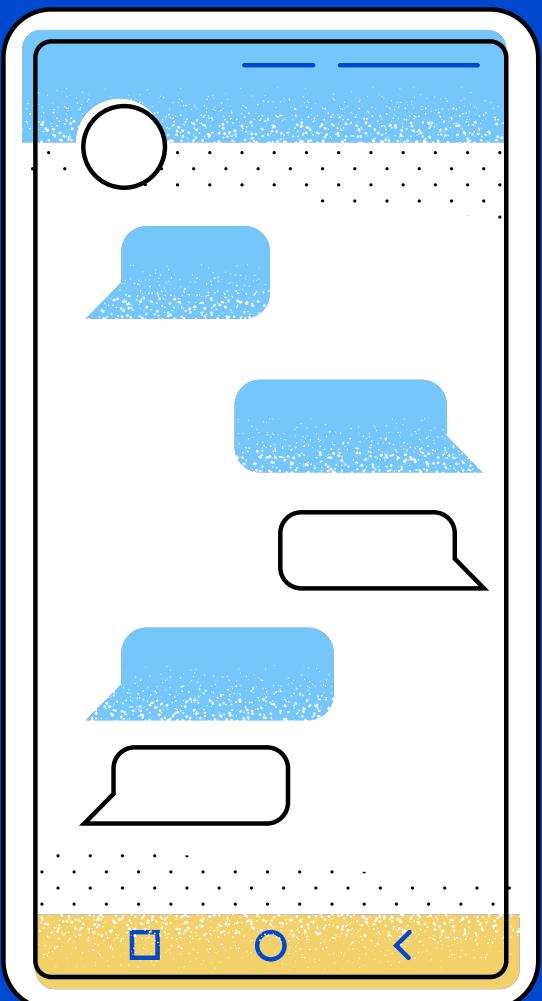
UX /UI

Planning Our Model

Gathering User Needs

Target Customer

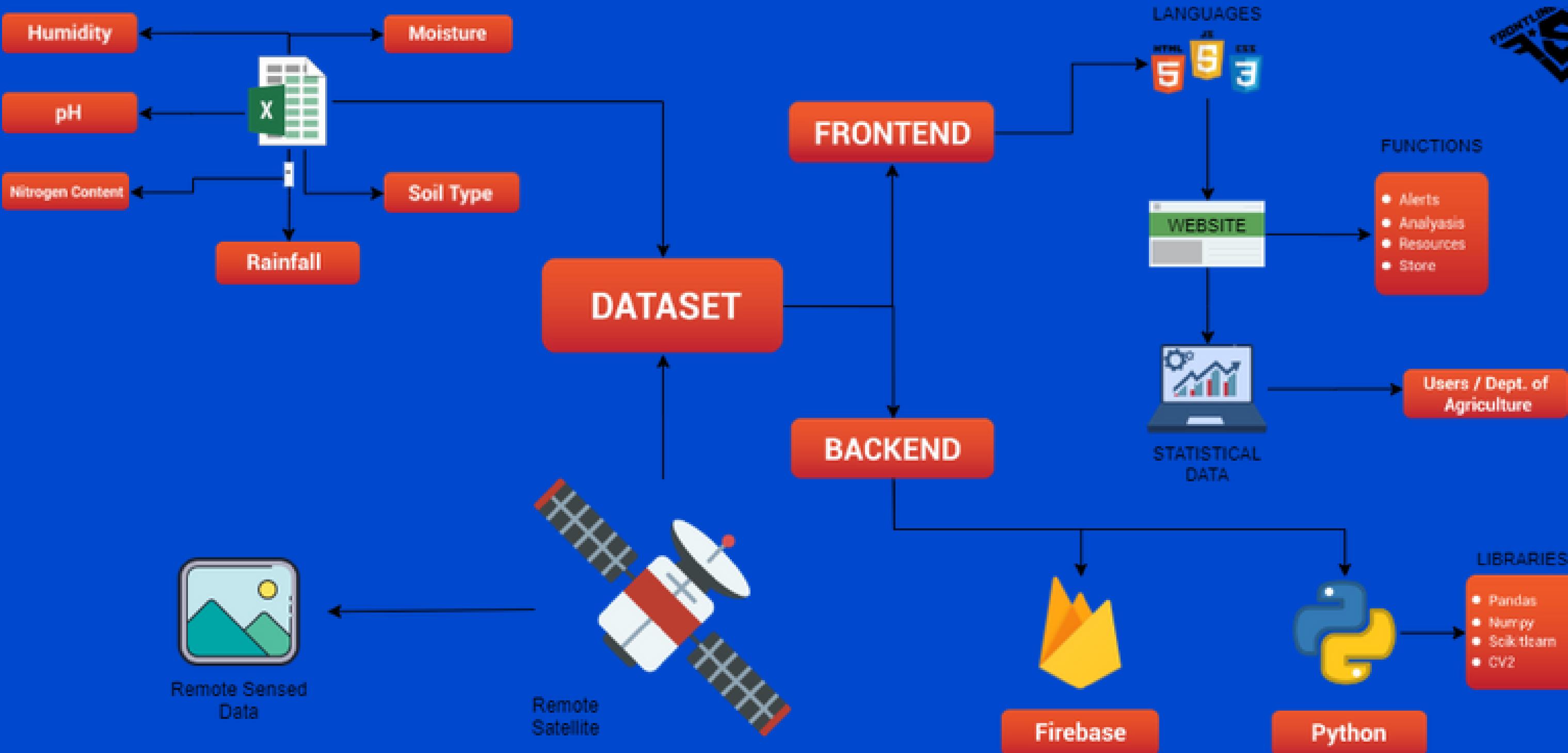
# ShowStopper

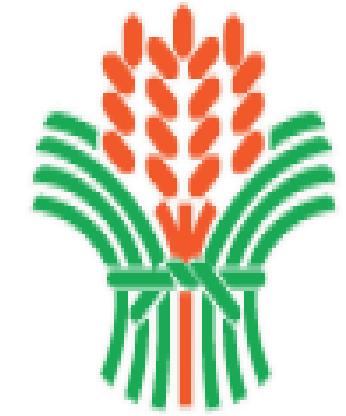


- Agriculture , being a natural phenomenon mostly relies on nature , and man can never predict or control nature , may it be rain, drought, availability of sunlight, etc.
- Faulty sensors or data processing engines can cause faulty decisions, which may lead to over use of water, fertilizers and wastage of other resources.
- The current systems are not scalable or reliable , and the initial costs are high which the farmers cannot afford to.



# WORKFLOW DIAGRAM





Department of Agriculture



We will depending on these Organizations for Data

# Generated Report

- A Brief Report showing the outputs from the analysis .
- The report will be generated in their regional language for the User's convenience.
- The Report contains the predicted data from our machine learning models .

02-07-2020  
ID: 41245854

## QUARTERLY REPORT

FIRST NAME:ANUPAM  
LAST NAME:GHOSH  
DISTRICT:VELLORE

You must be having a lot of questions about your land , yield and capabilities. Our report will not only help answer these questions , but will become your guide for deciding next step for your harvest. It will tell you what percentage of your land is good , how much it can yield and what steps needed to be taken to improve your productivity. If you have further questions please feel free to ask us,



Caption describing picture or graphic.

Temperature:	32	You have a very good productive land .
Humidity:	80	It has a yield of <b>27.68 metric ton/ha</b> .
pH:	6.4	<b>CROP SUITABLE-</b>
Rainfall:	202.95	<b>RAGI</b>
Area:	120 ha	<b>WHEAT</b>



Analysis Requisition Form / Regional Language

\* Required

First Name \*

Your answer

Last Name

Your answer

Email \*

Your answer

Aadhaar number \*

Your answer

Phone number \*

Your answer

City / Town \*

Your answer

District \*

Your answer

Pincode \*

Your answer

Report language : \*

Choose

W

Your answer

Soil test done? \*

Yes  
 No

When was the Last Soil Test done \*

Date

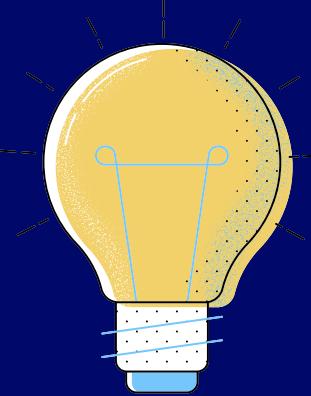
dd----yyyy

# Persona & Analysis Requisition Form

It collects the basic information of the user

&

Acts as request form for those users who needs a detailed analysis



# AGENDA

## FRONTEND



Improve the UI /UX of the website and Add additional features to it .

## MACHINE LEARNING MODEL



Embed the model to Ui

## STATISTICAL DATA



Displaying the data in Constructed manner for Better Understanding.



# FRONTLINE SQUADRON

ANUPAM GHOSH

TEAM LEADER

ABHISHEK VERMA

TEAM MEMBER

GARVIT D JAIN

TEAM MEMBER

SAI MAHESH

TEAM MEMBER

ASHNI S R

TEAM MEMBER

HARSHANA A S

TEAM MEMBER

# THE TEAM

