

Yuktix GidaBits®

Data driven farmer productivity

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Introduction

The farm productivity in India is low compared to the rest of the world. India is a big producer of commodities with one of the lowest productivities in the world. There is a significant scope to improve the yield by providing scientific input to assist grower decisions during the season. The increase in productivity is linked to the farmer income and sustainable resource utilization leading to food security in a world beset by climate change and population pressure on the land.

Yuktix GidaBits is a system to deliver data driven productivity gains for farms. Yuktix delivers the benefits of precision agriculture at an affordable cost for a variety of crops. The growers receive timely scientific input for crop management and protection leading to income generation and savings. Organizations can use our platform to deliver personalized advisories to their growers for better crop management leading to better yield and quality. GidaBits provides advisories in the following categories,

Crop management

- Irrigation advisory
- Soil & Nutrition management
- Access to Crop experts
- Residue reduction

Crop Protection

- Disease & PEST warnings
- Disease management
- Spray schedules

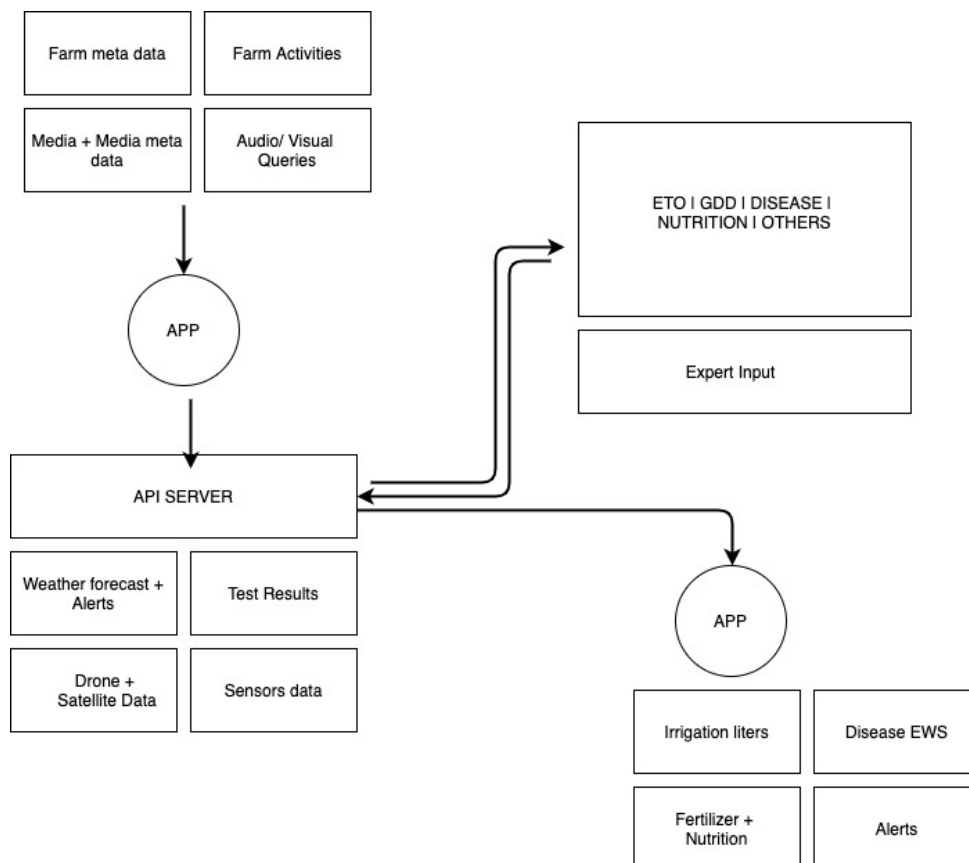
Activity planning

- Package of practices
- Planning calendar
- Forecasts

GidaBits USP

Personalization

GidaBits is different from broadcast systems that publish a single advisory for all growers irrespective of the farm conditions, crop stage and grower activities. GidaBits(r) app collects individual farmer activities, farm, and crop data. For example, GidaBits irrigation management factors in drip layouts, crop stage, seasonal water stress, soil conditions and rain forecasts before delivery the daily plant water needs. The advisories are personalized to the grower and the farm. That is like having the best crop expert work with you side by side through the season.



Affordable

GidaBits tries to deliver the best possible advisory with minimum capex investment. Traditionally, the advisory models have been to deliver benefits after installing a per farm capex

model. However, we recognize that such cost structures may not be suitable for most land holders in India. That is why GidaBits works with both primary as well as secondary data sources to drive advisories. The platform can also utilize any existing infrastructure, integrating at the data level. For example, if weather data is already available from other sources, then our platform can make use of that and publish the irrigation advisory rather than demanding a separate weather station installation.

Grower Oriented

Yuktix GidaBits platform has been created to answer one question, “how can grower benefit”. The system as well process orientation is to answer that one question. We assume that all the sensors, data and computations are of no use if they cannot be translated to income, savings, or sustainability.

- Better yield for better income
- Better activity planning for input savings
- Best scientific input for sustainable resource usage

Intellectual property

Our technology has been developed on GOI, Karnataka and Europe Innovation grants. We are actively working on the following problems,

- Short term timeseries prediction
- ML based Disease EWS models
- Irrigation management using less sensors
- Better rain forecasts

Solution components

IoT Device

GidaBits has been built to work with different data sources. Agriculture process modeling requires historical as well as real time data. GidaBits IoT devices can provide real time micro weather and soil data from the field. The devices are solar powered with battery backup and can work uninterrupted in field conditions. The devices support multiple sensor profiles to solve grower problems,



- Weather station
- Irrigation
- Spraying
- Disease & PEST warning
- Trap Camera

The coverage of a device depends on the use case it is deployed for. The devices can be deployed in the grid model where one device can serve multiple farmers resulting in shared costs and affordable personalized advisories. For few use cases, like irrigation effectiveness, the devices must be deployed on a per farm basis*. An organization can decide to deploy IoT devices either in a grid model or a mixed model where both grid devices as well as farm devices are deployed.

Software

The software collects and formats data from both primary (our IoT devices) as well as secondary sources. The software provides facilities to add computations for advisories as well as simulation models. Grower database is maintained per organization and system can issue advisories as well as alerts to the growers. The organization can opt for a cloud hosting model or a dedicated hosting model. The software also publishes a dashboard for agronomists to help with calculations and easy diagnosis of issues across the farms.

App

Growers do not want to interact with complex software. All grower interactions are limited to an app distributed to the grower. For growers with basic handsets, only SMS based advisories can be issued. All the benefits to the growers are delivered via the app only. Following benefits are delivered,

3:54 PM

Weather

Advisory

Jun 14, 2022

कल के लिए मौसम का पूर्वानुमान - 15 जून

बादल छाए हुआ मौसम

*कृपया ऐप पर मौसम के पूर्वानुमान की जांच करें

Jun 14, 2022

आज का मौसम- 14 जून

तापमान - अधिकतम 35 °C, न्यूनतम 25 °C
आर्द्रता - अधिकतम 71 %, न्यूनतम 29 %
हवा की गति - अधिकतम 18 मील प्रति घंटे, न्यूनतम, 12 मील प्रति घंटे.

Jun 10, 2022

Weather is hot today.



3:57 PM

Sensors

Praveen Grape Farm 1 - Praveen Herur Grape Farm - 1

phws01
Received on 29-Jun-22 15:53

30.2 C
Temperature

944.6 hPa
Pressure

62 %
Humidity
(Medium high)

0 mm
Rainfall
(Slight rain)

15.9 mph
Wind Speed
(Moderate wind)

18 %
VWC in %

465.0 mV
Leaf Wetness

8085.0 mV
Battery Voltage

NW --
Wind Direction

Last 24 Hour Average



3:57 PM

Irrigation

Praveen Grape Farm 1

phws01

18 %

sandy loam loam
Field Capacity: 22%
Wilting Point: 10%

Optimum Moisture

Daily average soil moisture in the last 14 days

Jun 15	Jun 16	Jun 17	Jun 18	Jun 19	Jun 20
Jun 21	Jun 22	Jun 23	Jun 24	Jun 25	Jun 26
Jun 27	Jun 28	Jun 29			

☐ No data
☐ Less Moisture 10 - 16%
☒ Optimum Moisture 16 - 22%
☐ Wilting < 10%



3:52 PM

yuktix account2

BANANA

Today 29 Jun, 2022

Sowing Date 01 Feb, 2022
 Transplantation Date 10 Feb, 2022
 Seed Type TULSI29
 Area 21 Acres

Plan for 29 Jun, 2022

Critical growth stage

49/100

Nutrient Management

Solid Fertilizer Urea 62 gram/plant or SSP 125 gram/plant

☐ Yes
☐ No



Grower Benefits

Income, savings & sustainability

SN	Field operations/ activities	Problems faced by Farmers	Advisory solutions
1	Timely land preparation	<p>Optimal soil moisture is critical for efficient tillage otherwise, farm energy (diesel/ bullock) is wasted to the tune of costing 10-15% more.</p> <p>Improper soil tilth leading to poor crop stand after sowing due to reduced moisture storage into soil and crop yields.</p> <p>More weed infestation that increases weeding cost at least 10-15% and weeds compete for moisture and nutrients with main crops that results poor productivity.</p> <p>Most cases, rainwater use efficiency is around 45-50% with present practices.</p>	<p>Advisory on Pre-monsoon off-season rains for land preparation will mitigate the consequences.</p> <p>Allows timely sowing; allows double cropping (kharif & rabi).</p> <p>Rainwater use efficiency increased to 60-70%.</p> <p>Reduced runoff by 30-40% and soil loss by 50-60%, as soil is receptive to absorb rainwater.</p>
2	Date of sowing/ transplanting of Kharif crops based on onset of monsoon	Poor germination due to insufficient moisture and extended dry spell after sowing severely affects productivity	<p>Weather forecast will help farmers in overcoming germination failure by providing information on optimum soil moisture and probability of receiving rains after sowing.</p> <p>Forecast on onset and withdrawal of rains will help in planning to accommodate kharif and rabi crops.</p>
3	Sowing of Rabi crops	Rabi crops sowing fails due to lack of moisture	Advisory will help farmers to provide supplemental irrigation at rabi sowing and subsequent

	using residual soil moisture		growing period in case of insufficient moisture condition.
4	Fertilizer application based at optimum moisture and rain free day and wind condition	Many a times, fertilizer applied is not efficiently used by crops due to lack of moisture at application; or rain shower immediately after application washes away fertilizers applied leading to reduced fertilizer efficiency by 40-50%.	Appropriate moisture level and rain-free period at least 3-4 days after fertilizer application enhances the use efficiency 40-50%; This weather and moisture advisory is very helpful.
5	Delay in fertilizer application based on rainfall forecast for conducive condition		
6	Early warning system for pest and disease management	<p>Pest and disease infestation is a major cause of loss of productivity.</p> <p>Cost on pesticide application is huge.</p> <p>Indiscriminate spraying to control</p>	<p>Early warning of pest and disease infestation will help in implementing proper control measures and further spreading.</p> <p>Reduced number of sprays and cost of cultivation.</p> <p>Less adverse impact on environment and human health.</p> <p>Better quality of produce and increased productivity</p>
7	Appropriate pest and diseases control measure	<p>Pesticide application efficiency is low.</p> <p>Health hazards.</p> <p>Increased cost of operation.</p>	<p>Appropriate timing for spray is advised based on wind speed and direction.</p> <p>Increased application efficiency and less cost on spraying operation.</p> <p>Less health hazards;</p>
8	Pesticide spray timing and direction		


9	Weeding/ thinning at regular interval	Cost on weeding is high and improper control measure leading to low productivity.	Advisory on right time of weeding with conducive soil condition based on weather data will help in reducing cost of operation and improved the crop stand due to better availability of moisture and nutrients to crops otherwise weeds would have consumed it.
10	Irrigation quantity and interval at critical stage of a crop based on soil moisture and weather data	Water is limited and critical resource, but farmers tend to over irrigate wasting the water, that affects: Crop growth. Fertilizer leaching. Leads to soil salinity.	Proper advisory on irrigation quantity and interval will help: Save water, energy, and cost of operation (> 50%). Area irrigated can be increased. Soil health improves and fertilizer leaching is prevented. Limits groundwater exploitation. Higher crop yields and retunes.
11	Advisories for timely harvest of crops	Many a times crops are lost due to unseasonal rains or shattering. Extent of loss varies huge.	Appropriate timely weather advisory can avoid shattering or crop loss due to rains.





Capex Deployment models

The grower benefits outlined above depend on the availability of computations and distribution of advisories using primary and secondary data. No capex is required If the organization already have a setup to capture the primary data. For example, if data is available from IMD or a weather station is already installed then that data can be utilized. However, in cases where primary data is not available, we need to install the Yuktix IoT devices.

There are two deployment models. The devices can be deployed in a grid model where multiple farmers at village level can benefit from a single deployment. Grid deployment can provide most of the required advisories. The coverage of a grid device is effective for deployment in a village or Taluka model.

For solutions that need local data collection, a farmer can opt-in for a per farm device model. An example of local setup is a device to measure the soil moisture at the farm. The farm device is effective only at the farm level.

Coverage	Device	Computations	Benefits
	Yuktix IoT device with air temperature, Humidity, Solar Radiation, Wind speed & direction and Soil Moisture sensors.	Calculation of evapotranspiration and crop water requirement - Temperature, Humidity, Rainfall, Windspeed	Easy Irrigation decision making through daily irrigation water need alerts
		Formulation of field and crop specific irrigation advisories	
		Disease forecasting models are run based on Temperature, Humidity and Rainfall	Early warning of disease helps in preventive sprays to avoid/control disease and reduce the number of chemical sprays
		Ideal spray timings for application of chemicals uses Temperature, humidity, windspeed and rainfall.	Weather based agro advisory to help farmers in application of systemic or contact fungicide

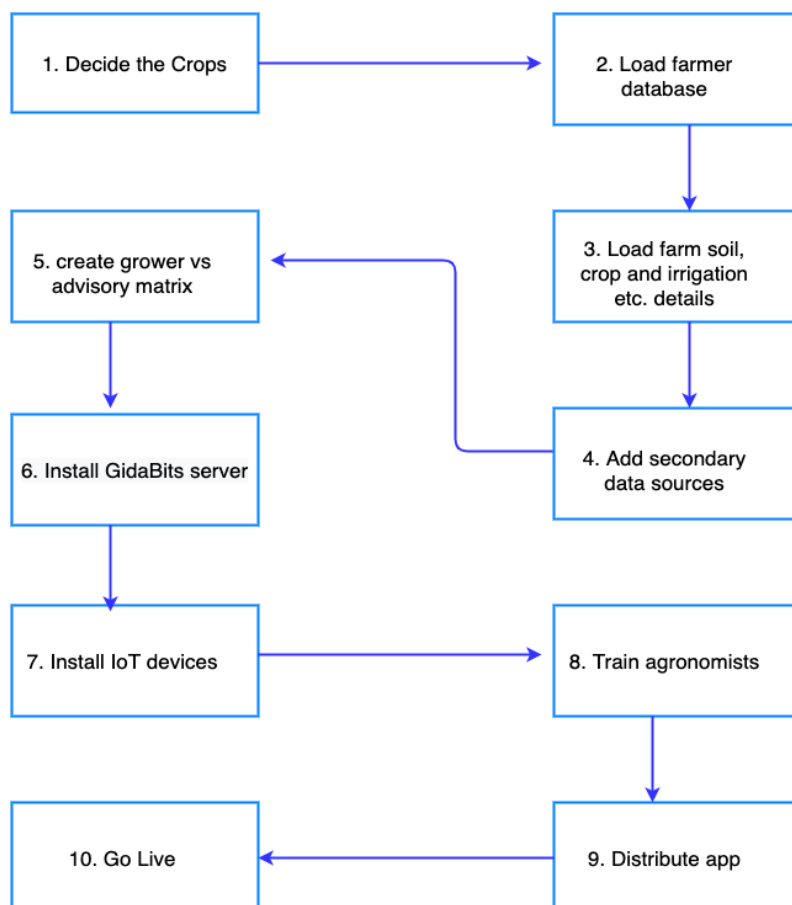
		Weather forecasts	Short term Weather forecast to enable farmers to schedule their farm activities depending on farm weather conditions.
	Yuktix IoT device with soil sensors that measure soil moisture & temperature at various depths	Calibration of soil moisture values to field - soil specific textures	Being able to gauge the soil moisture depletion trends and analyze the pattern of irrigation in field.
		Identification and threshold set to respective soils field capacity and wilting point	Farmer will be able to understand real time information on soil moisture status
		Integration with irrigation advisory system	Save irrigation water and electricity by reducing the pump run time.
	Yuktix IoT devices with wind speed, direction & temperature sensors	Calculate best spray timings using delta T computations.	Find idea time to spray pesticide and reduce the amount of pesticide by increasing the effectiveness of the sprays.
	Yuktix IoT device with temperature, humidity to detect disease conditions at farm	Use disease models to calculate the prevalence of a disease	Early warning to the grower would result in cheaper disease management
	Yuktix solar powered IoT IR camera to take pictures from insect trap	Capture images of the insects trapped	Estimate the population of insect attack in the field
		Manual image analysis with pest monitoring and control	Early sprays to reduce the insect damages.
		Automatic image analysis of insects trapped with recommendation on the application of chemicals.	

Benefits for organizations

Affordable, Automatic & Productive

- Accurate production records for certifications
- Affordable pricing. Get started with as few as 100 growers
- Climate smart and sustainable agriculture
- Automate agronomist workflows
- Get access to best experts

Onboarding



Costing

The costing depends on following factors

1. The cost of IoT devices (Grid model)
2. The cost of IoT devices (farm model)
3. The cost of grower subscription

For example, if we have 1000 growers on board with a 200 INR/ month/ grower package on 2 AWS deployed in the grid model, the cost would be,

CAPEX				
IoT Device	QTY	Price	Total	
Weather station	2	75,000	1,50,000	
Subscription cost				
Subscription	# of Growers	Subscription/ grower	Per Month	Total/Year
	1000	200	2,00,000	24,00,000

So, the cost per grower is 212/Month. Assuming an average size plot of 2 acres, the cost of deployment is approx. 111 INR/ acre/ month.