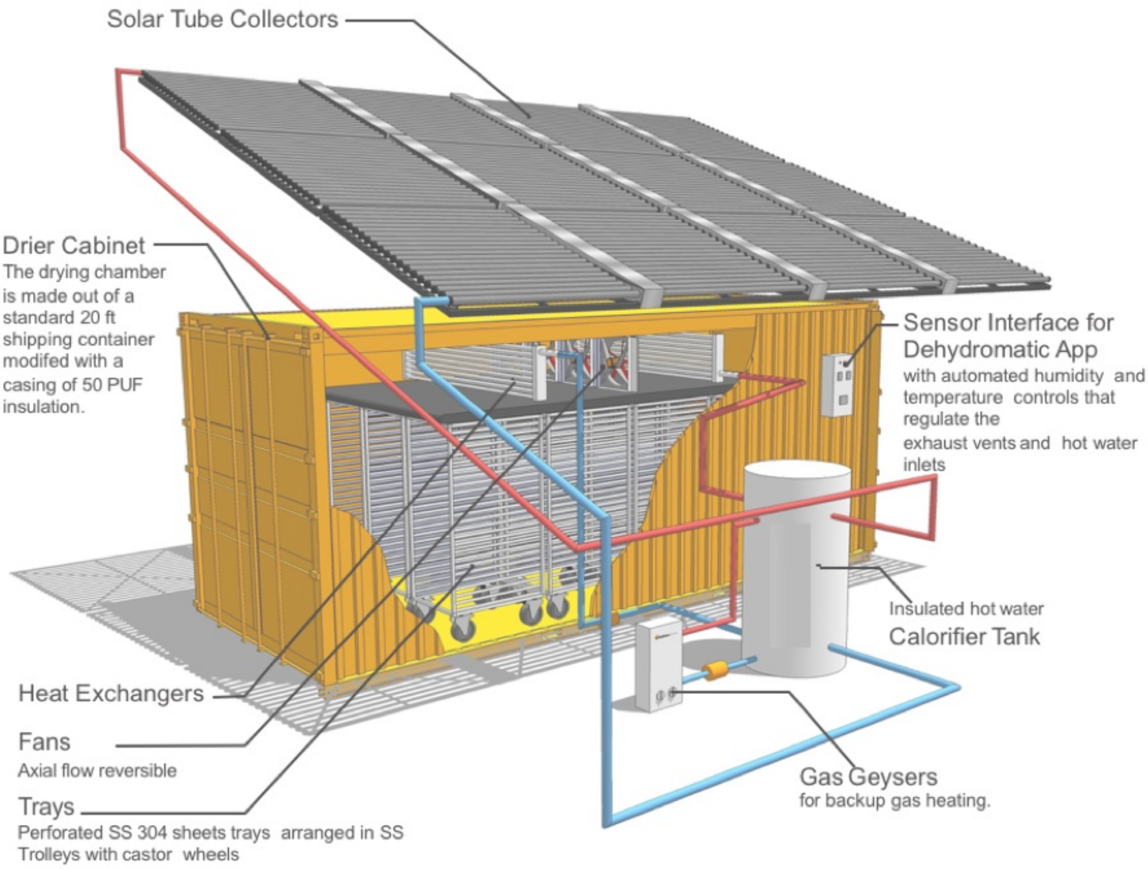
Dehydromatic

Dehydromatic is an Smartphone App (Android) to guide farmers and micro-processors in the solar drying of their fruits and vegetables. It also informs value-chain players (primarily processors, but also Transporters, Consumers, Growers, etc.) of relevant information related to the processing and trading of dried fruits and vegetables. The App accompanies a solar dryer (as depicted below):

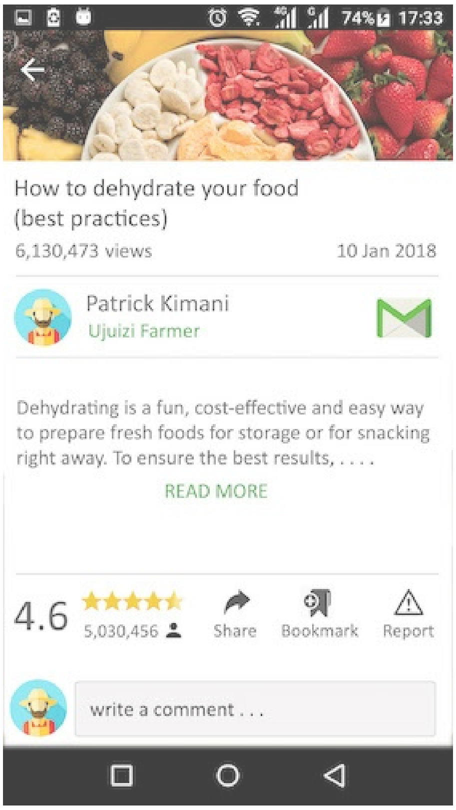


Contents

Product summary

- **Product description**. Dehydromatic is the name of an App to guide aer amers in the solar drying of their fruits and vegetables. It also informs value-chain players (primarly Processors, but also Transporters, Consumers, Growers, etc.) of relevant data related to sar dring.
- **Value proposition**. Share information about fruits and vegetables with value-chain players to farmers.
- **Company description**. Ujuuzi Laboratories provides advanced technology for the use of smartphones in the BoP, i.e. in recording and sharing information and also observes the micro-climate nd learns from the pert how vario operato as de a batch od good, medium, or bad.
- **Mission**. Dehydromatic reduces risks and increases profits for businesses active in the eiredfood drying processing, help lower maet prices for consumers by preventing-hses, stimulate fairer prices for growers, and help improve management information to drive interventions by public and private agencies.

Screen captures



Installing

- Download the an App on any supported device using the following Google Play Store link:

  GET IT ON Google Play

- For experimental builds, see our various releases:

  SAMPLE APK ALPHA

  SAMPLE APK BETA

  SAMPLE APK PRODUCTION

Core functionality

- Communication between food processors and farmers to exchange agricultural sourcing information (prices, quality, etc.)
- Learning materials (processing knowledge, experience, best practices)
- Site evaluation (solar energy through so-called solar radiance-intensity maps)
- Real-time monitoring and advice (combustion heating requirements and predicting fruit quality, by linking past micro-climate and outside weather conditions -> past quality ing a nuraleor)

Approach

Learn

The App provides users the ability to consume but also contribute to the learning material and best practices in drying tropical fruits and vegetables. To guide and also to let thenn the b toshare their ow materials (knowledge) and reviewing another user materials.

And we will put the information on this [wikiHow] as the default content of Learning Material section. For further discussion, please use this [issue]

Sharing your best drying practices and experiences:

1. User posts their knowledge
2. Another will be able to immediately see that post (depend on the ordering: newest, oldest, popular, etc). And of course we also need to limit the data to maximum 20 or 25 post per page, to maintain the memory and data usage.
3. Users are able to provide comments, ratings, and reports (duplicate, irrelevant, spamming, etc).
4. Based on the community responses, thel be listed on the top search or somewhere in the bottom, depending on the rating.

Plan

Before installing a solar dryer, one should evaluate the land first (*aka* “site evaluation”). The long-term average energy from the sun, as-per the solar intensity maps included in the App, can be used to identify suitable sites before initiating the installation and selection of a drying oven. The evaluation of a suitable site can be done through matching the available solar capacity against the required.

Long-term average daily solar irradiance can be estimated trough numerical weather (re)analysis or monitored using satellite meteorology. To estimate the weather factors of relevance we make use of various using satellite meteorology technologies, e.g. the 4-channel split-window algorithm (Sun & Pinker, 2007) for the estimation of Land Surface Temperature (LST) and the HELIOSAT-3 method (Hammer et al., 2003, Venus et al, 2013) for the estimation of incident solar radiation. For Ghana, a number of solar radiation intensity maps were developed, which have been integratedhic h been into the App using the RAMANI Maps-API for Android to facilitate easy access of such infirmation.

After th spatial evaluation of solar energy, there are other factors that determine the best site for deploying a certain type of solar dryer. E.g. presence of viable FBOs, current farm concentrations, production volumes, centrality, road condition/accessibility, existing marketing, input, and buying centers, etc. The central processing unit in Kintampo, Ghana has thus been identified.

Descide

Based on available solar energy (predicted using 2.5 minute snapshot of the whole of Africa and Europe satellite data)forecast the comingurrent day(s), the App also predicts combustion heating requiremenmt. While closely observing the micro-climate during drying, the App also learns from the expert user how various operations has yielded a batch o good, medium, or bad dryer produce. Based on this, the App is able to ‘learn’ from the operator what are so-called ‘best practices’. As time evolves, the App will get better at predicting quality of the dried produce by linking past micro-climate and outside weather conditions ->a quality by using Artificial Intelligence (AI). Currently, the following input and response variables are foreseen:

Input variables

1. DryingControl variables, consisting of:
   a. duration,
   b. external temperature,
   c. internal temperature,
   d. gas supply (time on/off and frequency of refilling the LPG-cylinder),
   e. fan (time ON/OFF, and;
   f. air direction (time forward or backward).

2. Micro-weather sensor observations, consisting of:
   a. Date
   b. Time
   c. Humidity in % sensor 1
   d. Temperature in degrees C (sensor1)
   e. Humidity in % sensor 2
   f. Temperature in degrees C (sensor2)

The measurements are retrieved line-by-line. The line record has the following fields, separated by commas. The output of one measurement looks like:

```
2016-08-02,15:46:25,43.00,25,44.10,26
```

Output variables

1. FruitSensor variables, consisting of:
   a. Brix level (sugar content),
   b. Colour,
   c. Firmness (to check the chewiness of the chips),
   d. PH,
   e. water content (%), and;
   f. RGB (camera photo).

2. Quality assessment of dried fruit from expert, based on:
   a. visual appearance (five star-rating),
   b. taste (five star-rating.

(optionally, selected output variables after drying may also be measured before drying)

Used libraries

1. Weather API providing solar radiation and cloud-cover information (forecast/now-cast) to assist in the ing for day-to-day operations of the natural gas supply (LPG) to provide additional heat (in case solar energy is insufficient).
   We calculating energy from the sun, *aka* insolation, from cloudiness and other weather and satellite data to arrive at the Total radiation at surface level (in J/m2.d):

2. RAMANI Maps-API for hint-casting (long-term average) and forecasting of weather for site-selection (and seamless integration of other spatial data).

System requirements

Supported Android version:

- The minimum Android OS to install Dehydromatic is KitKat (4.4 and up).

Software dependencies

- RAMANI Maps-API
- Ujuuzi AI
- RAMANI Crowd-API
- RAMANI Location Manager
- RAMANI Feedback
- Gitlab API
- Ujuuzi DBManager

Getting started

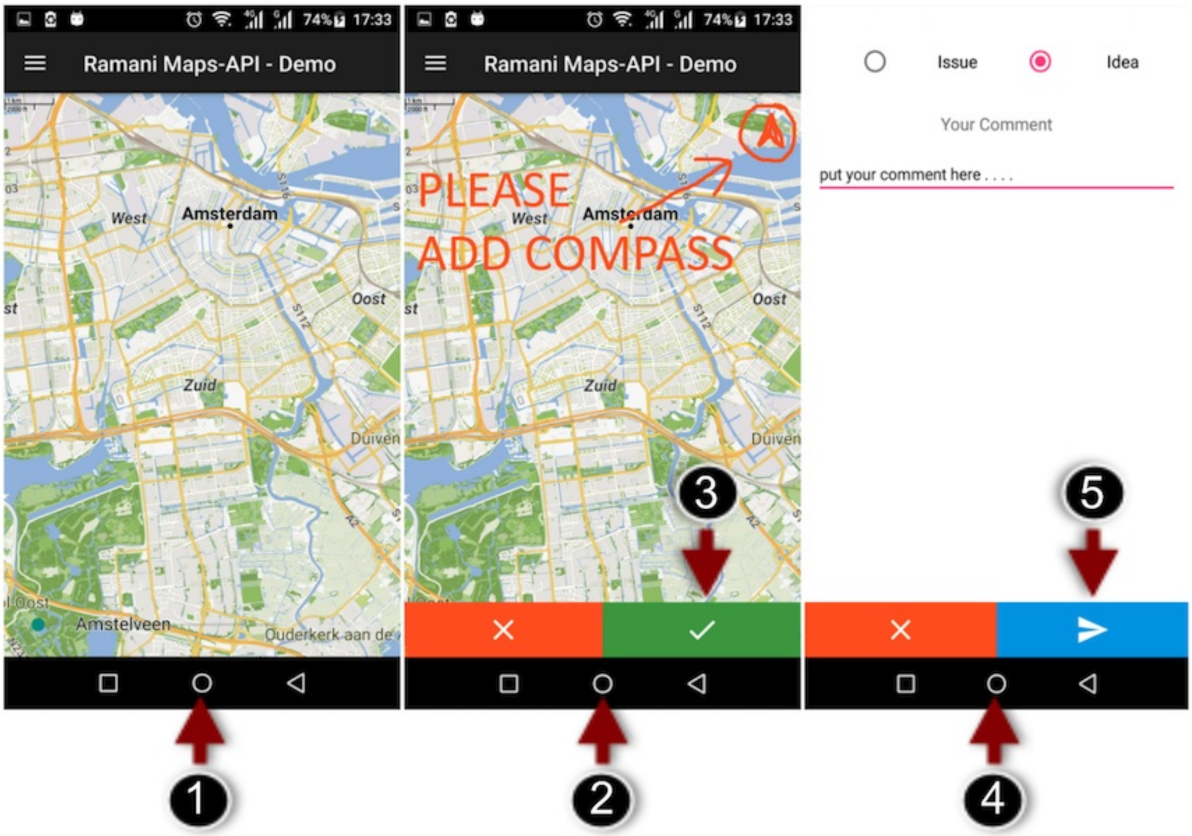
- To install the app, search for “Dehydromatic” (without the quotes) in the Google Play Store or click here and click on INSTALL.

Contributing

- For testing purposes, users are invited to try from our various release channels, either **Alpha**, **Beta**, or **Production** (depending on how brave you are you can opt-in for our early access releases). To join the Alpha and Beta channel please register your Google account here.
- After installing your release of choice, please provide us with your feedback (see Feedback)

Feedback

At any moment in the App, you can submit feedback to report your experiences with the App as follows:



1. Press the Volume-down key, and a Feedbackform will be shown (touch the Back button to revert any time)
2. Draw any on-screen feature to point out wrong or missing elements in the App
3. Toucur on-screen annotations
4. Use the comment section to provide some textual information clarifying the issue or idea and select the feedback type
5. Touch the Send button to submit

A confirmation e-mail is send for tracking purposes and follow-up correspondence.the progress update, see here * Training AI

- Validating solar radiance forecast data

Releases

ALPHA

This channel should test new functionality on the demo project corresponding library. If new functionality works, then will be merge to BETA channel.

BETA

Tester needs to verify that every feature (old and new) are working. After this BETA testing phase is complete, and all test results prove satisfactory, the corresponding testing issues may be closed one-by-one. With each closed testing issue your personal branch, with each commit, may be merged into the PRODUCTION-channel.

PRODUCTION

This channel mean that the App is completely ready for use on any of the supported phones (this is same as the version released to the general public via the Google Play store).

License

Acknowledgements

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Reviewers

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