

Expert in your “Field”

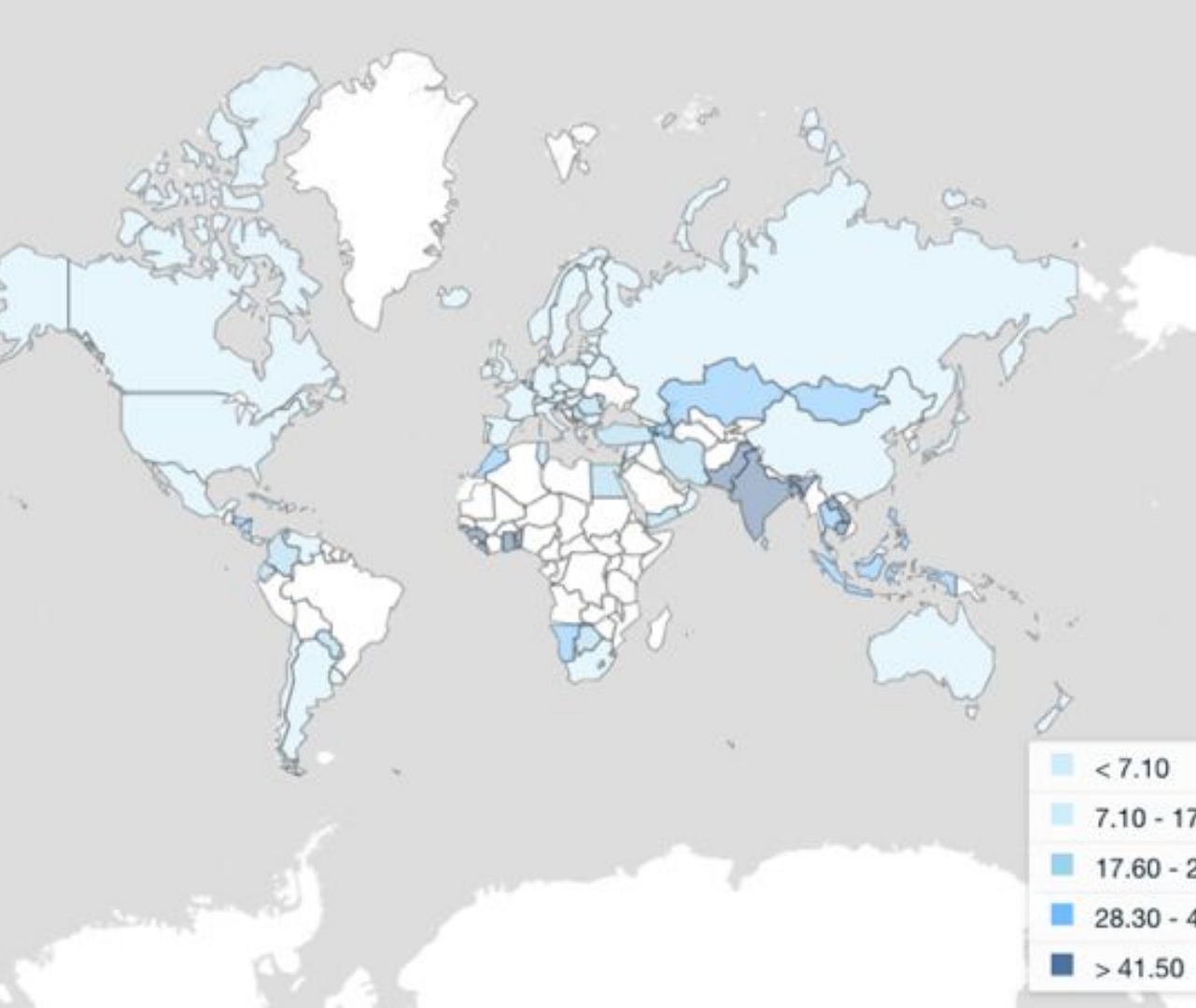
A Presentation by Anushri Kumar, Bilal El-Habibi, Christine Vandevoorde, Devin Bisconer and Taskin Khan



Meet Our
Farmers

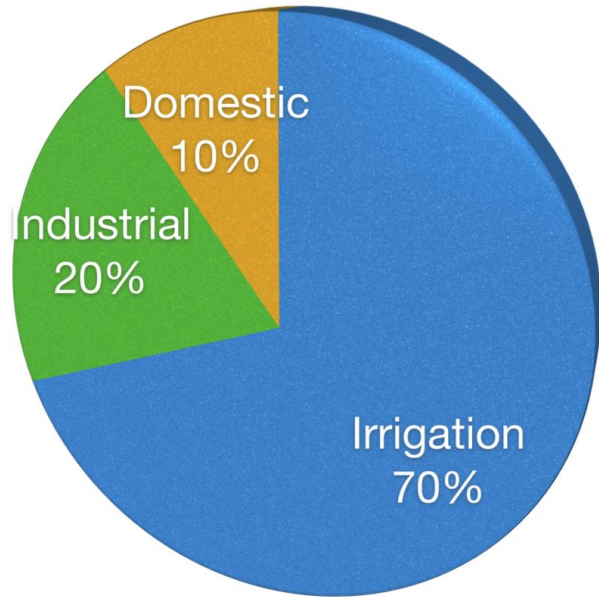
The Agricultural Sector

Agriculture is the world's largest provider of jobs, **employing 40% of the global workforce.**



Irrigation Water Use

% of Freshwater Use in the World



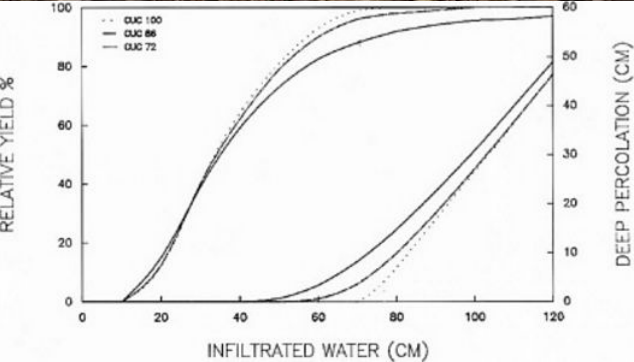
- Rainfed agriculture is the predominant agricultural production system around the world, and its current productivity is, on average, little more than 1/2 the potential under optimal agricultural management.
- That means, **over 1.3 billion people like Ramu and Drew are being half as productive as they can be, all because of poor irrigation management.**

Water-Energy Nexus

CA: Water use accounts for **20%** of electricity use, or **7.2 TWh**.

Equivalent to 300 million tons of coal!





Make Smart Irrigation Smarter

- Account for **Resource Scarcity**
- Capitalize on the nuance of **Plant Yield**
- Inform difficult **Business Decisions**

All while being **MORE**

- **Affordable**
- **Accessible**
- **Renewable-Friendly**

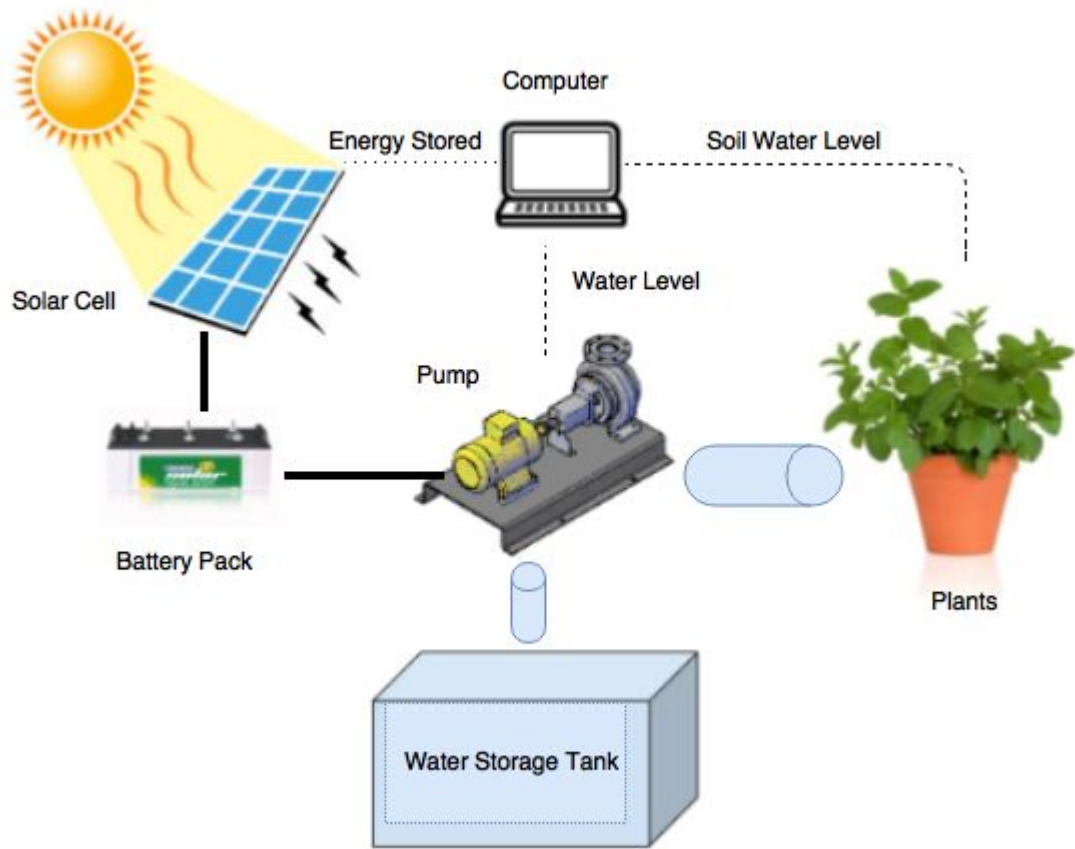
Multi-Objective Optimization

1. Economic : $J_1 = \sum_{K=0}^N (C_{grid} \times P_{grid}(k) + C_w \times P_{pump}(k))$

2. Yield moisture deviation : $J_2 = \sum_{K=0}^N [m(k) - m_{des}]^2$

3. Hybrid : $J_3 = (1 - \gamma) \times J_1 + \gamma \times J_2 \quad 0 \leq \gamma \leq 1$

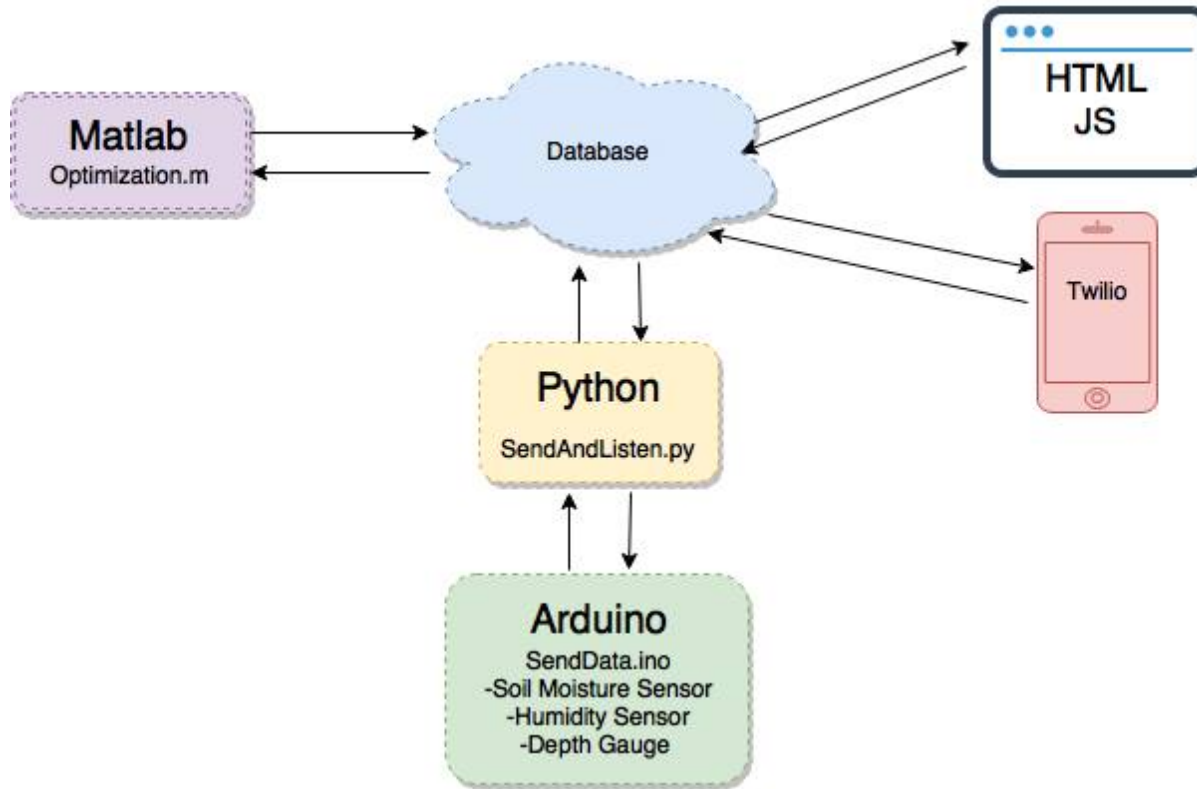
Where γ is a tuning factor, for the user to weight the importance of economic cost vs plant health.



Demo



Cyber-Physical Layer



On

Sent from your Twilio trial account - Thanks for the message. Configure your number's SMS URL to change this message. Reply HELP for help. Reply STOP to unsubscribe. Msg&Data rates may apply.

Today 10:41 PM



Sent from your Twilio trial account - Sent from your Twilio trial account - Pump ON!

Text Controlled Pump - Screenshots

trial account - Pump ON!

Off

Sent from your Twilio trial account - Thanks for the message. Configure your number's SMS URL to change this message. Reply HELP for help. Reply STOP to unsubscribe. Msg&Data rates may apply.

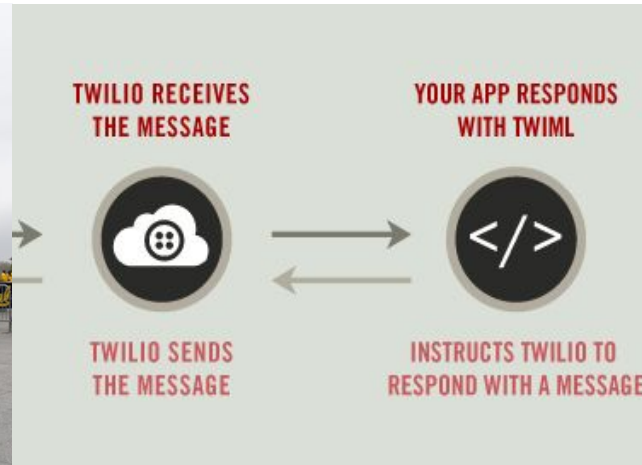


Sent from your Twilio trial account - Sent from your Twilio trial account - Pump OFF!

So How Does Texting Work?

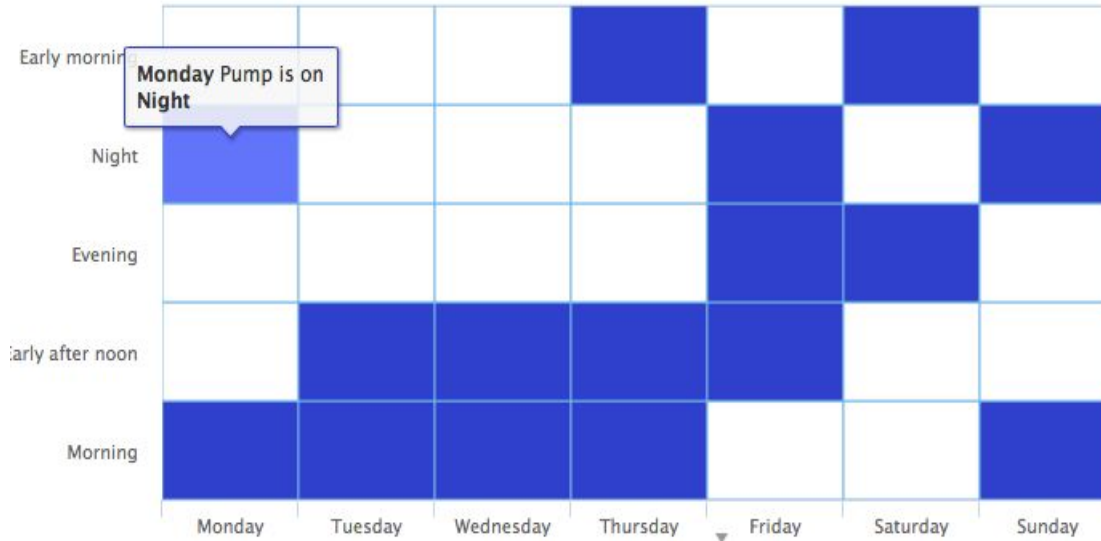
Twilio allows software developers to send and receive text messages using its web service API.

We paired Twilio with the Linux and WiFi capabilities of the **Arduino Yun**

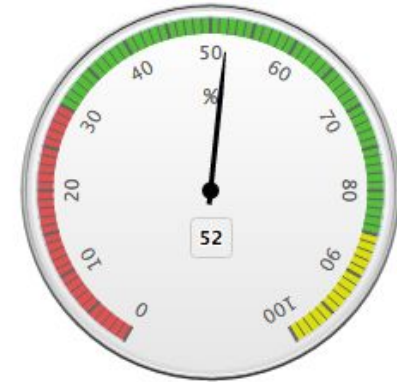


More Visualizations

Irrigation Schedule



Moisture Level



Battery Level



A green tractor is shown in a field of green crops, likely a vegetable field. The tractor is positioned on the left side of the frame, and its large steering wheel is visible. The background shows a line of trees under a clear sky. A large black circle is overlaid on the center of the image, containing white text.

Summary:

Affordable, renewable
irrigation, optimized for
farmers all over the world.

Questions?