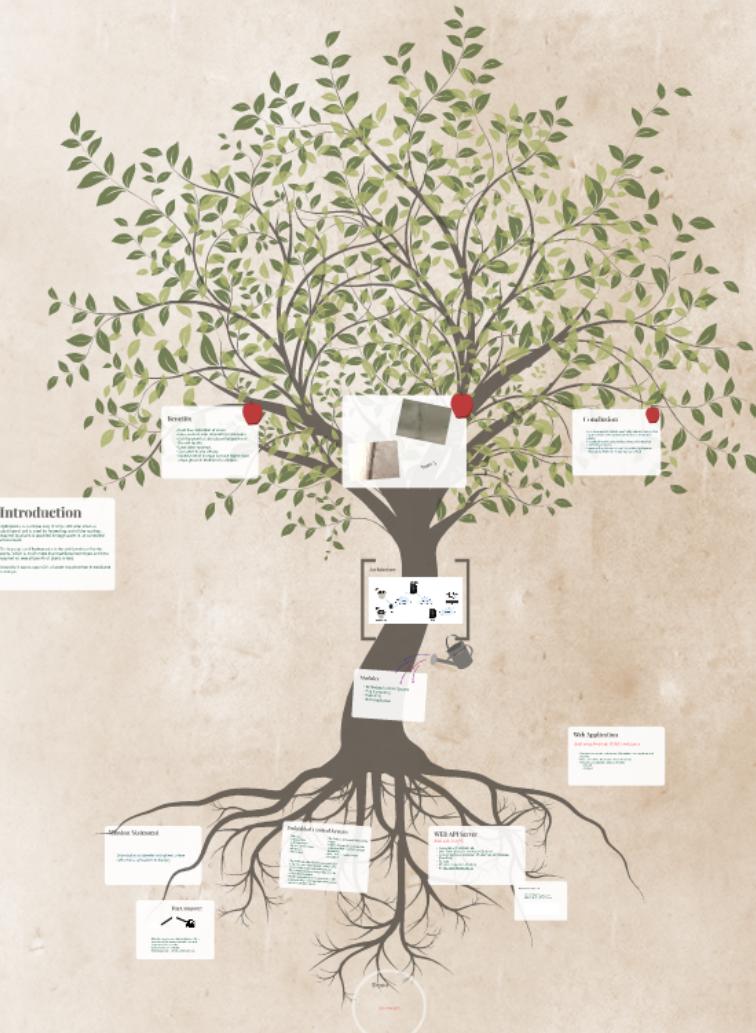


COEN 396 - Hydroponics

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Introduction

Hydroponics is a unique way of crop cultivation where a substitute of soil is used for harvesting and all the nutrition, required by plants is provided through water in an controlled environment.

The key aspect of hydroponics is the yield produced by the plants, which is much more than traditional technique and time required for overall growth of plants is less.

Secondly, it saves upto 95% of water required than in traditional technique.

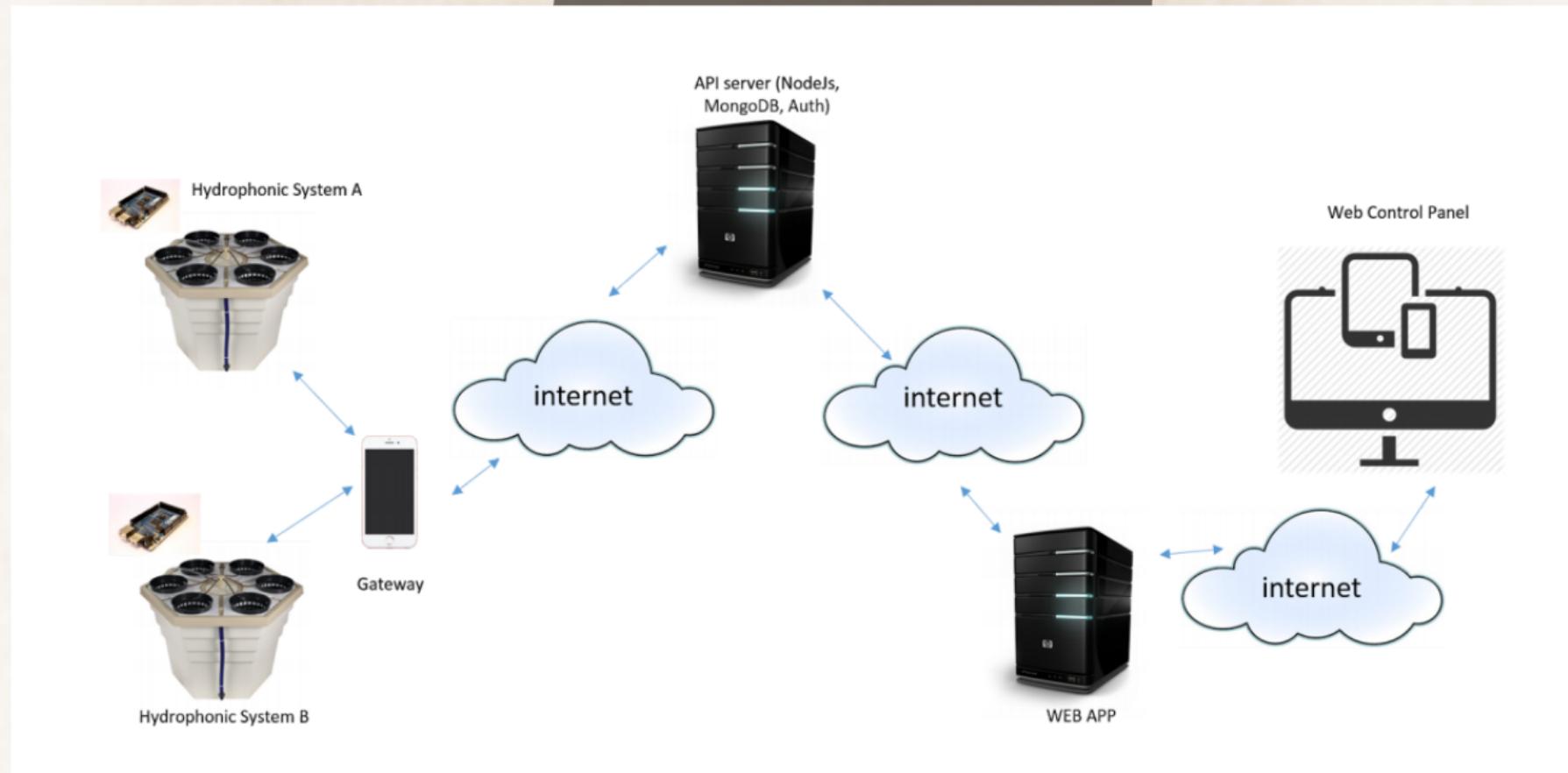
Mission Statement

*To provide a sustainable hydroponic system
with a touch of modern technology.*

Benefits

- Pest free cultivation of crops.
- Less surface area required for cultivation.
- Can be grown at any place irrespective of the soil quality.
- Less labor required.
- Can grow in any climate.
- Nutrition level in crops is much higher than crops grown in traditional technique.

Architecture



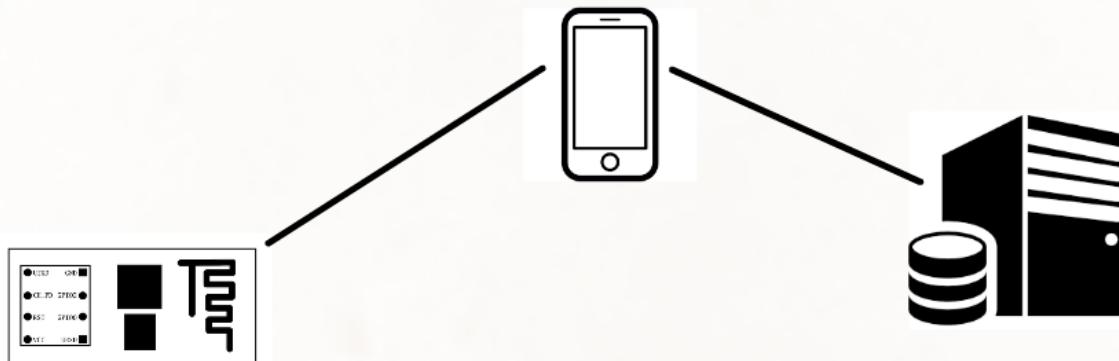
Modules

- Embedded Control System
- Fog Computing
- Web APIs
- Web Application

Embedded Control System

- **ESP8266**
- **Arduino UNO**
- **Soil Hygrometer**
- **Photoresistive Sensor**
- **pH Sensor**
- **TDS Sensor**
- **The ESP8266 is the main brain of the system.**
- **Arduino UNO works as sensor data acquisition device and Relay Signal Forwarding**
- **Data - ESP - > Arduino (NOT POSSIBLE!)**
- **The ESP fetches thresholds from server, and waits for sensor input from the Arduino UNO via the UART serial communication port.**
- **The scanning continues until it detects delta or threshold violations.**
- **If a threshold violation is detected, the sends relay(controller - inverted logic) with relevant actuator activation signal.**

Fog Computer



- iOS device acts as a fog computer which process all the sensor sensed data and responses the actuator.
- Lessens the cloud traffic
- Decreases the internet dependencies.

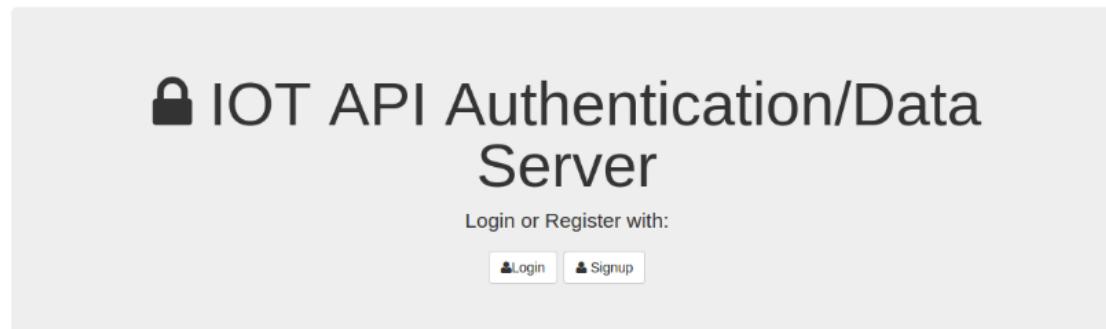
WEB API Server

Built with NodeJS

- Responds with JSON/HTML
- User Token Based Authentication Enabled
- Acts as Middleware between iPhone(Fog) and WebApp (FrontEnd)
- Failsafe
- Maintains Logs for each plant
- try <http://api.humandroid.us>

WEB API Server - II

- Try <http://api.humandroid.us>
- Load tested with 100k requests, 1000 concurrency
- Sends push notification to the Fog via APNS
- Separate Authentication page for user with redirectUri



Web Application

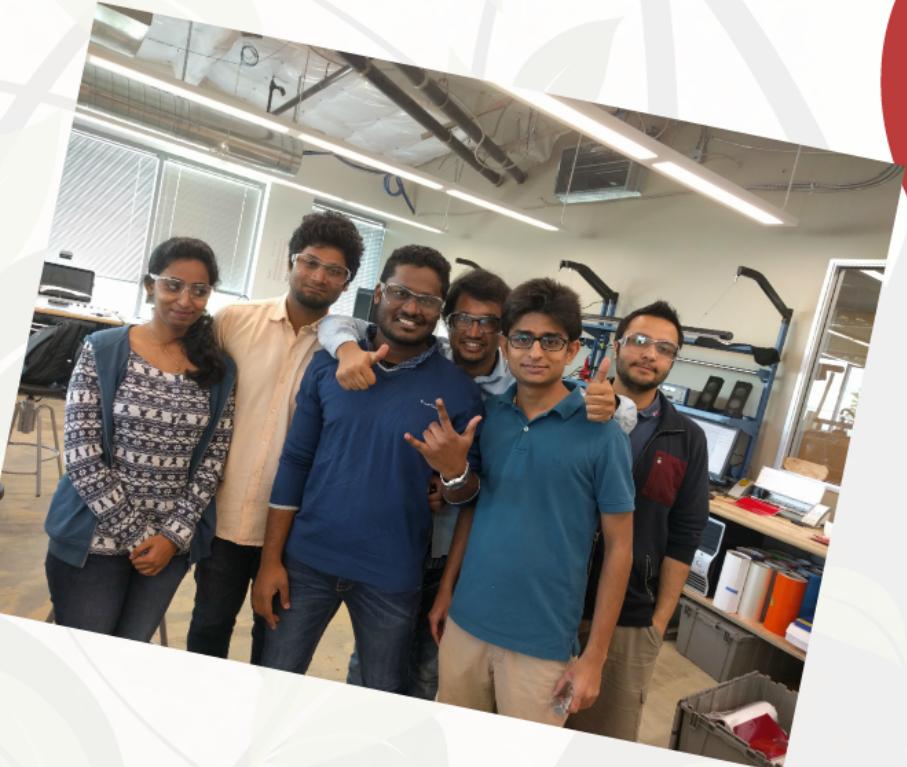
Built using Bootstrap, HTML5 and jquery

- The user can control and monitor the system from anywhere and anytime.
- User can set the Threshold values of sensors
- The user can operate using two modes
 - Default
 - Custom



Demo

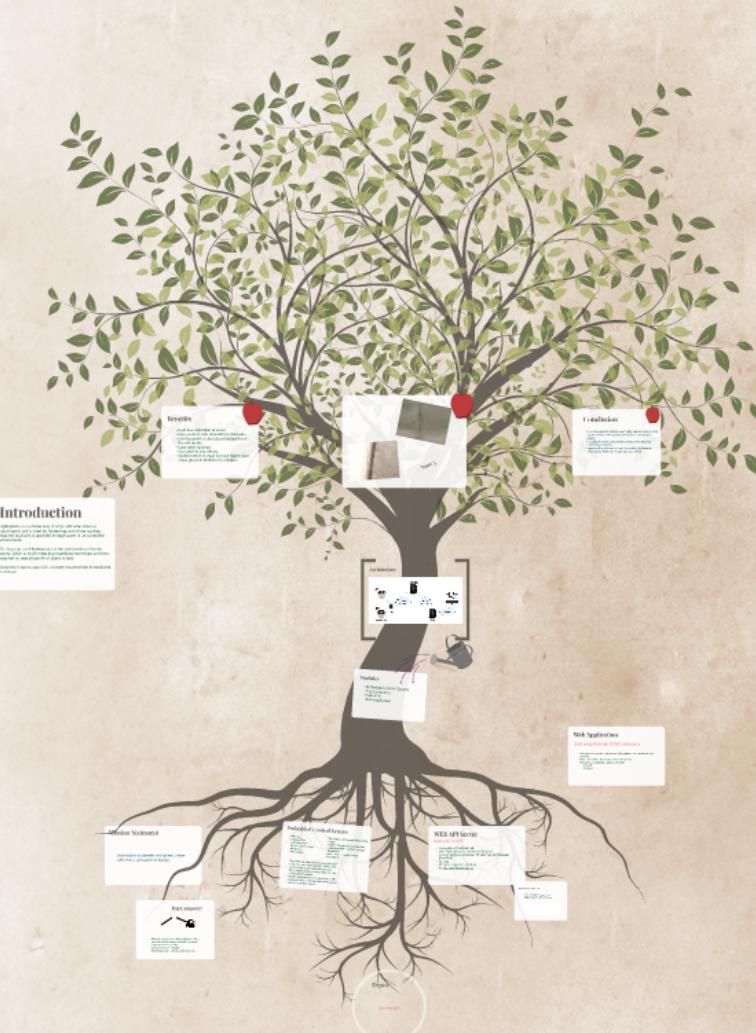
Stay Amazed ...



Team :)

Conclusion

- IoT Hydroponics system eventually automatizes control system required to control external environment for plants.
- It regularly provides control parameters to user for monitoring purpose.
- Lessens the burden on user to monitor hydroponic.
- This can be future for major source of food.



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