

Jaron Wilson

Redhead Farm

Retrofitting Old Machinery With New Tech On A
Budget





**Jaron & Liz, Walter and Peter
Wilson**

Redhead Farm

Paullina - Northwest IA



Certified Organic

107 acres of Corn,
Soybeans, Small Grains
and Cover Crops.



CompTIA A+ Certified

Tech Certification -
Basic troubleshooting
knowledge of hardware
and software.



Self-Taught

The Beauty of the
internet and a desire
to learn

Retrofitting

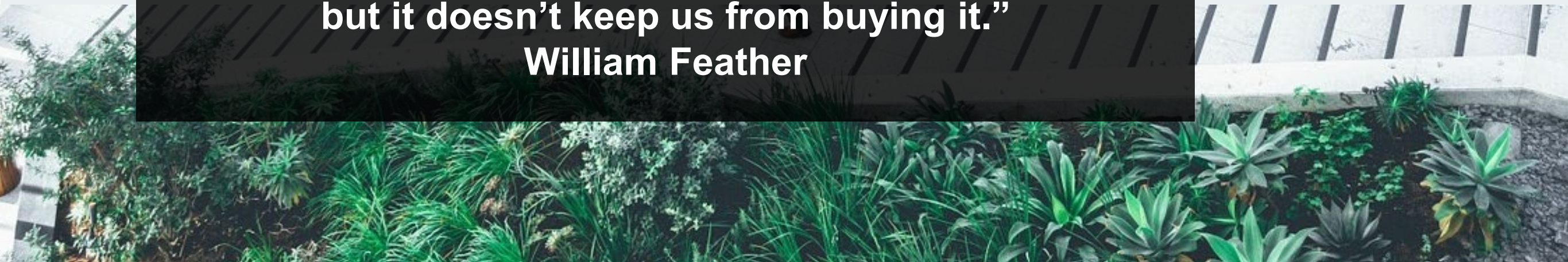
Definition of retrofit:

Add a component or accessory to something that did not have it when manufactured.

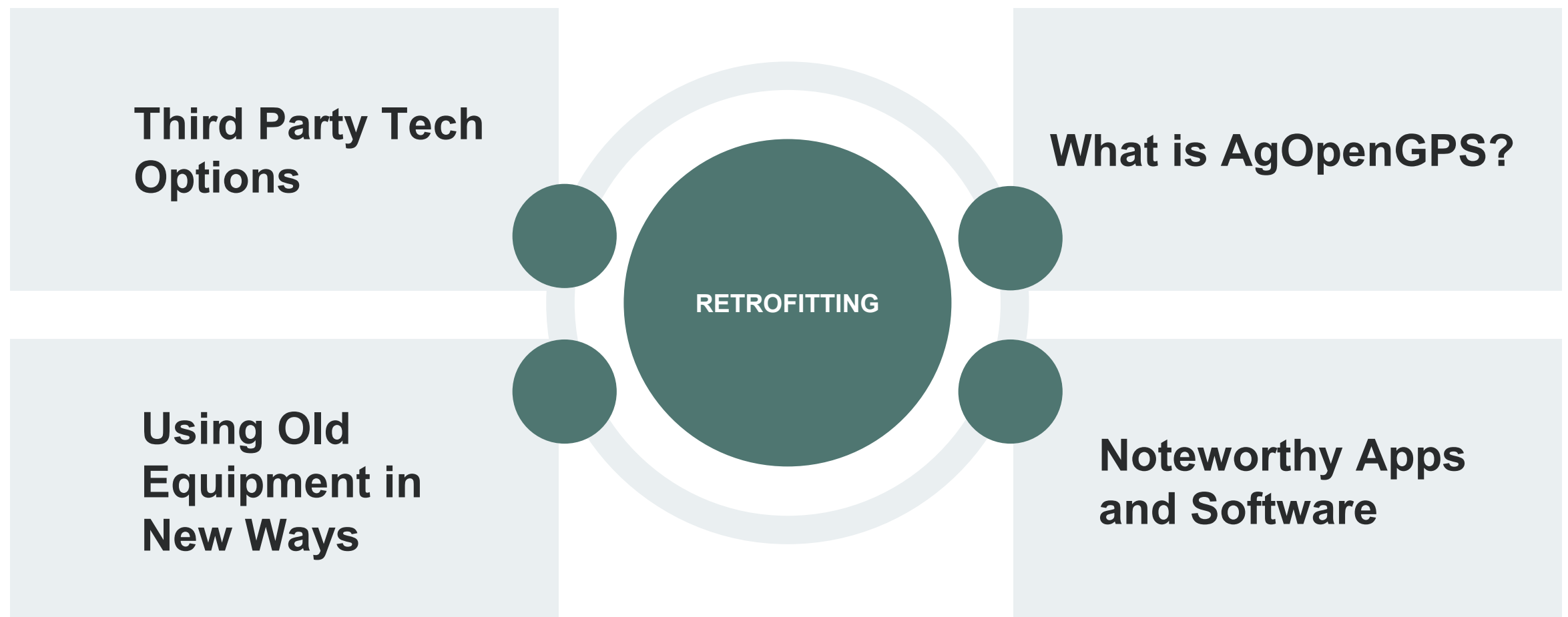
On A Budget...

“A Budget tells us what we can’t afford,
but it doesn’t keep us from buying it.”

William Feather



Direction for Today



How Tech Savvy Are You?

Do you Know what these terms mean or refer to?

1

RTK

2

Arduino

3

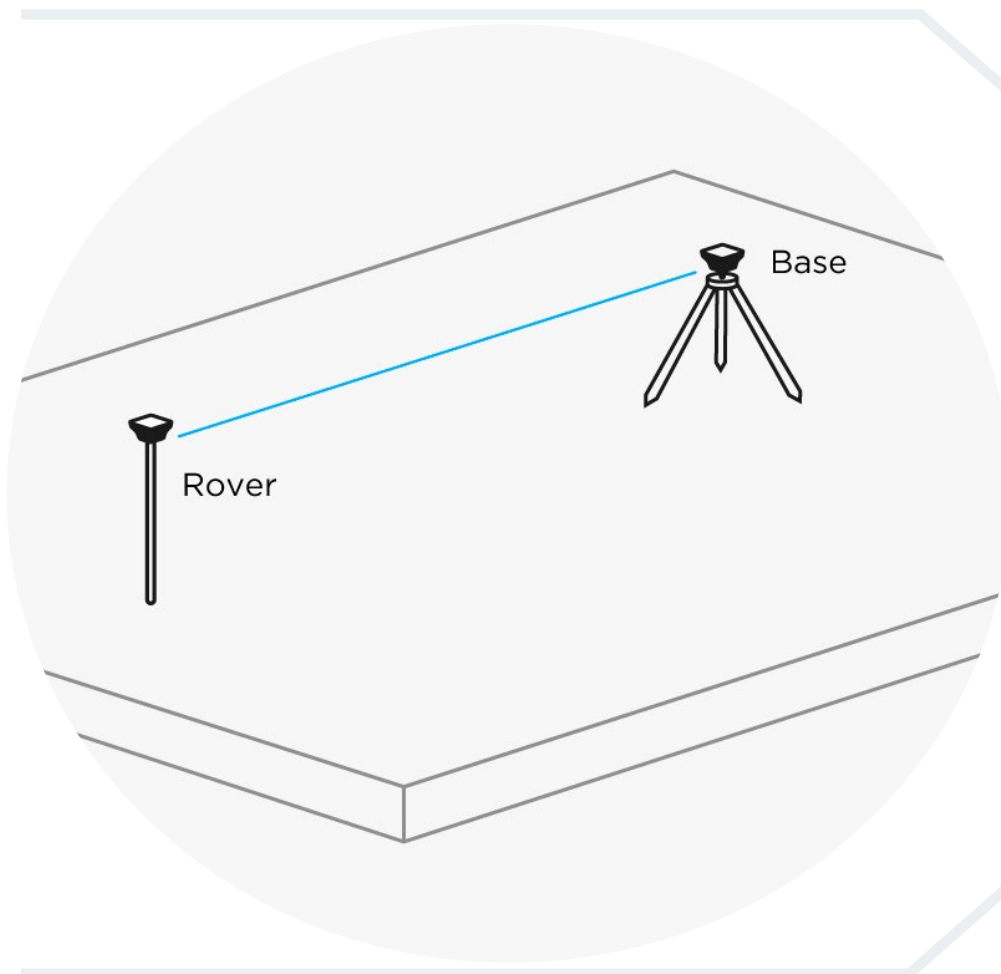
Raspberry Pi

4

Open-Source

1. RTK

Real-Time Kinematic(GPS Corrections)



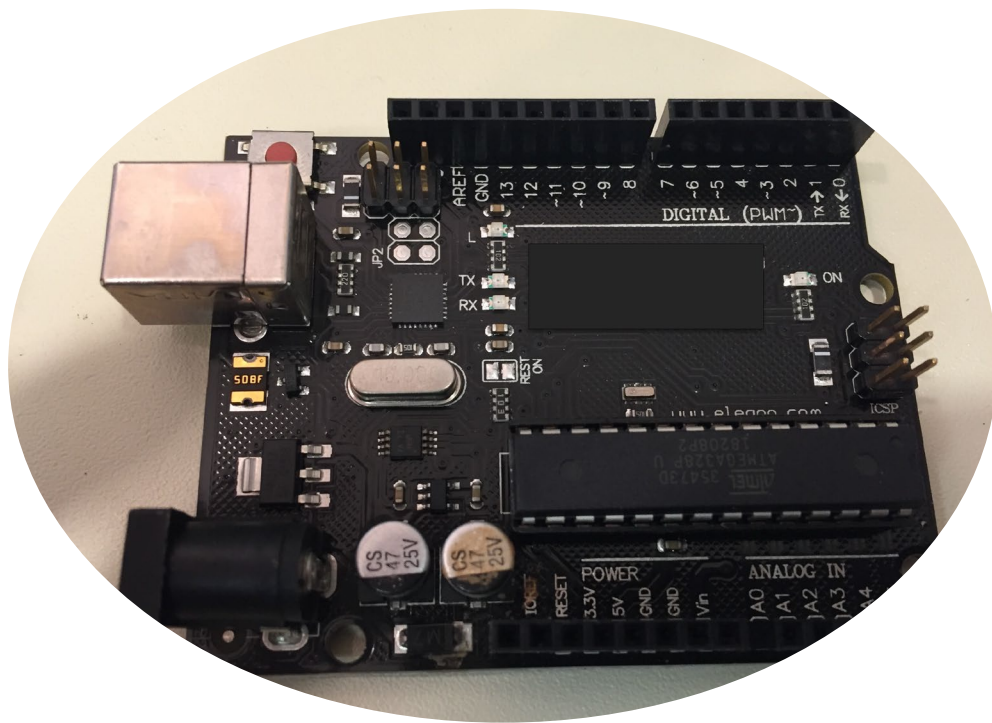
Two receivers are used in RTK. One of them is stationary, another moves freely.

The Base's mission is to stay in one place and send corrections to a moving receiver.

The Rover uses that data to achieve centimeter precise position.

2. Arduino

Low cost Open-source micro-controller boards with numerous uses and capabilities (\$10-90)



Arduino UNO \$11 on amazon

3. Raspberry Pi

Low Cost, Credit-Card sized Fully Functional Computer



- CPU: 4× ARM Cortex-A53, 1.2GHz.
- GPU: Broadcom VideoCore IV.
- RAM: 1GB LPDDR2 (900 MHz)
- Networking: 10/100 Ethernet, 2.4GHz 802.11n wireless.
- Bluetooth: 4.1
- Storage: microSD.
- \$47 on [amazon.com](https://www.amazon.com)

4. Open-Source

A term that is used to describe software is made freely available to study and use.

Making Technology Work for You

Creating the remote controlled seeder gate

Problems:

- How do we mount this seeder up front at low cost.
- Not enough hydraulic outlets

Answers:

- Remote operated Electric linear actuator from eBay (\$35)
- Remote 3 position switch (\$8)





Get Creative...

Recognize anything?

Arduino Uno

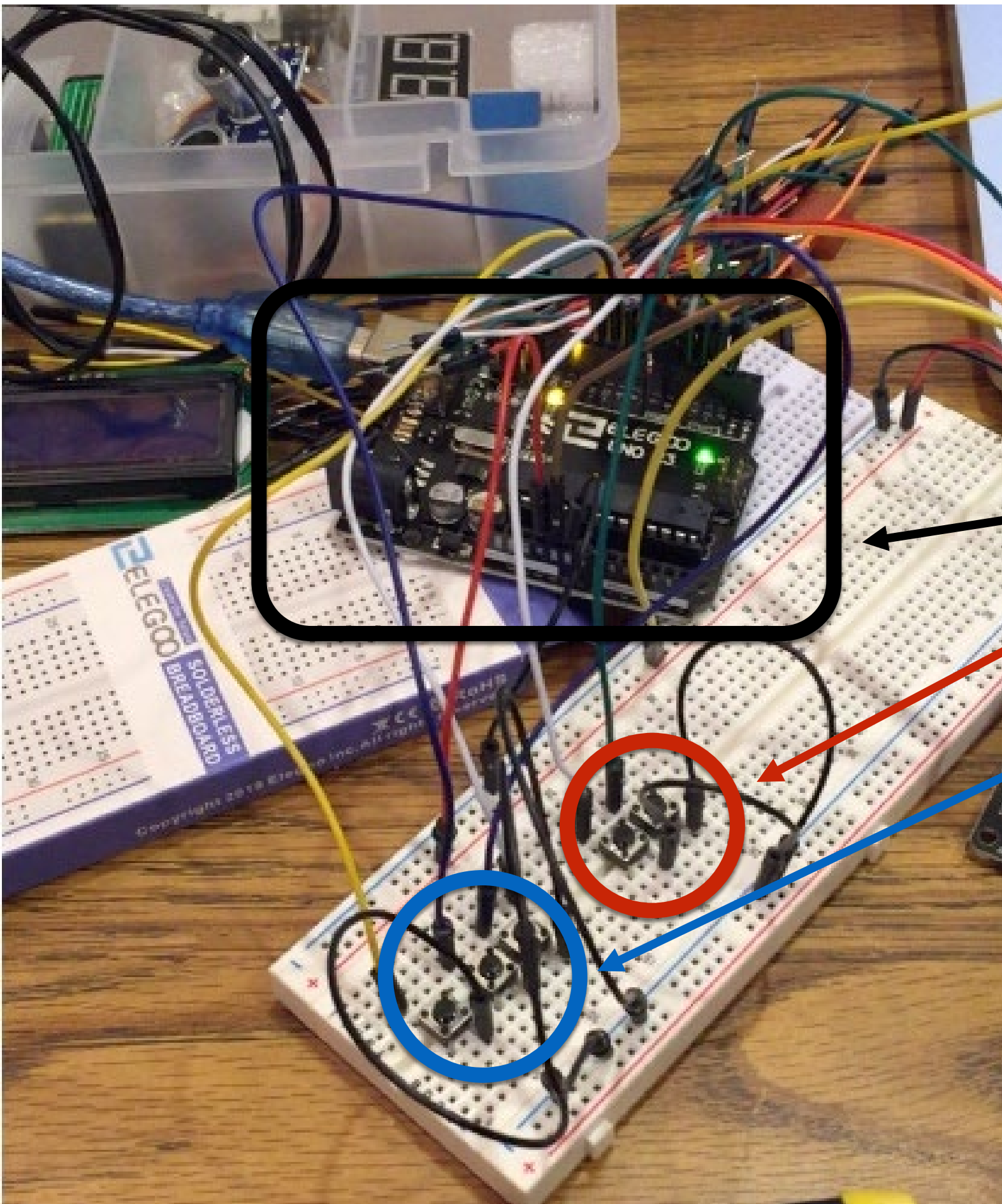
Open/Close Buttons

3 Programmable Presets

Parts list

- Arduino UNO (\$11)
- Momentary buttons, Breadboard, Various cables (\$14)
- Relay Board (\$7)
- Find or write code

Total cost= \$32



The Cultivator Guide Hitch

Comes Standard with Crop Sensing Wands...



Buffalo Scout

\$300-500

Bigiron

Navigator Slide hitch

\$600-1,000

Bigiron



Sunco Acura Trak

\$700-2,500 BigIron

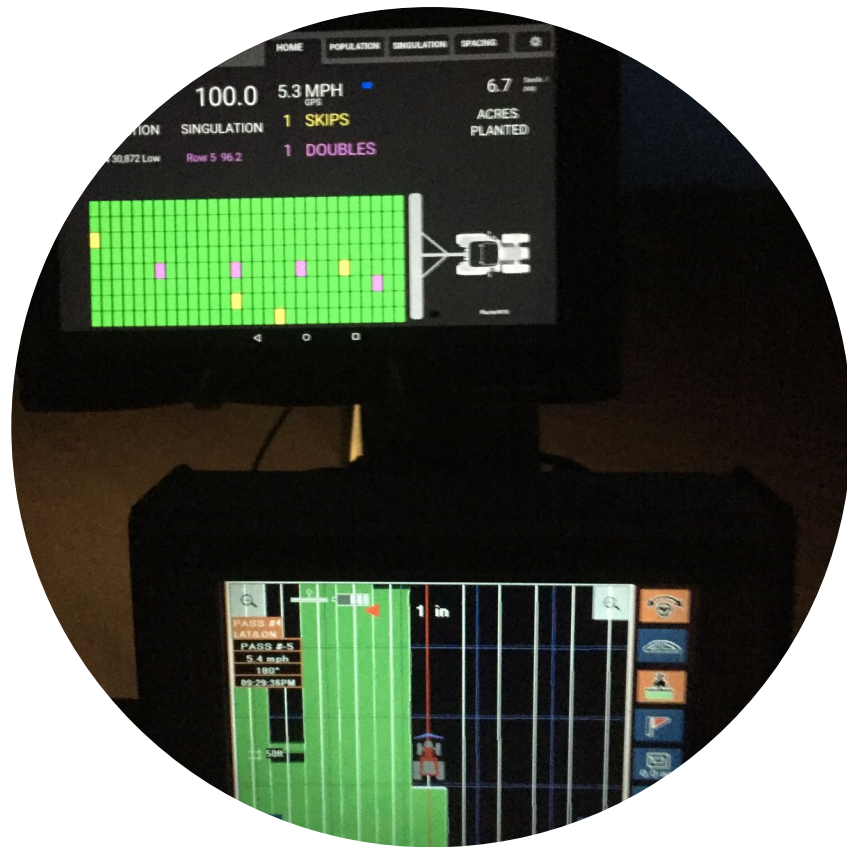


Make Sure Your Controls are Correct



Auto-Steer

Outback S3 eDrive X with Baseline RTK*



Current Setup

- 1-2" accuracy
- \$5-9,000 used
- No longer supported or repairable*
- No subscriptions fees
- Difficult to swap



S3 Monitor



GPS Corrections



Steer motor



eDrive X

Free Android GPS Apps

Light-Bar Options: Not for Accuracy



Agribus-Navi



Farm Sprayer GPS

Both Use Tablet GPS or External USB Receiver



Field Navigator



**GPS Field Area
Measure**

For Measuring an area via GPS

Wheelman Pro

handsfreefarm.com

- WAAS 6-8" accuracy
- Entry level Auto-Steer
- Simple Install
- Works With 700+ makes and models
- Cost: \$3,995



Wheelman Pro Device
with Guidance Dashboard
on Wheel

Whirl Autosteering App



Smart Antenna



Image Sourced from
handsfreefarm.com





Fieldbee/eFarmer

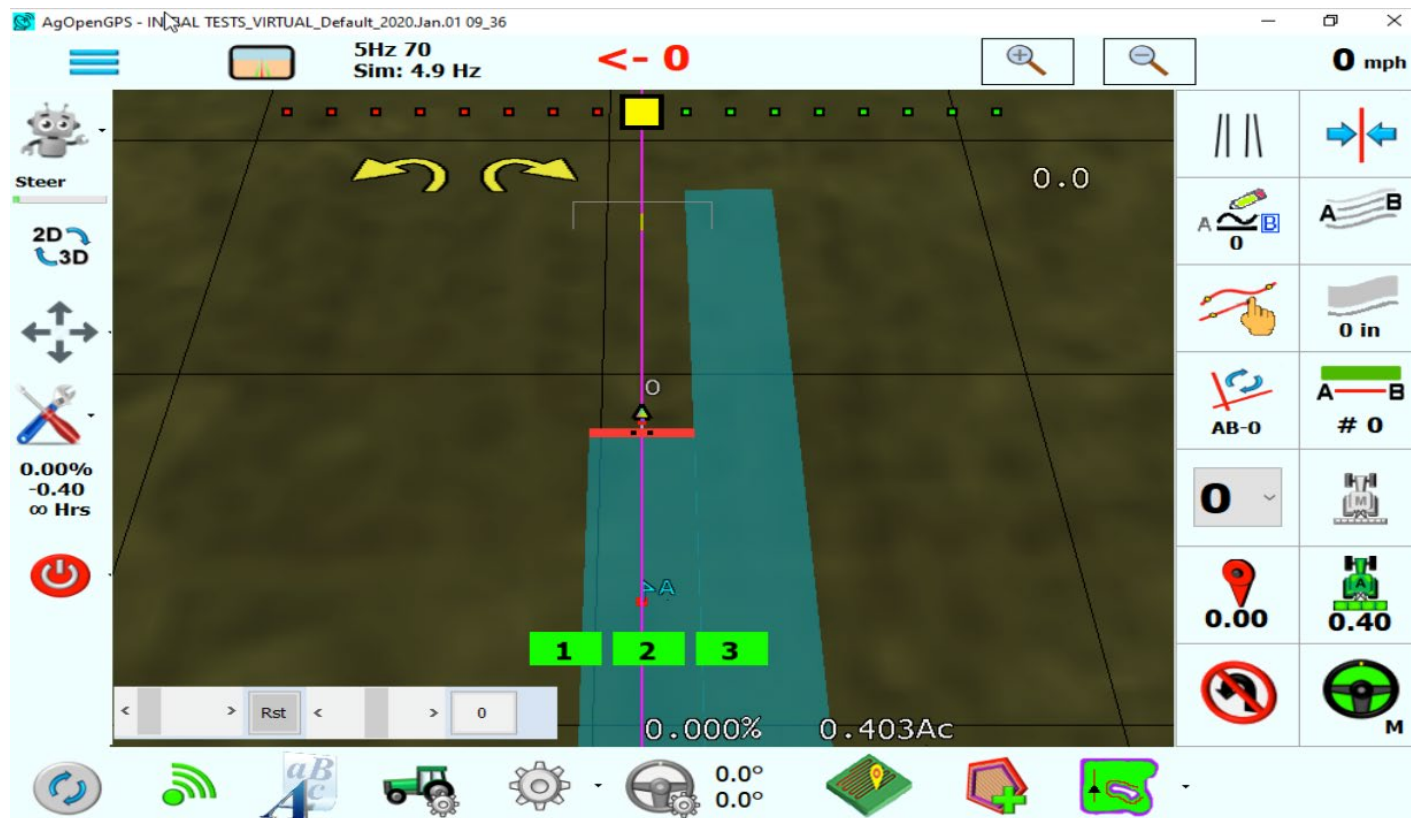
fieldbee.com
efarmer.nl

Europe based Company

- Wide range of supported makes and models
- Multiple price points and accuracy levels
- eFarmer app manages farm data and does Auto-steer guidance
- Base station for subscription-less RTK
- €800-6,518(\$900-7,265)

AgOpenGPS

Ag Precision Mapping and Section Control Software
(Open Source)



AgOpenGPS

- cm accuracy
- Free (Software)
- Being Developed and updated
- Learning Curve
- Ultimate in DIY Auto-Steer
- Feature Packed
- Runs on Windows Tablet or 2 in

Important

This Software is for discussion of Precision Ag Algorithms and techniques. It is not in any way to be used on any physical equipment and is meant for use by a simulator only.

Any use of AgOpenGPS on real physical equipment is not allowed and is not recommended in any way, neither off road or on road.

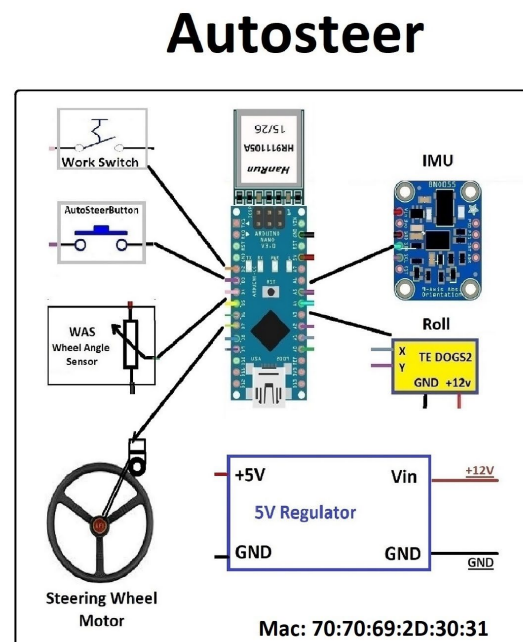
It is completely unsafe and has no safety limits built in or implied.

AgOpenGPS is strictly an example of C# programming for demonstration purposes only and shall not be used for any other purpose.

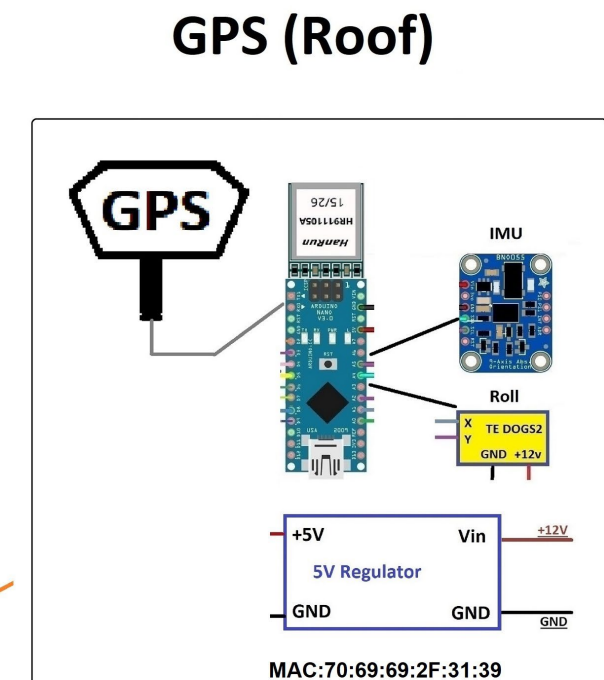
Hardware

1. Basic Auto-Steer 4-6" accuracy \$700
2. High Accuracy 1-2" with RTK Correction \$2300-\$3000

Complete Guides and Parts list: <http://agopengps.gh-ortner.com/>



IP:192.168.1.70 Port: 5577
PGN: Autosteer In 7FFE
PGN: Settings In 7FFC
PGN: Out 7FFD



IP:192.168.1.79
Port: 5544
PGN: Out 7FEE

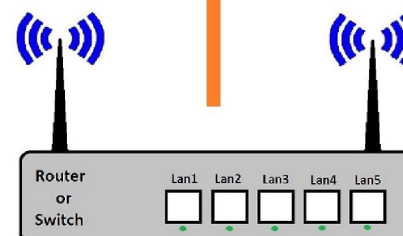


Image Sourced from
agopengps.gh-ortner.com

Yield Monitors

Universal Options For Any Combine

FarmTRX



\$1,849

- Cloud Data Storage
- Mapping
- No Moisture Sensor (coming soon 2020)
- 1st yr subscription free (calculated on acres harvested after that)

Loup ceres 8000i



\$3,200 (Used*)
\$4,175 (New)

- Local Data Storage
- Mapping*
- Moisture Sensor
- Optical Yield Sensor
- Excellent Tech support

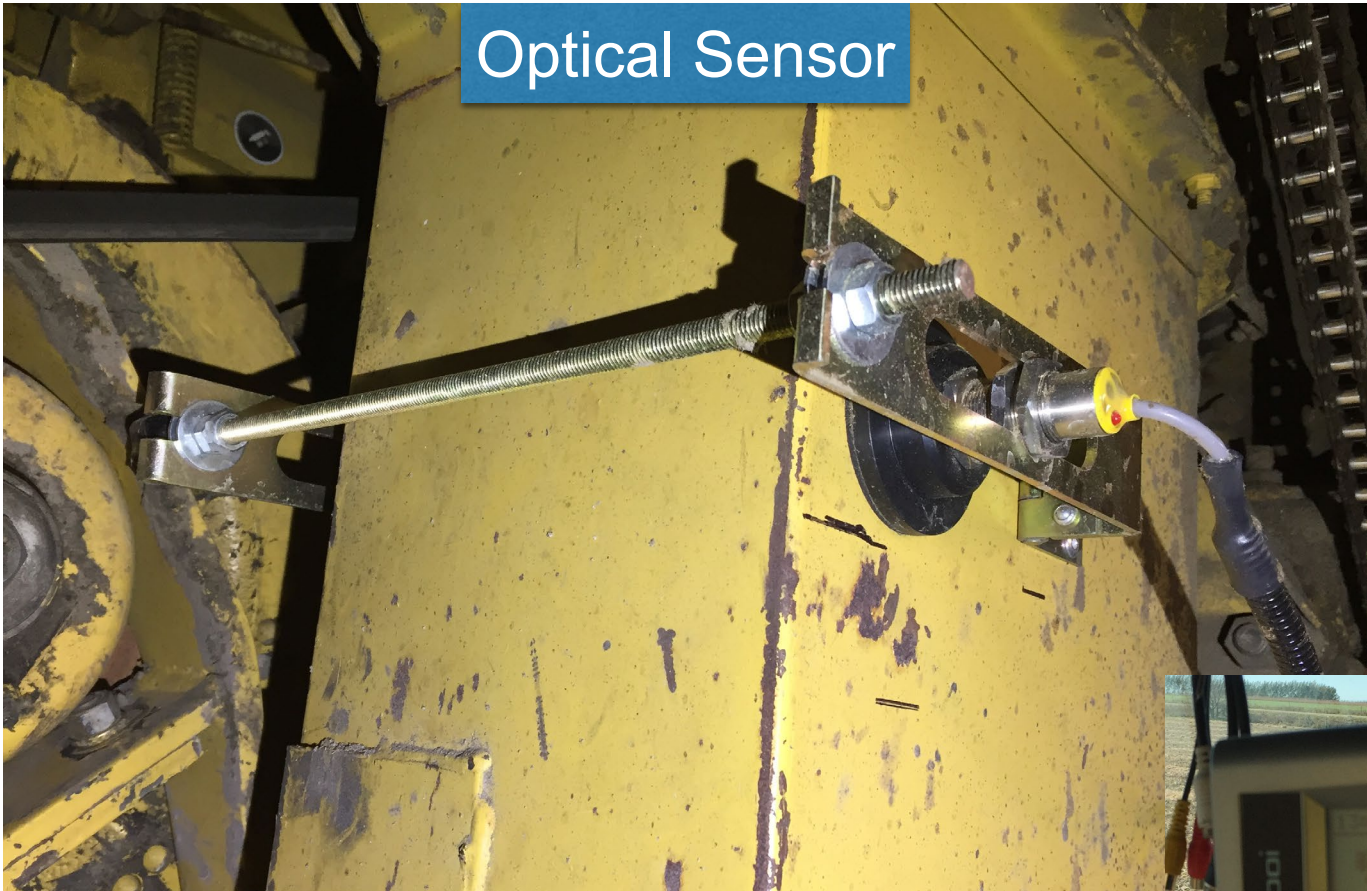
Loup Elite



Request Quote

- Multi Use monitor (Yield and Seeding)
- touchscreen
- Graphical Mapping
- Load Logging
- Plus 8000i features

Optical Sensor



GPS Globe



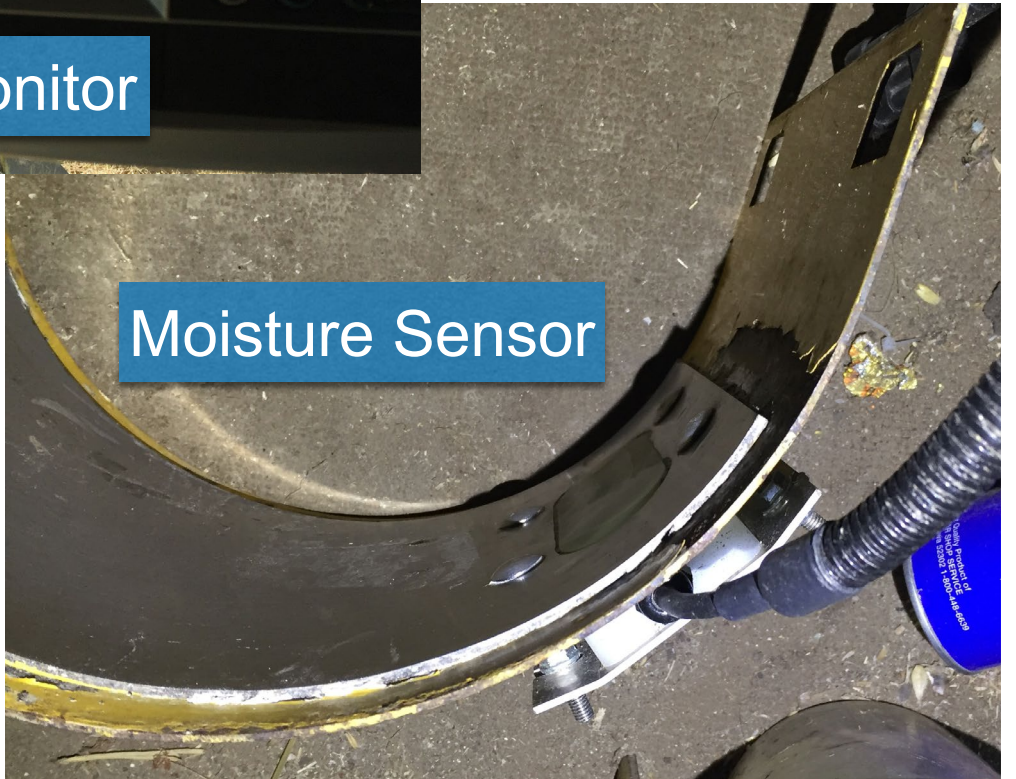
Junction box



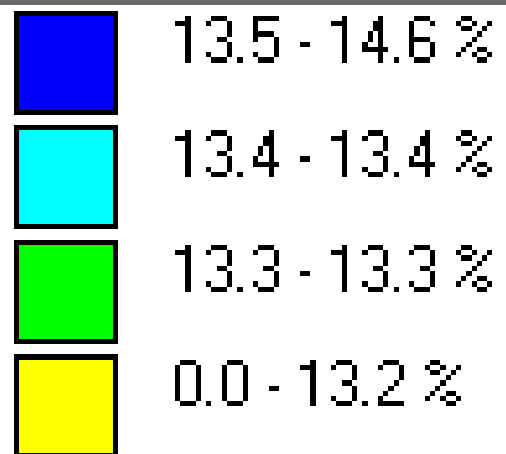
Monitor



Moisture Sensor



Yield Map Moisture %

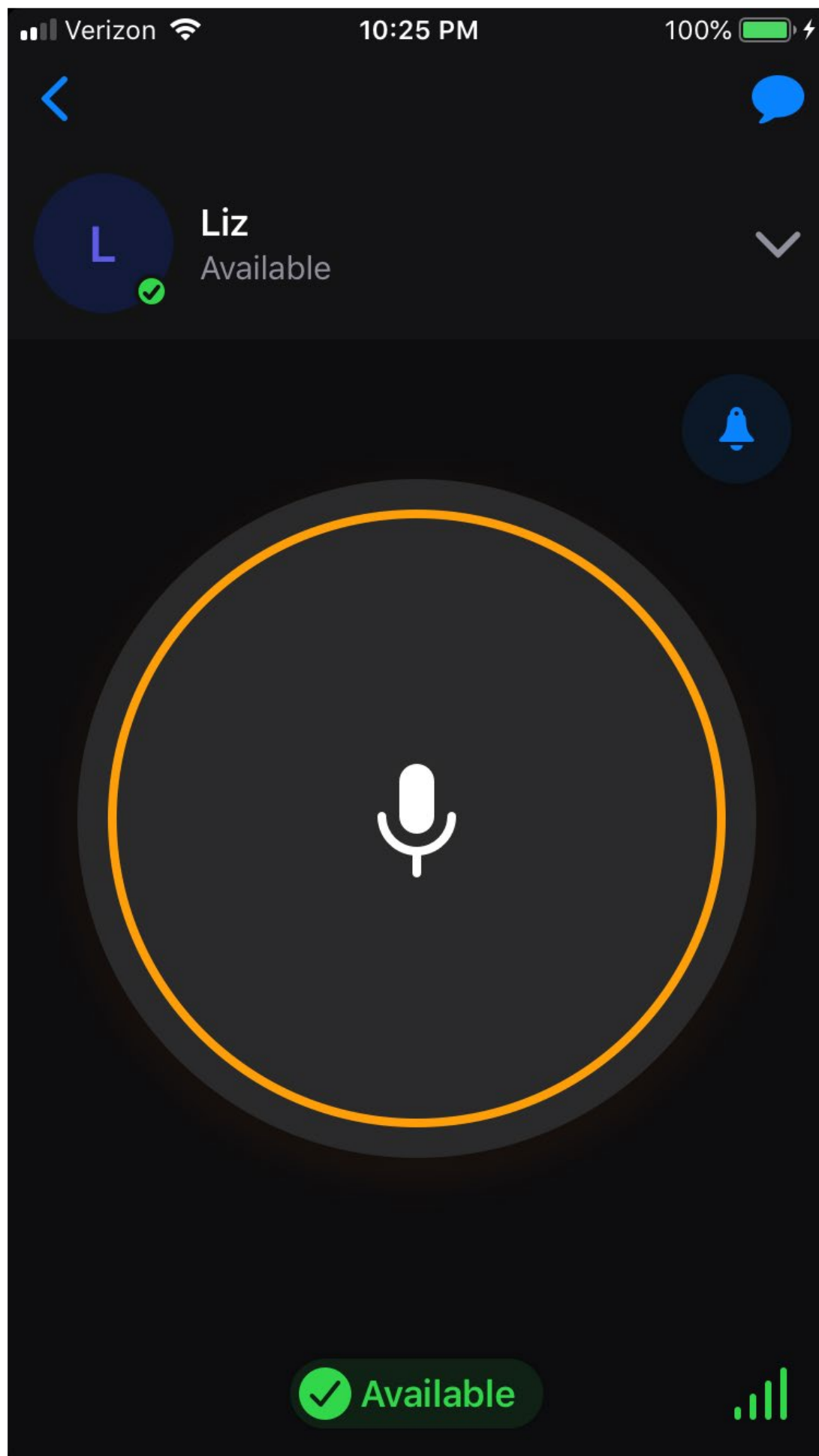




FarmOS + Farmier

Web-based App for Agricultural Management, Planning and Record Keeping

- **Open-Source**
- **Free (\$75/yr to host it thru Farmier server)**
- **Sensor data collection**
- **Web App - Android & iOS apps being developed but not stable yet**
- **Good How-To installation guides**



Zello

Push-To-Talk App

Android & iOS

- private channels up to 6000 users
- works with headsets
- Wifi/LTE Very low data usage
- No Range Limit
- Almost Instant

Links

WHEELMAN (GPS)

handsfreefarm.com

FLIELBEE (GPS)

fieldbee.com

AGOPENGPS

agopengps.jimdosite.com

FARMOS

FarmOS.org

ZELLO PUSH-TO-TALK APP

zello.com

FARMHACK

farmhack.org