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PROBLEM STATEMENT AND SETTING:

Vegetable planting and harvesting activities require a tractor to pull a setter for the plants or a trailer for harvesting. Harvest and planting speeds are slow (1 mph to 4 mph) as much of the labor is done manually. The driver of the tractor moves the tractor as needed to keep pace with the planting or harvesting process. The elimination of the tractor driver would save money in the form of reduced labor expenses and allow the skilled tractor operator to perform other work on the farm instead of just driving the tractor. A worker performing the setting of the plants or grading of the produce would remotely control the operation of the tractor across the field. A worker would turn the tractor on the ends of the field.

MAIN COMPONENTS:

- Receiver box in cab
- Handheld remote control
- Electric actuator for brakes
- Electric actuator for throttle
- Shuttle shift remote operation connector
- GreenStar™ guidance system
- Weatherproof enclosure for 8 relays
- Slope sensor +/- 20
- Manual emergency shutoff

FINAL BUDGET

Materials	Cost
Remote Control and Receiver	\$ 1,715.00
Relay Switches	\$ 188.09
Slope Sensor	\$ 208.00
Wiring Supplies	\$ 557.22
Fabrication Materials	\$ 15.00
Actuators	\$ 277.66
GreenStar™ Supplies	\$ 173.00
Miscellaneous	\$ 179.77
Total	\$ 3,313.74
Under Budget	\$ 836.26



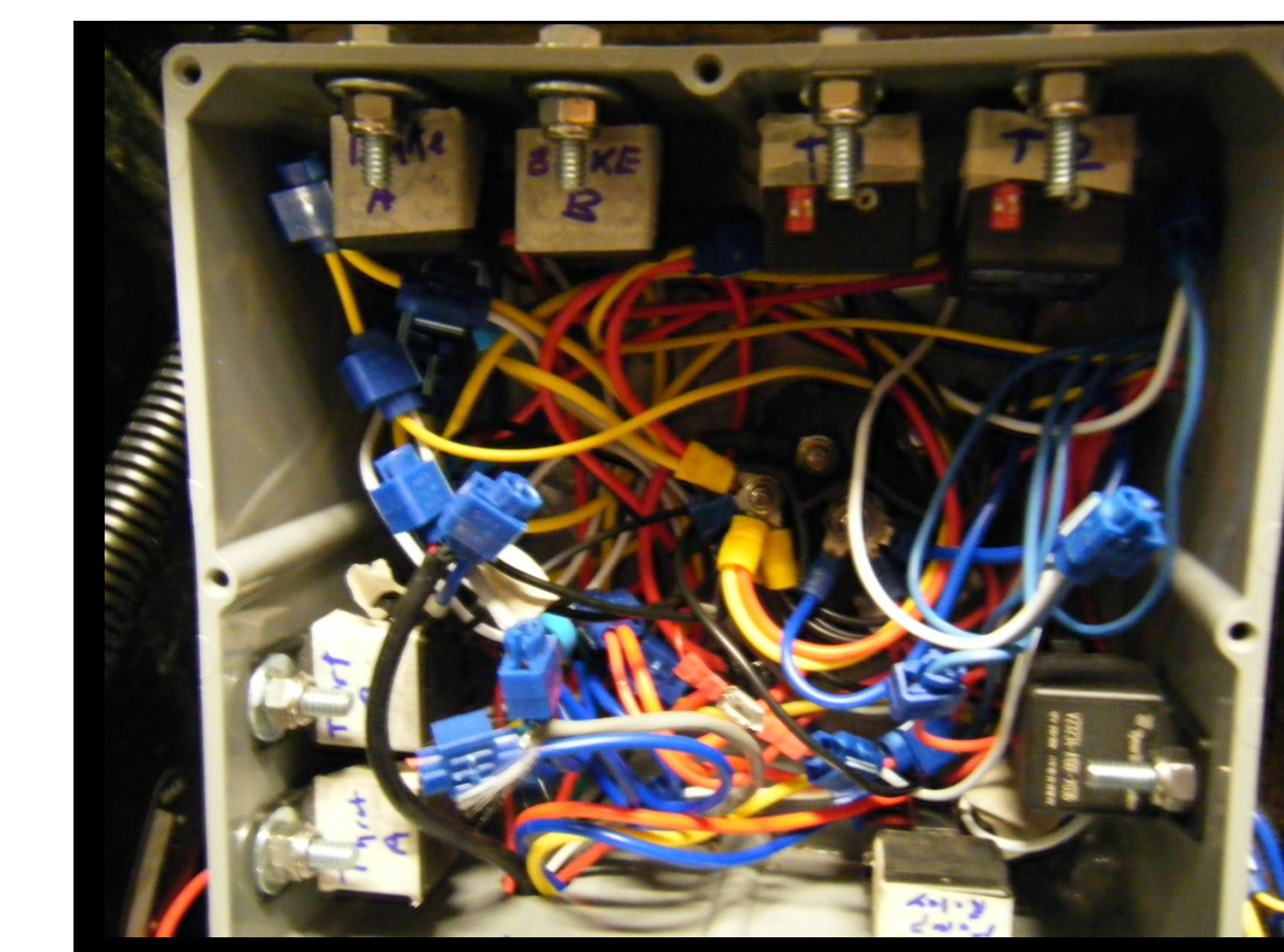
Receiver box and handheld remote control



Electric actuator and U-bracket for brakes



John Deere 5603 tractor used for vegetable crop planting and harvesting on Daily Farms



Weatherproof enclosure for 8 relays



Slope sensor and slope override switch



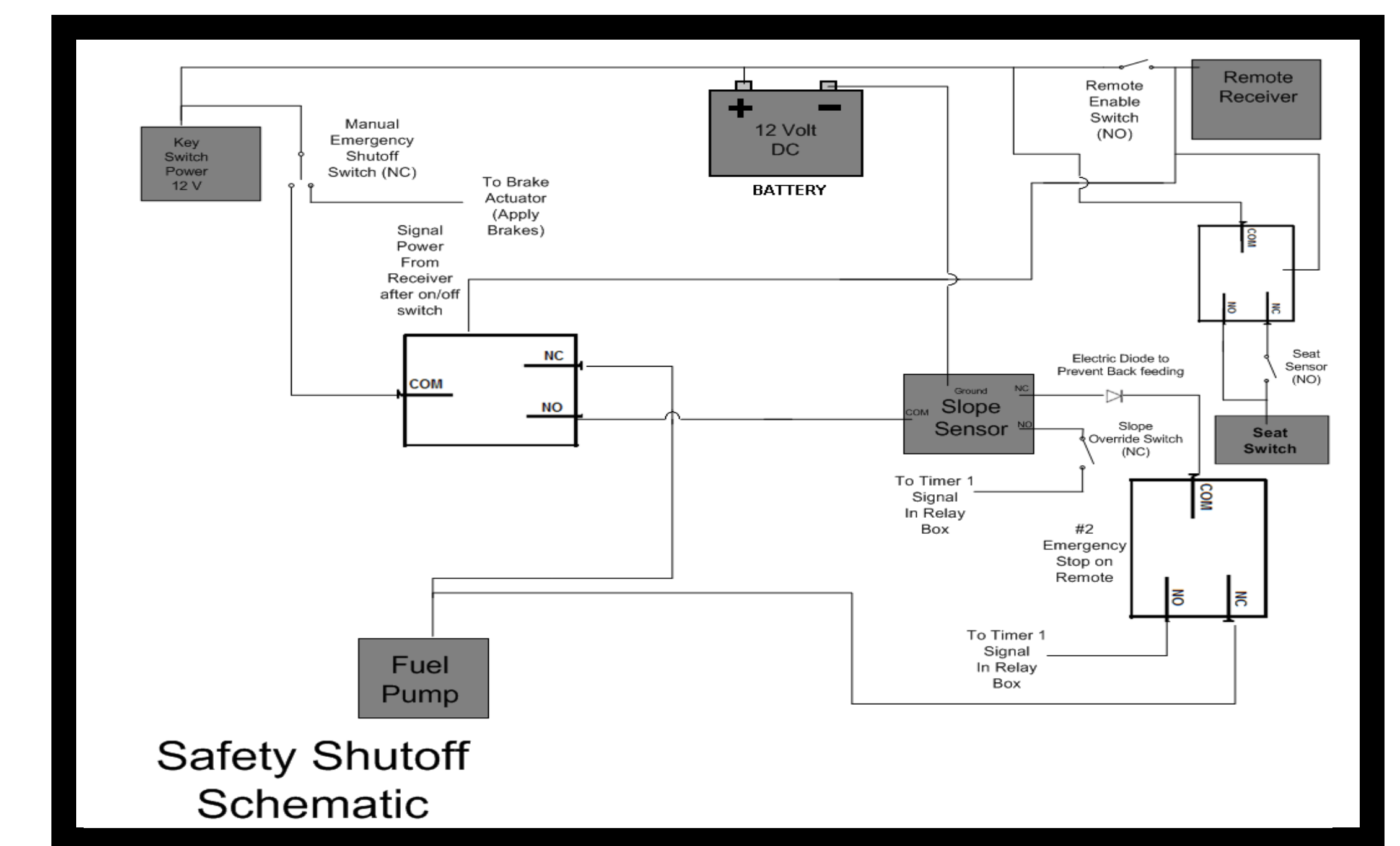
AutoTrac Universal steering wheel for parallel tracking



Electric actuator and mounting bracket for throttle

ALTERNATIVE SOLUTIONS:

- Infrared controller
- Smart phone application
- Worker outfitted with GPS receiver



Safety system wiring schematic

CONSTRAINTS/REQUIREMENTS:

- Safe remote control operation of John Deere 5603 tractor (99 hp)
- Control steering, brakes, throttle, and direction of travel (Neutral and Forward)
- Use John Deere GreenStar™ guidance system for parallel tracking
- Installation of slope sensor and multiple safety shutoffs
- Easy conversion to manual operation
- Budget \$4,150

MODES OF SAFETY:

1. Manual emergency shutoff
2. Emergency shutoff on remote
3. Tractor shuts down when 20 slope limit is reached (front to back and side to side)
4. Manual override of slope sensor required to restart tractor on slopes greater than 20
5. Seat Switch (relay override for remote operation)
6. Brakes apply anytime an emergency shutoff occurs
7. Brakes cannot be released without manual emergency shutoff in the forward position.