Design Requirements:

General:

1. Cost effective

Criteria: Design must fall within the budget provided

Metric: $ spent on parts and stuff

Constraint: Should contact stakeholders to get an exact budget

Criteria: Design must be cheap to maintain after implementation (Design should be cheap to repair)

Metric: Annual expected repair fees. Max replacement cost?

1. Identify which sheep belong to who – functionality (maybe we focus on this one?)

Criteria: Identification must be unique to each sheep

Metric: Must be able to identify each sheep (design has to apply to every single sheep)

Criteria: Must be able to differentiate between different farmers’ sheep

1. Identify when sheep are lost
2. Locate lost sheep

^ These highlighted ones are HARD, maybe we rescope to ignore?? Just my suggestion

* I think we can’t ignore this, this is really the main/only thing the stakeholder is requiring

<https://learn.sparkfun.com/tutorials/displaying-your-coordinates-with-a-gps-module?_ga=2.222258008.1748545720.1643768613-178600164.1643768613> gps modules are like $70

1. Durability

Must survive conditions on the field

No exposed parts since shepherds will be using the product

Drop test, pressure tests etc.

1. Accessibility

Must be implemented in a system that local shepherds with limited access to technology can use

Should be implemented in the local language (Xhosa)

1. Portability

Needs to be easy to move around, farmers gotta find their sheep and scan or something right

1. Safety

No sharp corners, should not shock the user even if it short circuits, too much power supplied

1. Praxis 3 stuff

Should be an electromechanical widget, make use of circuit stuff, microcontrollers and cad

1. Ease of learning (missing)
2. Policy stuff? How to convince people using?

Risk/assumptions:

* If we want to use tracker, how would we balance the cost?
* Based on the salary research, or at least no more expensive than the loss. (research)

Potential solutions:

* GPS
* Drones
* Cameras vs radio waves/Radio transmitter receptor

Non-Functionality Research:

Mthatha:

“Subsistence agriculture and livestock raising are the primary economic activities in the area;” - <https://www.britannica.com/place/Mthatha>

Pop. 140000 – Not the smallest of towns.

Connections to an airport and rail – getting the product to them would be difficult because they are in another country but not impossible cause it can be shipped via air or rail.

Sheep:

Sheep are relatively small and easy to handle, compared with cows, horses, and pigs.

Sheep don't need perfect pastureland; they happily eat brushes, grasses, and weeds that grow in poor soil.2

The best type of fence for sheep is a smooth-wire electric or woven wire non-electric fencing. You use electric net fencing for temporary paddocks. [16] Rotating sheep into different paddocks keeps them on fresh pasture. [17] https://www.treehugger.com/how-to-raise-sheep-3016859

Graphical user interface, text, application

Description automatically generated

Graphical user interface, text, application

Description automatically generated

profit efficiency among smallholder sheep farmers in South Africa:

* The average profitability (profit efficiency) score was estimated at 65.5% meaning that an estimated 34.9% of the profitability is lost due to the combination of technical and allocative efficiencies in production.
* Smallholder livestock production is a major economic occupation and creates employment for approximately 70% of people in rural areas around the world (Poole 2017)

^ <https://www.tandfonline.com/doi/full/10.1080/20421338.2021.1879510?casa_token=SSCu9HK5fpYAAAAA%3AFbjWeE5EVe70_OuQcgL_iR4TL7cvC7aUDx82dMzo6eqSRXTJZvsurbmlvasMTHCH4hUKqMuSYsvwg4E>

Average price for one dorper sheep is like 2000-3000 Ram, which is about 200ish CAD.

<https://www.gumtree.co.za/s-livestock-poultry/dorper+sheep+for+sale/v1c9140q0p1>

Possible revenue per year for 150 sheep is 22500

<https://www.farmanimalreport.com/2021/07/04/14-ways-to-make-money-from-sheep-farming/>