



The Peaceful Farming Brobot

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Prior Work

Main inspiration: *IGN StarCraft II Guide: Terran Tactics* [1]

combination of 2 strategies:

- **The Proxy Bunker**
early game strategy - build a bunker in front of enemy base
- **The Air Armada**
Accumulate army of mostly air units (battle cruisers etc)

[1] [https://www.ign.com/wikis/starcraft-2/Terran Tactics](https://www.ign.com/wikis/starcraft-2/Terran_Tactics)



Motivation: Overview

High Level Strat:

“Quickly expand and create an unstoppable army to overwhelm enemy”

3 steps:

1. **Build Proxy Base**
2. **Farm Resources**
3. **Launch Attack**

Motivation: Proxy Base

1. Build Proxy Base: Create a proxy base in front of the enemy. If necessary scout for the enemy location to determine where to build the proxy base.



Motivation: Farming

2. Farm: Expand and gather resources from mineral patches all over the map (minerals & gas).



SatBase placed at (100.56, 29.50) with 8 mineral patches / 2 geysers
SatBase placed at (53.67, 50.94) with 8 mineral patches / 2 geysers
SatBase placed at (23.78, 66.06) with 8 mineral patches / 2 geysers
SatBase placed at (28.44, 29.94) with 8 mineral patches / 2 geysers
SatBase placed at (162.94, 97.94) with 8 mineral patches / 2 geysers
SatBase placed at (141.06, 54.28) with 8 mineral patches / 2 geysers

Motivation: Attacking

3. Attack: Eliminate the enemy by spamming battlecruisers, patrol the map to find any other enemy bases/buildings.



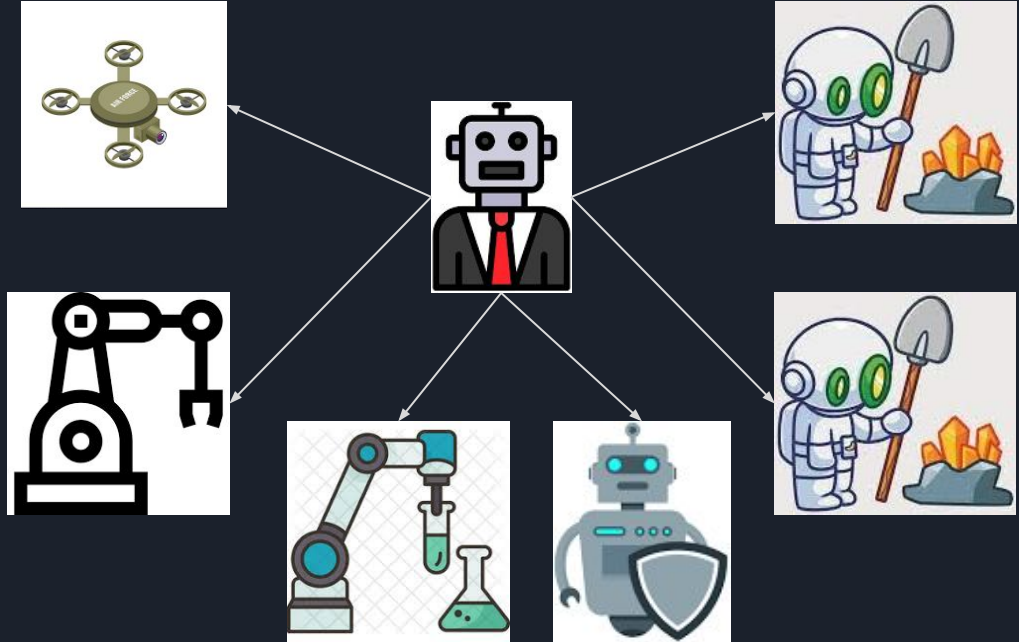
Our Approach: The Manager System

Idea: Create bunch of simpler objects that can manage specific tasks independently

Each manages own group of units

Brobot (CEO) calls act() on:

- Farming manager
- Outpost manager
- Research manager
- Unit production manager
- Attack manager



Our Approach: Scouting

- Cactus Valley: use marines to determine enemy start location
- Other maps: not necessary - only two possible enemy start locations
- Once enemy start location found -> begin building proxy base



Our Approach: Outpost (Proxy Base)

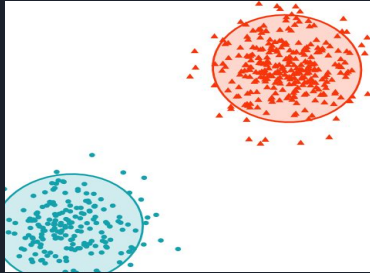
Outpost: a proxy base used to *block in the enemy*.
use all different types of defensive buildings.



Our Approach: Resource Farming

Overview:

1: Cluster Resources



(163.56, 162.28) with 8 mineral patches / 2 geysers
(138.56, 140.94) with 8 mineral patches / 2 geysers
(28.67, 162.28) with 8 mineral patches / 2 geysers
(50.33, 137.72) with 8 mineral patches / 2 geysers
(28.78, 93.50) with 8 mineral patches / 2 geysers
(167.83, 125.17) with 8 mineral patches / 2 geysers
(91.33, 162.39) with 8 mineral patches / 3 geysers
(65.22, 167.61) with 8 mineral patches / 1 geysers
(127.39, 25.06) with 8 mineral patches / 2 geysers

2: Build Satellite Base



3: Harvest Resources

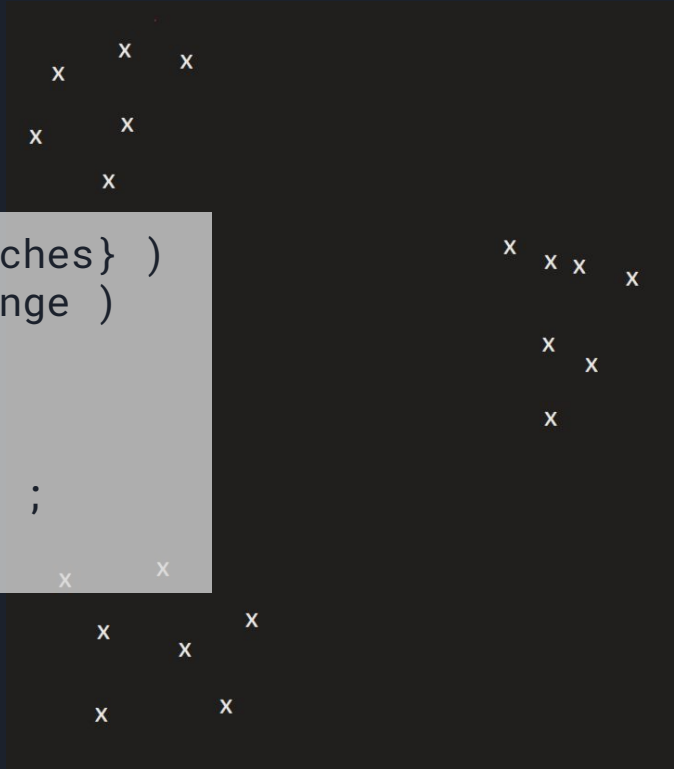


Our Approach: Resource Farming

1: Cluster Resources

Idea: “cluster together if within predef radius = r ”

```
for( resource : {geysers + mineral patches} )  
  if( clusters has a cluster within range )  
    add resource to cluster ;  
    recalculate cluster center ;  
  else  
    create new cluster with resource ;  
    add cluster to clusters ;
```



Our Approach: Resource Farming

1: Cluster Resources

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Our Approach: Resource Farming

2: Build Satellite Base

Idea: “within bounding box, find location that minimizes distance to resources”

```
minps := all mineral patches;  
float sum_dist(Point2D p)  
    := sum(Distance2(p,m) for m : minps)  
grid := all points in square grid;  
  
find placeable p in grid  
    with minimum sum_dist(p);
```



Our Approach: Resource Farming

3: Harvest Resource



- Train SCVs
 - IF: total worker count < 80
 - IF: current workers < ideal harvesters + 2
- Build Refineries
- Order SCVs to Harvest

Our Approach: Unit Producer

Unit Producer:

- manage construction of military units
- researches the techlab upgrades

Constructs buildings in phases:

start with a few Barracks only -> 1 of each -> More Starports



Our Approach: Research Upgrades

Phase 1

Engineering Bay

Fusion Reactor



Phase 2 Armory

Phase 3

Max. Out. Everything.



Our Approach: Attack

- MilitaryProducer: build army comprised mostly of battlecruisers
- once troop capacity is nearly reached -> send in attack
- continuously send in newly made troops until enemy main base is destroyed.



Our Approach: Patrols

- use Hellions to patrol around map
- search points of interest (POI): any secondary bases built by enemy, etc
- send troops to POI after enemy main base has been destroyed



Evidence of Achievement

We construct an outpost fortification at every choke point on every map.



Satellite bases are constructed at the correct positions and harvest resources.

Units are produced, they rally at a point, then they attack the enemy.





Pros & Cons

Advantages:

- Quick movement towards the enemy trapping them with the outpost preventing the enemy from advancing
- Resource “monopoly” starving enemy from development
- Attack is difficult to counter



Pros & Cons

Disadvantages:

- Optimistic assumptions about early game, prone to countering
- **Lacking Defense:**
Minimal defenses exist behind the outpost, if outpost goes down it is a big potentially game losing setback
- **All or Nothing:**
If initial attack fails to wipe out enemy, outpost is lacking support troops for defence



Future Work: Other Strats

from IGN guide[1]:

- **Reaper Harassment**
 - Use Reapers in the early game to damage the enemies economy early on
- **Drop Play**
 - Load units into medivacs and drop them directly on top of enemy base
- **Nuclear Launch Detected**
 - Use Ghosts and ghost academy to drop nukes on enemy



Future Work: Resource Harvesting

Smarter & Fancier

- **Depleted Bases & Moving Command Centers**
 - dealing with depleted bases: release all workers?
 - determine whether to build brand new base, or move idle one from nearby
- **Upgrading to Orbital Command:** MULEs / Scanner Sweep
 - MULEs: harvest faster & no supply cost
 - Scanner Sweep: easy peasy patrolling
- **Stronger Defense**
 - Tanks? Widow Mines?
 - Repair?



Future Work: Other Improvements

- **Adaptable choke point calculations**
 - Finding choke points for forward base regardless of map.
 - Find choke points accounting for enemy development
- **Better Scouting**
 - Modify scouting to include battlecruisers in late-game
 - Use Scanner Sweep ability from orbital command centers



Questions?