Snow Leopard Design Document

(based on Nisarg's ideas with concepts borrowed from David's and Chun's)

Controls (default):

A and S - rotation

W and D - forward and rear thrust

Q and E - strafe

Any keys can be bound to activate any weapon/device, switch any mode, or switch and activate. This also applies to weapon groups.

Mouse:

By default mouse scroll goes through weapons/devices, and shift scroll goes through modes of the current device. Mouse1 fires the current weapon, and the other buttons are free to be bound. You can click on a part of the onscreen representation of the ship to switch to that.

The pointer position indicates direction for turreted weapons to point. Fixed weapons are not affected by the pointer position. Hovering over a ship or hotspot of a ship causes homing items to target that.

Weapons:

Either Switched with the number buttons and fired with space or (for more advanced players) fired with buttons on the right side of the keyboard. Player can assign weapon groups etc. a-la mechwarrior. They can also select between different modes, which may be on/off, different variations of projectiles, different tradeoffs between laser beam power usage and recharge time, etc.

Customization:

Config of ship is a tradeoff between mass, thrust, weaponry, etc. Light, manueverable ships, slow, heavily armored ships, etc. should all be viable. Both small and large sizes should be viable. The small sizes can spend more money on engines, shields, weapons etc. since they didn't spend so much on the hull.

Customization is done before each mission, but for some missions or strings of missions only a certain amount of changes can be made, to simulate time pressure. However, before some missions there are an unlimited number of changes allowed, so players can make drastic changes, buy new hulls, etc.

Weapons:

There are a number of weapon archetypes, each with a number of parameters like reliability, spread, density. Recharge time, etc. Each archetype has some different parameters depending on the nature of the weapon.

There are also a number of different projectiles, with different sizes and properties. There should be three or four calibers, plus a few special projectiles (like micro-black holes) that are generated or fired from only certain weapons. Weapons of a same caliber should be interchangeable, although properties like priming time, muzzle velocity, etc. may change.

Sockets:

Heavily borrowed from mechwarrior. Don't think it should be split into beam, missile, and gun weapons like mechwarrior, but each slot should effect properties like recycle time and should be rated for only a certain mass and energy drain. So at the beginning possibly only beam weapons can fit into a certain slot because only they are light enough, but later more miniturized weapons are available (or affordable) and more things can be put in.

Companies:

Each item has a company associated with it. Each company has different specialties that modify the stats. There should be 4-6 companies, and players should be able to get familiar with their properties reasonably quickly.

Beam weapons: high energy usage, low mass

(instead of ammo, they have capacitor banks. The cap. Banks act as a buffer that slowly recharges. It allows the player to fire a bunch of times in a row with low recharge times, but then they need to wait for a while for more charge to build up. Acts like heat in mechwarrior, but only for beam weapons.)

Missile weapons: low energy usage, high mass

Field weapons/devices : (repel enemies, freeze them, implode them, mess with their control, etc.)

Varying mass and energy usage. This is where ECM,ECCM, thrust boosters, shields, etc. fall. There's no fundamental distinction between weapons and other devices. For example, a star wars interdictor ship would have a large hull and a bunch of field devices in this model. It would not need to be 'special'.

Gun weapons: high energy, high mass.

The amount of projectiles loaded is chosen at outfitting time and directly affects the mass of the ship. You can only have as many projectiles as the mass rating of the socket. Each projectile is treated as a 'mode'. Modes are associated with weapons and can be loaded and reordered at outfitting time. You can have multiple variations of the same caliber projectile, but each additional number imposes a one-time mass penalty (ex. Having only basic or only incendiary has no penalty. Having both loaded so you can switch between them during the mission imposes an additional 5 tons on that socket, plus the masses of all the projectiles and the weapon)

Socket types:

All sockets have a mass rating, energy rating, and shape. Shape is an abstraction for compatibility between weapons and sockets. Normal weapons at the beginning of the game are triangles and squares. As time goes by, pentagons and hexagons become available. Special weapons are octagons, which are available only in a select number of hulls. "shape adapters" are relatively inexpensive and can be purchased. They allow a player to use triangle weapons in squares, squares in pentagons, etc. This allows a player to buy a new hull but still use their old weapons for a while (smooths upgrade path). However, there are no adapters to put stuff in octagons.

Gun and missile types: (parameters - recycle time,health, caliber of projectile, reliability (chance of failure), socket, mass, energy drain)

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Single shot: basic, straightforward weapon

Grouped shot: fires multiple projectiles at once in a formation that stays together

Parameters - shape of the projectile group, number of projectiles in the group

Spread shot:shotgun type shot

Parameters - degree of the shot, angle between each projectile, number of projectiles

Straight missile: ejected, waits a second, and then accelerates straight

Homing missile: ejected, waits a second, and then seeks enemy ships (parameters - range)

Delayed homing missile: basically mines

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Beam types (parameters - recharge time,reliability,health, properties of beam (implemented as a projectile. Different beams can still be 'loaded' in the same style as gun projectiles, but they're interpreted as different ways of tuning the beam) , socket, mass, energy drain):

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Focused beam: traditional straight line of fire

Diffuse beam: (parameters - angle of beam)

Autofiring beam: shoots at passing enemy ships without intervention of player.

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Field weapons and devices (parameters - energy usage, mass, socket)

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ECM: disrupts locks of enemy missiles (parameters - strength)

ECCM: disrupts disruption of missile locks

(parameters - strength)

The success of the missile lock is a 'fight' between the ECM strength and ECCM strength. Success is a percentage, not binary. Based on a gaussian distribution modified by each strength.

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Gravity manipulator: has a number of different modes

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Attract:pulls ships towards the eqipped ship and damages them (can be used to pull them into a mine field, black hole, turret firing range, etc.)

Repel: pushes ships away from the equipped ship and damages them.

Entrap: surrounds each individual ship in a deep field. Hampers their movement.

Collide: bends space to make groups of enemy ships crash in to each other.

Initially only the first mode is available. With more time and money, higher strengths and extra modes become available.

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Projectiles and armor:

Projectiles refer to anything fired out of the weapon, whether it is a missile, beam, etc.

Projectiles have the following properties:

Shield evasion

Armor penetration

Power

Projectiles can also have special additional properties like helping homing missiles, interfering with enemy shields, etc.

Defense is composed of shields, armor, and autofiring weapons. Armor is a special shape (empty circle) and can be associated with the whole ship (for small ships) or only a region of the ship. Armor has the parameters of mass, energy usage, and power. Normal armor doesn't use energy, but special armors that are self-healing, adaptable, etc. may.

Shields are just field devices and have all their properties, plus power.

Power and health are separate. Power acts like damage reduction, using the standard formula.

Autofiring weapons have already been covered. They are particlarly effective against mines and missiles.

Everything, including weapons, armor, shields, field devices... can take damage, and this has a corresponding effect on the efficacy, reliability, strength ... of the weapon/device. This damage has to be repaired between missions, and this takes 'time'

Ship Implementation:

Need to create a "multisprite" class, which manages groups of sprites. Subclass sprite to implement hulls and weapons. A ship will be a collection of fields like name, id, etc. and a multisprite containing all the visible parts of the ship (hull, devices, weapons). Each sprite in a multisprite will have the same center of rotation (the center of the ship and also the center of the hull). This should allow them to stay together correctly.

Long thin rectangle sockets for shields and armor