# Flock Initialization:

- 49 bird phrases, 3 to 8 notes long-- digital genome
- Song is 50%- 80% silence
- Current song is 8 phrases from group of 49 (global parameter)
- At start, pick your current song of 8 phrases. Some may be repeats of same phrase
- Volume, Timbre, and Tempo are part of genome
- Also subject to global initialization

Flock Main Processes:

- Sing process:
  - bird sings in order of current song list, with silence in between. This goes on continuously. 50%- 80% silence
- Broadcast Process:
  - broadcasts a packet every n phrases sung with contents of current song list-- string of numbers
- Listen Process:
  - bird listens at all times, collects song packets, signal strength, time-stamps packets
- Breeding Cycle:
  - runs Breeding Cycle every m phrases (or m packets received or m seconds). This changes the song list
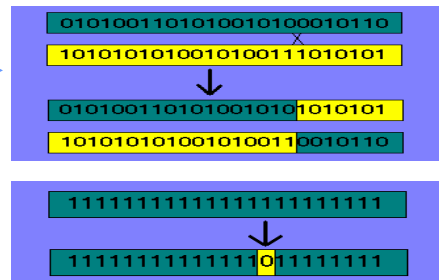
Flock Details: Listen

- Arriving packets need to be time-stamped
- Packets from Node 0 must be specially treated – they may contain global parameters
- Arriving packets must be strength-stamped for RSSI value – special radio stack required
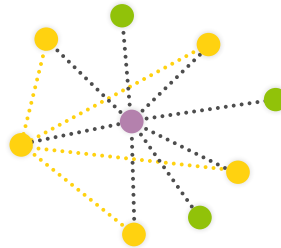
Flock Details: Breeding Cycle

- Compute linear distance between my birdsong and heard songs:
- sum of(difference[0:n-1] * Number of different phrases) (incorporate RSSI) (may do autocorrelation instead)
- Lowest number wins
- Modify genes:
  - Compute Crossover:
    - 1. starting position,
    - 2. Number to copy
  - Compute Mutation
    - 1. Probability of mutation
    - 2. gene to change
    - 3. Compute new value

```
010100110101001010001011 0
101010101001010011101010 1
          ↓
010100110101001010 1010101
101010101001010011 0010110
```

```
111111111111111111111111
          ↓
1111111111111 0 11111111
```

Flock Details: Calculation

- Use linear difference between songs
- …with scalars that track how many phrases differ
- do this 9 times--line up, shift +/- 1, 2, 3, 4...(multiplying the score by a penalty of how many shifts were necessary for the score)
- …on an array of size n that is zero based and goes until n-1
- indices (i,j) then the distance is:

min {|i-j|, [(closest end to i) + (closest end to j)]}

Flock Details: Decide

- Common rules for breeding-- changing our song
- Similar to Cellular Automata, like Conway's Game of Life

- Goals:
  - Will songs develop similarities over time?
  - Can EC techniques create a dynamic soundscape?
  - Can the listener discern emergent behavior?

For Friday

- Make three suggestions for improvement to any aspect of the flow or decision algorithm to improve chances of accomplishing this
- Do not consider trivial algorithms
- No Central Control!
- Turn in one page-- computer produced, not handwritten.

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