CLAIMS

We claim:

1. A system comprising:

an output of an electrical signal ~~wherein the electrical signal is driven~~ that is controlled by an interpolation of a ~~real-time progressive~~ polynomial spline ~~evaluation that achieves an up-sampling by a power-of-two factor using a linear combination of counters.~~ evaluated over uniformly spaced samples in real-time;

wherein, within the interpolation, a term of an nth power of an independent variable at an mth timestep within an interval is inferred using identities for an mth n-dimensional triangular number and all mth triangular numbers in lower numbers of dimensions whose values correspond to those producible using recursively defined counters;

wherein a rearrangement rearranges identities into a polynomial that is progressively evaluated using an integer combinations of recursive counters given by the rearrangement;

wherein at least one of the recursive counters is incremented on each timestep by a sample value that is to be interpolated;

wherein the interpolation results in an up-sampling of a function described by values of the uniformly-spaced samples, and increasing a number of the uniformly spaced samples of the function by a power-of-two.

2. The system of claim 1, wherein the polynomial spline has a plurality of intervals, and wherein at least one of the plurality of intervals is a base frequency period.

3. The system of claim 1, wherein the polynomial spline has a plurality of intervals, and wherein at least one of the plurality of intervals is a power-of-two count of base frequency periods.

4. The system of claim 1, wherein the polynomial spline has a plurality of intervals, and wherein at least one of the plurality of intervals is a power-of-two fraction of a base frequency period.

5. The system of claim 1, wherein the electrical signal has a phase angle, and wherein the phase angle is modified by a rolling counter incremented by a value driven by an external environmental monitoring sensor.

6. The system of claim 1, wherein the electrical signal has a phase angle, and wherein the phase angle is modified by a rolling counter decremented by a value driven by an external environmental monitoring sensor.

7. A system comprising:

an electrical signal wherein an instantaneous phase angle of the electrical signal is substantially calculated by a real-time progressive polynomial spline;

~~evaluation that achieves an up-sampling by a power-of-two factor using a linear combination of counters.~~

wherein, within the evaluation, a term of an nth power of an independent variable at an mth timestep within an interval is inferred using identities for an mth n-dimensional triangular number and all mth triangular numbers in lower numbers of dimensions whose values correspond to those producible using recursively defined counters;

wherein a rearrangement rearranges identities into a polynomial that is progressively evaluated using an integer combinations of recursive counters given by the rearrangement;

wherein at least one of the recursive counters is incremented on each timestep by a sample value that is to be interpolated;

wherein the evaluation results in an up-sampling of a function described by values of uniformly-spaced samples, and increasing a number of the uniformly spaced samples of the function by a power-of-two.

8. The system of claim 7, wherein the polynomial spline has a plurality of intervals, and wherein at least one of the plurality of intervals is a base frequency period.

9. The system of claim 7, wherein the polynomial spline has a plurality of intervals, and wherein at least one of the plurality of intervals is a power-of-two count of base frequency periods.

10. The system of claim 7, wherein the polynomial spline has a plurality of intervals, and wherein at least one of the plurality of intervals is a power-of-two fraction of a base frequency period.

11. The system of claim 7, wherein the electrical signal has a phase angle, and wherein the phase angle is modified by a rolling counter incremented by a value driven by an external environmental monitoring sensor.

12. The system of claim 7, wherein the electrical signal has a phase angle, and wherein the phase angle is modified by a rolling counter decremented by a value driven by an external environmental monitoring sensor.

~~13. A system comprising:~~
~~a digital electrical signal having a state, wherein the state is calculated by comparing a difference between a current position in a base frequency cycle and an instantaneous phase angle to a proportion of cycle duty that would be present at the base frequency cycle.~~

~~14. The system of claim 13, further comprising a polynomial spline having a plurality of intervals, and wherein at least one of the plurality of intervals is a base frequency period.~~

~~15. The system of claim 13, further comprising a polynomial spline having a plurality of intervals, and wherein at least one of the plurality of intervals is a power-of-two count of base frequency periods.~~

~~16. The system of claim 13, further comprising a polynomial spline having a plurality of intervals, and wherein at least one of the plurality of intervals is a power-of-two fraction of a base frequency period.~~

~~17. The system of claim 13, wherein the electrical signal has a phase angle, and wherein the phase angle is modified by a rolling counter incremented by a value driven by an external environmental monitoring sensor.~~

~~18. The system of claim 13, wherein the electrical signal has a phase angle, and wherein the phase angle is modified by a rolling counter decremented by a value driven by an external environmental monitoring sensor.~~