when the initial velocity begins for the given velocity vs. time line segment. As can be appreciated by those skilled in the art, with the desired velocity known over a given period of time, control of the step motor may be realized.

[0029] In an embodiment, with velocity given in steps/s, a relationship between the delay value for the step motor and the velocity can be taken to be dt=steps/v, taking v as positive for simplicity. In order to keep track of time and velocity units (seconds and steps/second), the symbol μ is used to denote a unit step (one step), where one can write the step delay as $dt=\mu/v$. For a selected line segment of the control spin reel profile, with the point $P_0=(t_0, v_0)$ on the line $v=at+v_i$, the next point $P_1=(t_1, v_1)$ is calculated to also satisfy $v=at+v_i$. To correlate to the stepping of the motor, the next point is selected as that point that corresponds to a unit step for which v_1 is related to the delay value at P_0 by $v_1=\mu/dt_0$, where at P_0, $dt_0=t_1-t_0$. With $v_1=\mu/dt_0$, substitution into the line equation provides $v_1=adt_0+v_0 \Rightarrow v_1=a(\mu/v_1-t_0)+v_0$. Solving for v_1 yields:

$$v_1=(v_0-at_0)/2+/-\text{sqrt}((v_0-at_0)^2/4+\mu a) \quad (1)$$

[0030] Equation (1) may be used repeatedly for computation when traveling the line segment.

[0031] In an embodiment with the velocity v_0 and delay value dt_0 at a point $P_0=(t_0, v_0)$ known, the next point and delay value may be calculated as:

$$P_1=(t_0+1/v_0, v_0+1/dt_0) \quad (2)$$

$$dt_1=1/(v_0+1/dt_0) \quad (3)$$

[0032] In this embodiment, the repeated computation of a form of Equation (1) is not required, since, while "traveling" the segment, equations (2) and (3) can be used. However, since 1/v, for small values of v, would be very large (infinite for v=0), the first delay value of a segment may be calculated using equation (1). Additionally, the segment under calculation may be brought to the origin, $t_0=0$, and equation (1) can be simplified to:

$$v_1=v_0/2+sqrt(v_0^2/4+\mu a) \quad (4)$$

[0033] Above the segment level, i.e. the profile level, which is made up of multiple segments, there are further considerations due to the discrete nature of the delay values. The total sum of generated delay values for a segment will not necessarily match the total time of the segment used to approximate the desired control reel profile over the time period of the line segment. In some embodiments, it may be important to avoid sudden changes in acceleration, other than those dictated by the segments. This can be achieved in several ways. In one approach, a constraint is set on the segments, which can thus be pre-checked to conform to the delay generation scheme. Another approach includes handling a mismatch between the end of a profile segment and the end of a number of delay values in the following manner. Delays for a segment are generated until generating one more would bring the total sum of delays beyond the total time of the segment. The difference ("unused time") is added to the next segment. In an embodiment, the unused time can be added to the next segment by moving its start point backwards (in time) by the value of the difference. This starting point shift has the effect of slightly lowering the acceleration of the next segment, but not increasing it.

[0034] Other embodiments can be realized that approximates a reel spin profile defined by a game play design with a set of curves that allows real time calculation of velocities, acceleration, and/or other motion parameters to control a spin reel to provide motion as defined by the game play design. In an embodiment, a method includes providing a set of motion parameters in a reel controller of a gaming machine, and driving a reel based on the set of motion parameters. The set of motion parameters may include a first motion parameter correlated to a start of a time period and a second motion parameter correlated to a finish of a time period, where the time period is associated with a time period of a spin profile for the reel. Alternately, the set may include a starting velocity along with a finishing velocity and/or an end time or period length of a selected time period of the spin profile. In an embodiment, the reel spin profile is approximated with a set of linear segments. In an embodiment, the set of motion parameters during procession through a time period is calculated in real time in a reel controller. Alternately, the set is calculated in a main processor for the gaming machine and downloaded to a reel controller of the gaming machine. In an embodiment, a starting set of motion parameters that defines line segments that approximate the spin profile for the reel are read from a memory.

[0035] In order to facilitate creative game designs, the reel control system must support complex theme based spin behaviors. As an example, for an earthquake game theme it may be desirable to have the reels shake and shudder about a given stop position. In a car chase game theme, the gaming machine would spin the reels at varying speeds with sudden changes in both speed and direction as the car chase unfolds. Such configurations may be supported by an embodiment of a gaming machine having reel controllers that can dynamically manage the actuation of each reel with respect to a spin profile for that reel as provided by the game design.

[0036] **FIG. 5** depicts a block diagram of an embodiment of a gaming machine **500** having a reel controller **510**, a number of reels **520-1**, **520-2**, . . . **520**-N, and a number of reel drivers **530-1**, **530-2**, . . . **530**-N in which reel controller **510** uses spin profiles to manage the operation of the number of reels **520-1**, **520-2**, . . . **520**-N. In an embodiment, five reels are used in gaming machine **500**. However, gaming machine **500** is not limited to using five reels. Controller **510** includes a processor **540** and memory **550** that that correlates motion parameters to realize the spin profiles associated with a game embedded in gaming machine **500**. In an embodiment, the spin profiles are realized as a set of interconnected line segments. In an embodiment, processor **540** is a digital signal processor, DSP. In various embodiments, other forms of processors may be implemented as processor **540**. In an embodiment, memory **550** is read only memory, ROM. In various embodiments, other forms of memory may be implemented as memory **550**.

[0037] In an embodiment, each reel driver **530-1**, **530-2**, . . . **530**-N is responsive to reel controller **510** to drive a corresponding one of the number of reels **520-1**, **520-2**, . . . **520**-N based on motion parameters assigned to a time period associated with a spin profile for each reel. In an embodiment, the motion parameters are assigned to a start and a finish of a time period of the spin profile. In an embodiment, reel controller **510** communicates with each reel driver **530-1**, **530-2**, . . . **530**-N via a corresponding reel interfaces **560-1**, **560-2**, . . . **560**-N, respectively. Alternately, a single reel interface may be coupled to the processor **540** to