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## Best Practices for Use of Vibration Feedback in Video Console Games

## Table of Contents

Introduction	1
The Value and Universal Appeal of Rumble	2
Realism, Engagement, and Fun	2
Value for Many Game Genres	3
Wide Appeal	4
Uses of Rumble	6
Status and Alerts	6
Warnings and Forewarnings	7
Action	8
Emotion	10
Atmosphere	12
Top Ten Rumble Design & Coding Tips	13
Taking It to the Next Level	14
Appendix A – Rumble Reference: Examples of Best Rumble as Reported by Survey Respondents	15

### A Note on Terminology

There are many terms used to describe the result of adding touch stimuli to the human-computer interface, including “full force feedback,” “haptics,” “rumble feedback,” “tactile feedback,” “touch-enabled,” “vibration,” “vibro-tactile,” and many more. Many parts of the industry have standardized on the term “force feedback” to describe a combination of vibro-tactile and kinesthetic outputs. This document deals mainly with vibro-tactile output alone, which the market often calls “rumble.”

# Introduction

## Most Games Use Rumble...

Since the introduction of vibration (rumble) feedback, most games have adopted it to enhance game play, with several games heralded for their use of the technology:

***Silent Hill 2***, developed by Konami

“Completing the mood is a creepy use of the PS2 controller’s rumble feature. As James is hurt, you will feel his heartbeat as it slowly pulsates in your hands. As he suffers more and more damage, his pulse will reach weaker speeds. If he is struck down suddenly, you will feel his pulse dribble rapidly to nothing and it’s an effect that can be very disturbing.”

—Kristopher Abel, **GameNation.com**, February 19, 2003

***Metal Gear Solid***, developed by Konami

“But don’t even think of playing *Metal Gear Solid* without the Dual Shock controller. This game is probably the first to really make perfect use of the vibration functions and really goes a long way to maintaining the suspension of belief in both its timing and its subtlety.”

—Jeff Gerstmann, **GameSpot**, September 25, 1998

## But Not All Use It Well...

Rumble can be a powerful tool because engaging the sense of touch is crucial to providing multidimensional realism. But rumble has to be implemented well to enhance game play, and many gamers believe it could be improved in some games.

“Rumble quality varies greatly in different types of games. I would have to say that *Halo 2* has a very good responsive rumble feature when taking damage.”

—Respondent, Ipsos Insight survey, August 2006

“I would say what makes the vibration feedback good is to use it on a limited basis. Don’t use it for every little bump or hit but only for really big crashes or hits. That to me would make it good.”

—Respondent, Ipsos Insight survey, August 2006

“The inclusion of rumbles at inappropriate times can actually draw me out of the gaming experience.”

—Post made to **Eurogamer** chat board, July 6, 2006

## Here’s How, According To Gamers

This paper sets out principles and practices for making the best use of rumble feedback technology so you can give gamers more of what they want: fun, realism, and immersion. This information includes design and coding tips as well as “the voice of the gamer” — the verbatim\* comments from the more than 11,000 gamers surveyed from June – August 2006\*\*. In short, the voice of the gamer says that the value of rumble is its ability to immerse players in a virtual world. It says that sound and touch feedback can add to the experience in a way that even the most remarkable high-definition graphics cannot.

\*Comments are presented as written except for minor spelling and punctuation edits made for readability.

\*\*Immersion conducted surveys at gaming Web sites (Eurogamer, GameDaily, GameSpot, GamePro, GameSpy, and IGN) and sponsored an Ipsos Insight survey of 1,075 gamers drawn from a statistical sampling of the Ipsos North America online panel of more than 800,000 U.S. households. The Ipsos Insight survey report is available at [www.immersion.com/rumble\\_survey.php](http://www.immersion.com/rumble_survey.php).

## The Value and Universal Appeal of Rumble

Gamers just want to have fun. Many aspects of a game can contribute to an experience that keeps the player coming back for more: a compelling storyline, challenging scenarios, amazing graphics, exciting online play, and good game design are just a few.

Rumble effects used properly can also greatly enhance the gaming experience and increase entertainment. Though some have criticized rumble as a feedback-only, reactionary feature, it supplies a physical connection to the game that cannot be furnished through an input-only device. Touch feedback can reveal crucial information that can be neither seen nor heard.

Rumble is great when it's carefully designed and closely timed to the player's actions or to onscreen events and/or sounds. Gamers say it's awesome when it's realistic — when a machine gun doesn't purr like a kitten but instead rattles your teeth! And rumble is also very compelling when it heightens emotions and involves the player at a deeper level.

The 11,000+ gamers surveyed from June through August 2006 were asked about the best uses of rumble in console video games. The verbatim comments that follow reveal that rumble is vital, and why that is so: it adds realism, engagement, and fun to many game genres. In addition, the data shows that rumble appeals to gamers of both genders and a wide range of ages.



*Gamers say touch  
feedback increases  
realism, engagement,  
and fun,...*

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### Realism, Engagement, and Fun

*Gamers say touch feedback increases realism, engagement, and fun, but what may be surprising are the broad types of rumble effects that provide these qualities. Gamers appreciate not only rumble effects that simulate real-world phenomena, but also those that provide information that makes the situation more realistic, compelling, or challenging. Moreover, rumble effects used to heighten the game's intensity by acting on emotion (but that are not necessarily physically realistic) also add fun to the game.*

"When characters are hit or cars are going over rough terrain it makes it more real. The *Sims 2* for instance, it helps to warn you when there are fires or deaths with the game play. *Star Wars* is another that HAS to have that feature. Without it you wouldn't know whether or not you are getting hit when it happens, it is vital in these types of games and should stay there and maybe even be improved somehow."

"In games like *Resident Evil* and *Final Fantasy* it makes you feel like part of the game. Whether you're getting chewed on by zombies or casting a spell. In games like *Madden Football* it lets you know when you get hit. The rumble feature has brought a whole new experience to game playing. For those who don't enjoy the rumble feature, they can simply turn it off. Why should the many of us who do enjoy the rumble feature suffer because of the few who don't enjoy it?"

"Goes with the game play — adds to it as much as stereo speakers to television — expands the play."

"It gives you a chance to feel like you are actually in the game. When you get hit, you feel the impact, etc. It's much better because it gives you more of a hands-on enjoyment other than just looking through a screen."

"I like it — makes the game more real and keeps me motivated to do more."

"It just makes it so much more fun, it's hard to put into words!"

## Value for Many Game Genres

*Gamers say that for realism, engagement, and fun, rumble is essential in action/adventure, shooter, sports, racing, and fighting games. These genres account for 72 percent of video console games sold in 2005 (The NPD Group). However, role-playing and family games were also mentioned as including enjoyable and useful rumble effects. (See also Appendix A, page 15.)*

### Action/Adventure

"In any *Metal Gear Solid* game in the series, they take rumble/vibration to the next level cuz of the range of rumble they use. Slight bumps when for instance a cigar is dropped or increase thumping when a character suffers a heart attack. These weren't arbitrarily put in for the sake of having rumble, and it makes the game all the more cinematic."

"When you are playing *Resident Evil* the vibration will pulse like a heartbeat and it gets my own heart racing. It intensifies the game and gives it a sense of realism. When you're being attacked it will shake like crazy and it almost makes you panic it brings the game so to life."

### Shooter

"Take *Call of Duty 2* for the XBOX 360 for instance. You can feel when you are being struck by the enemies' bullets, the intensity of the explosions, and the mighty rumble of the vehicles, both airborne and mobile. The game would lack significant impact without this feature."

"As for shooters or FPS games, I believe the rumble feature is essential not only for making the game more realistic, but actually aiding you in gameplay. I love the rumble feature and I believe that most if not all games in the racing, fighting, and shooting genres should incorporate it."

### Sports

"The vibration function is really useful in the *Madden* series. I wouldn't want to play a football game where I couldn't feel vibration when contact is made. I like to have vibration in just about every game."

"On *Madden* it makes it feel more real like I'm not just watching a game but actually playing."

"It is good in games like *Madden* because it seems so life like when guys get hit. I also think that without it *Madden* would be just an ordinary game."

### Racing

"It involves me knowing where the edge or boundaries of the race track are in a racing game...At times I'd be lost without it."

"I enjoy the rumble feeling in my *Gran Turismo* game, especially when it goes around the curves."

"I play *Burnout* racing, and the rumble/vibration is awesome. It makes me feel like I am actually driving the car and when I crash, it seems realistic."

"In race games it can give you a feel for the road and car response if the video and rumble is tightly integrated."

### Fighting

"Feeling every kick and punch really immerses me in the gameplay."



*"On Madden it makes it feel more real like I'm not just watching a game but actually playing."*



## Wide Appeal

*Men and women ages 18 to 70+ and in all stages of life hold similar views of rumble: It's fun, adds excitement and realism, and can be helpful in making it easier to play, to gain confidence and skill, and to become more involved with the game and its characters.*

### Grandparents

*"Mario Party 7 — Adds to the excitement for me and my grandkids."*

*"In games like FlatOut and FlatOut 2 where collisions and loss of control are a major part of the gaming experience, the tactile feedback adds a great deal to the realism, makes the games easier to play, and definitely cranks up the fun meter! Even my father-in-law, who is in his seventies, prefers to play FlatOut with the force-feedback turned up. He crashes a lot, but all the shaking and rumbling really tickles him!"*

### Parents

*"We (with my 11 year old son) play a ton of hockey and football games. It is nearly impossible to tell how hard you hit someone without the rumble feature. It provides feedback that allows the user to gain skill and confidence when making a hit. Similar to a swing training aid in golf that allows you to figure out if you did it right or wrong the instant it happens. If wrong, you try something a little different the next time around. It improves your play and makes the games more fun."*

*"I think the rumble feature is best when I am doing other things, but kids want me to play video games with them, it lets me know it is my turn. My kids like it during the racing games!!"*

### Ages 18-24

*"As for fighting games the rumble feature adds a sense of realism. When hits are taken and you actually feel it, it makes you more involved in the game and in turn makes you not only want to play the game more often. But perhaps even purchase other games like it."*

*"I love it in the racing games, it makes the experience more realistic. You hit a wall or another car, your controller vibrates. If you were speeding down the road racing and hit a wall or car, you wouldn't feel nothing...granted you'd feel more than just a vibration in your hands."*

*"I play Need For Speed: Most Wanted a lot and the vibration is very useful when being pursued by police. It can mean the difference between getting busted and evading the pursuit all together. It also helps when you are racing others on the "Black List" and can mean the difference between winning and losing the race."*

*"I think it works best on role-playing games because it's like an alarm, it keeps you aware."*



### **Ages 50+**

"War games are the best. It gets you into the game more."

"Best in shooter type games. Keep it out of card games."

"In *Ratchet & Clank*, I like the vibration when enemies are hit or objectives destroyed. It seems more lifelike to have the vibration."

"It allows one to feel enthralled in a game and it helps with storylines in most cases by adding a better sense of what is going on."

"It makes it feel like you are in the game. It gives you the shock that you need at the moment of surprise."

### **Women (Ages 25–50)**

"Racing and Wrestling games makes you feel like you are in it."

"It happens when you are in the midst of a good action and makes you feel like you have entered a different mode to the game. It's exciting and you look for it."

"In role playing, it helps with staying in character."

"It makes the game more interesting in every way possible."

### **Men (Ages 25–50)**

"I like the "full" experience of having the vibration feedback on SSX. It includes more of the senses than without the vibration."

"In *Nascar 2006*, when setting the damage to the most realistic setting, it's appropriate to have significant vibration following a front-end crash, as it's simulating what the driver would really feel. It's also realistic how the simulated damage impacts speed, and the ability to control the car and feel the vibration varies with speed."

"When used sparingly at the end of a sequence of events, such as a catch made in *Madden*, the execution of a combat attack in *Final Fantasy*. Other games with more action, such as the *GTA* series, benefit from it in situations when one would expect the hands to be shaken, such as the firing of a gun or crashing of a vehicle."

"When I play Racing games it makes the crashes feel real instead of just watching it. I also like the rumble whenever I'm about to encounter a big enemy as a warning. It helps you prepare for the attack."

*"It happens when you are in the midst of a good action and makes you feel like you have entered a different mode to the game. It's exciting and you look for it."*



## Uses of Rumble



Feeling the game is an essential part of the experience for several reasons. Because of the simple fact that we use touch to grapple with the physical world, rumble can connect the physical to the virtual. Rumble acting on your sense of touch can immediately and intuitively alert you to what's happening, and it can establish realistic proximity. This type of instinctive information promotes the suspension of disbelief, essential for a fun experience. Plus some things have a greater impact when they are felt rather than seen.

Rumble can be used to motivate gamers to improve their game playing skills. And it can be used to instill and intensify emotions and create a rich, tangible, authentic atmosphere.

In practice, supplying fun, engaging, and realistic gaming experiences has been achieved by supplying well-designed rumble effects that:

- Signal status and alerts
- Provide warnings and forewarnings
- Enliven action
- Intensify emotion
- Create an atmosphere

## Status and Alerts

*You can use rumble intuitively to give players information through touch — and avoid making them use eye sight, which many say distracts from game play. Status and alerts provided using rumble are as varied as game genres: health/life/injury/attack status and reminders to check progress, take your turn, keep playing, keep focused, etc. Gamers say that receiving this type of information through rumble helps maintain their focus and improve their reaction time.*

### Health or Life Indications

"If you are playing an action game and you are getting shot...especially in *Splinter Cell* type games with not a lot of health...this lets you know that you are getting shot. If not for the rumble feature you would have to constantly check your health and that detracts from the fun in the game."

"What I like the most about rumble packs is that it helps you realize at times that you have been injured. Sometimes there is so much going on in games you forget to check your health. If your controller keeps shaking you know you keep taking damage."

"OK guys, I'm one of the biggest *Resident Evil* fans around. I love the vibration function on these games because if I look away for even a second it alerts me that I'm being attacked. And some games let you know your general health by feeling your heart beat."

"Well, in *Grand Theft* I like the vibrations because whenever I'm being hit from behind or blind-sided I can react without looking at my life span bar!!!"

### Reminders

"In *Katamari* it is like a wake up call to check progress."

"In the *Athens 2004* Game it warns you when you need to pump the pedal, or if you run out of breath during swimming."

"When I play golf I switch back to the TV because of the amount of time it takes for the other golfers to go and also the celebrations can be too long and it will let me know when it is my turn sometimes!"

"I love to play *Mario Party* with my family. The rumble feature lets you know when it is your turn, and also is good throughout the game like when you explode, etc."

### Prompts

"I use the rumble feature in most wrestling video games because it helps me to stay on track if I get distracted."

"I like how the rumble occurs exactly when you do something in the game that you would experience rumble from. The rumble also keeps me more in focus with the game."

"It helps keep me on track. Sometimes you get so involved in the game that you forget to move your hands, but the vibration keeps you moving."



"In *MVP Baseball*, the rumble alerts you when players are stealing."

"Playing *Mario Party*, the rumble feature is important because you have to shoot, jump for something or stop whenever you feel the rumble."

## Warnings and Forewarnings

*Warnings and forewarnings are actions or events that can be sensed, but not seen. They warn the player of an impending event or hidden object, enemy, or target and can really only be provided using rumble. Rumble warnings and forewarnings also have been creatively used for assisting mastery by supplying aiming guidance in sports games and for locating a monster's weak points so it could be slain.*

### Trouble or Gunfire

"In certain games like *Splinter Cell* or fighting games like *Dead Or Alive* the rumble feature lets you know when you are getting hit even if you don't see it happening, as in an attack from behind. Also in some games the rumble feature will let you know trouble is near."

"Rumble is good in *Duke Nukem* when destruction is off-screen and needs to be noticed."

"I think that in *Ghost Recon* when I am playing multi-player and I am not sure when the other players are killing people, the rumble pack helps me a lot better cause I know when it rumbles hard that a tank was destroyed but when it rumbles a little bit a tank is coming."

"*Oblivion*. Example: Walk through poison gas in a dungeon. I wouldn't know I was dying if the controller weren't rumbling."

### Impending Loss of Control

"On racing games it warns if pushing the limits of your car."

"*Formula One*. It gives tactile feedback when you are on the track to let you know what is happening with the car."

### Danger

"The game *Rampage*. When you are on a building and it is about to fall the rumble will warn you to jump off the building or lose power if you don't."

"With *Tomb Raider* I can feel the boulders and rocks coming at me before I really see them."

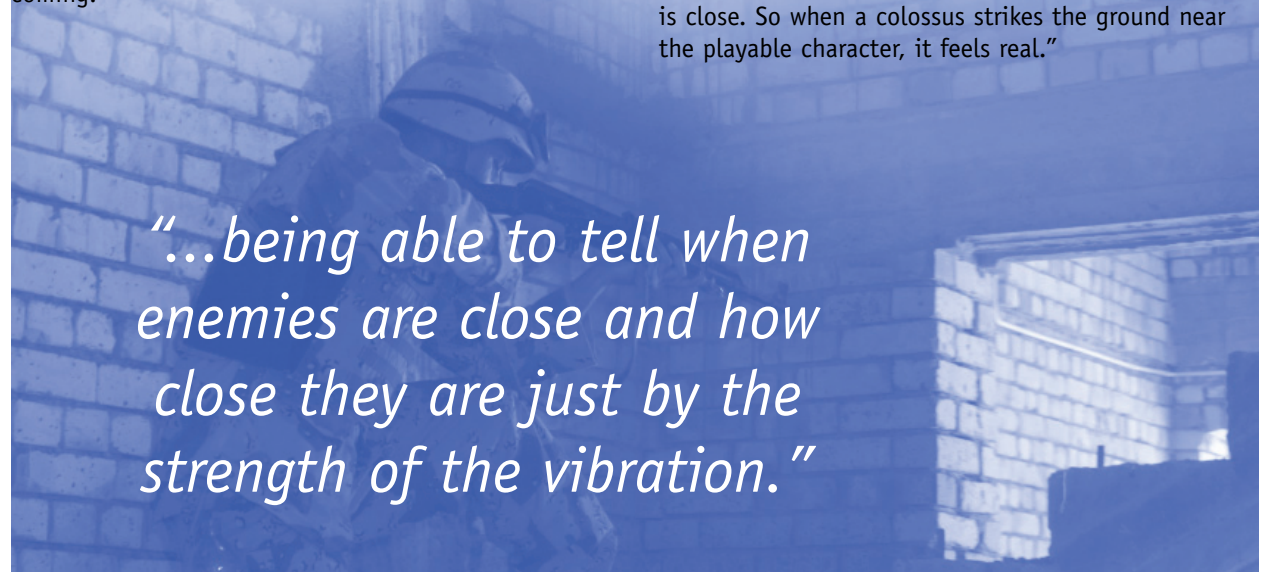
### Proximity and Size of an Approaching Enemy

"I would say that *Halo 2* uses great rumble feedback. It helps to tell when enemies are close or coming after you. Especially when they are throwing grenades. It makes you react quicker."

"In *Metal Gear Solid* games, being able to tell when enemies are close and how close they are just by the strength of the vibration."

"*Final Fantasy X-2*: feel the monsters approach."

"In *Shadow of the Colossus*, the shaking of the controller whenever an impact on the ground occurs works well because the shaking is minimal when the impact is a little ways off and strong when the impact is close. So when a colossus strikes the ground near the playable character, it feels real."



"...being able to tell when enemies are close and how close they are just by the strength of the vibration."

*"Monster Hunter uses the vibration feature the best. You can feel how close the monsters are to you when they roar or stomp."*

### **Location of Hidden Items, Treasure, or Secret Paths**

*"The Legend of Zelda: The Ocarina of Time. This game used the rumble feature to alert me when my health is low, when I took damage, and it was used in non-combat situations in order to alert me to the location of secret areas. When it started rumbling in the middle of a field it meant to lay a bomb and open the hidden 'tunnel' to a secret area, and without the rumble you would have never known it was there."*

*"Ocarina of Time, the rumble feature was used to help locate hidden places to drop bombs and enter secret/hidden areas of the game, kind of like a metal detector..."*

### **Targets**

*"For Mario Party 6 on GameCube you can't play some of the games without the vibration on. An example is when you are in a boat and you need to release the crane and pick boxes up — you wouldn't know when to drop the crane if you couldn't feel the controller vibrate when you are over one."*

*"I play a helicopter game that it helps with finding enemy targets on the ground and finding enemy weapons."*

*"The best use for the rumble feature to date has to be the original Ape Escape for PlayStation, specifically when armed with the Monkey Radar. It uses varying intensities of vibration to indicate the proximity of the player to the target."*

*"I play MVP Baseball a lot, and when you are pitching and you are getting pitch location, the controller vibrates when you are about to leave the strike zone, which makes it easy to know where the strike zone is. The vibration feature is awesome."*

*"Allows me to tweak my putt stroke in Tiger Woods 06."*

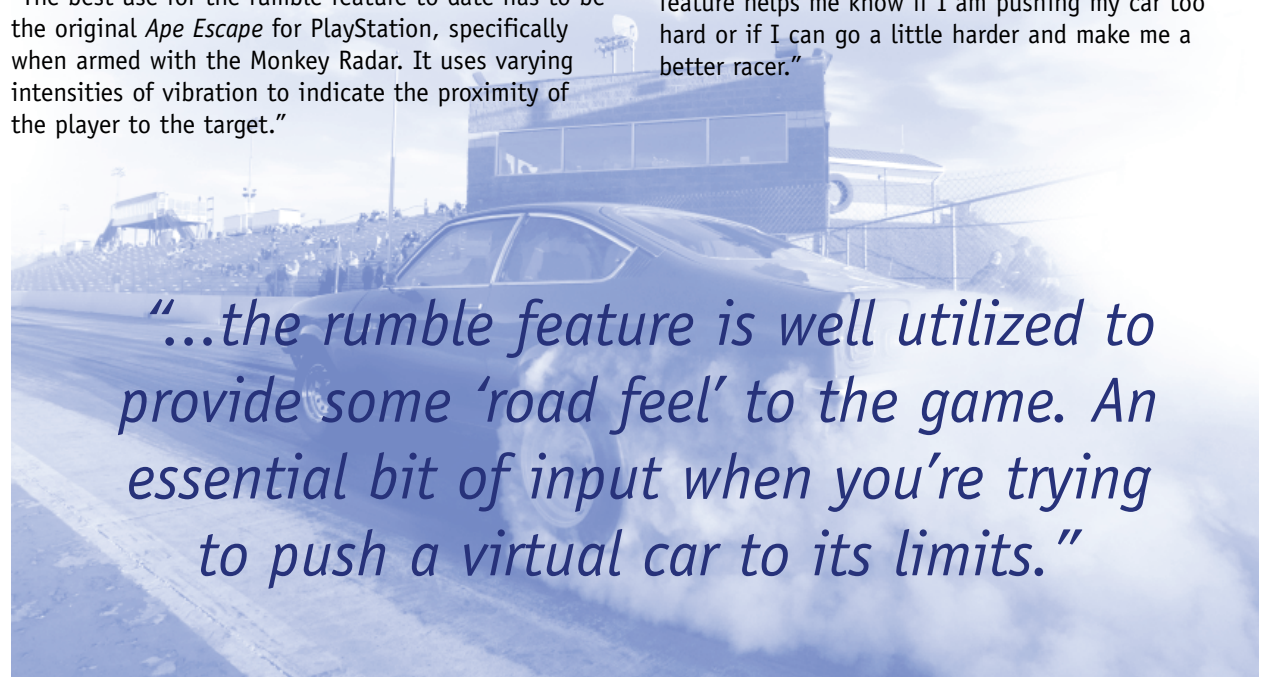
*"In Baldur's Gate Dark Alliance, the rumble feature helps in knowing when I've hit a target. Especially when there are multiple targets in an area."*

### **Action**

*Rumble lets gamers feel the action and reaction of the virtual world, making it seem real. This realistic response gives players the information they need to move more quickly and more precisely. If done with good timing and detail, rumble can emphasize a player's accomplishments by making them feel that they've had to use all their faculties to win — an all-out effort was needed — and they triumphed. For example, players talk about being able to feel even slight variations of force in the car they are racing. When they feel they can judge the amount of stability or instability, traction or the lack of it, they feel more in control and better able to apply the effort and skill needed to win.*

### **Vehicles**

*"Mostly racing games such as Gran Turismo 4 and Need for Speed Most Wanted, reason is cause the rumble feature helps me know if I am pushing my car too hard or if I can go a little harder and make me a better racer."*



*"...the rumble feature is well utilized to provide some 'road feel' to the game. An essential bit of input when you're trying to push a virtual car to its limits."*

"In *Forza Motorsport*, the rumble feature is well utilized to provide some 'road feel' to the game. An essential bit of input when you're trying to push a virtual car to its limits."

"It involves me knowing where the edge or boundaries of the race track are in a Racing Game. In a Shooter Game it lets me know when I've been shot by an Opponent. At times I'd be lost without it."

*"Need for Speed Most Wanted:* I like the feed back from the road. When racing circuits you can remember bits of the track better. Should I slow down here or can I just barrel through it."

"For PS2, *Gran Turismo 4* needs the rumble feature to connect you to the car so you can more adequately feel how the car is handling."

"When you tap or hit another car it let's you know you need to back off a little."

"Because when you crash a car you feel like you are really there in the race."

*"Grand Theft Auto.* I enjoy the crash vibration. It lets me feel like I'm in a wreck."

### **Weapons**

"Most often, shooter games benefit from rumble packs because it puts the feel of a real weapon directly in your hands."

"It is best in shooter games because you can feel the recoil, and that makes it seem more real."

"I think vibration is critical while shooting with all shooter games. It makes you feel like you are really shooting a gun. Games that vibrate more or less according to the weapon you are shooting are great (big gun, more vibration)."

"*GTA* series, during shootouts to let you know you've been hit."

"Playing shooter games the impact of a round striking you during game play is cool, radical, awesome."

"Rumble/vibration made it feel good when I first played a fighting game because I didn't have to say 'did they shoot me?' I felt it lol => so loved it...."

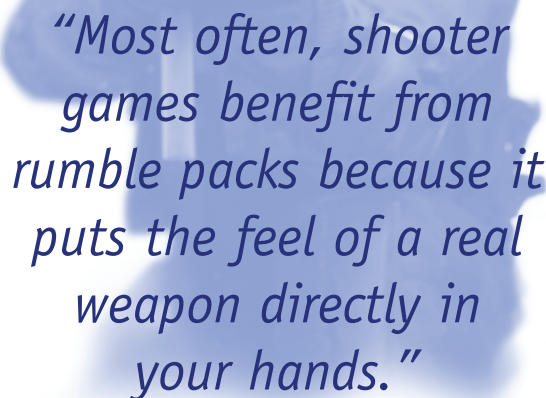
"In *Gods of War*, the main character of the game has to fight his way to the main boss monster, Ares the God of War, and in doing so he encounters lots of battles with lower and mid-range monsters. The vibration function helps me to know when I get hit or if I dodged the attack in time to prevent from being hit and losing hit points. If I get hit, it vibrates. If they miss there is no vibration thus I know that I have dodged the attack in time."

"It is a great way to warn you or gauge how bad you are damaged/ how well you hit."

"I would say that *Halo 2* uses great rumble feedback. It helps to tell when enemies are close or coming after you. Especially when they're throwing grenades. It makes you react quicker."

*"Gauntlet.* The vibration is excellent in letting me know there is something attacking me that I do not realize — at the ankles when I am fighting enemies."

*"Champions of Norrath....*my character would probably have died many times without the rumble feature."



*"Most often, shooter games benefit from rumble packs because it puts the feel of a real weapon directly in your hands."*



## Explosions

"The vibration helps with the feel of the game when fighting. It also helps to connect with what the character is going through in the game. If something is blowing up next to him and the vibration is off you won't get the true feel or idea of him being next to something blowing up. It just makes it more life like. Like you are kind of in the game also."

*"Medal of Honor, it makes you feel the bombs exploding around you and gives you awareness of shots fired."*

"I was playing *Resident Evil Zero* and I blew up a zombie. The rumble effect makes it feel so realistic for me. It makes the game fun and real."

## Sports

*"Madden NFL: The rumble feature during tackles, blocks, and sacks adds to the game by making the tactile experience your physical connection to the game."*

"The rumble feature can add details to the game that are needed. With sports games it can let you know the difference between a regular tackle or hit and a smash."

"Like for instance, in football. You're the running back and feel the rumble/vibration from the controller while you are running the ball. Then a defender comes and gives a crushing blow. You can feel the pain. That's totally awesome."

"The game in which I use this feature is *MLB '06* it adds to the excitement of hitting the ball home runs and such as well as the pitching aspect."

"I like the rumble/vibration in games where it signifies something happening, like in *Tiger Woods* how you get the vibrations when you are going to make a hole in one or another long distance shot."

"Playing a golf game. I want to know how hard I hit the ball."

"In *Dark Cloud 2* it would be almost impossible to fish without it."

"In the fishing games you can really feel the fish strike and fight."

## Emotion

*Touch being the most personal of the senses, it provides a physical connection that can fuel strong emotion. Involving the player at this level elevates the experience beyond the passive and helps propel the gamer out of "trying to imagine what it's like being in the game" to simply "being in the game." Effective across many game genres, gamers report that rumble can intensify a wide range of emotions.*

## Fear

"How could I pick locks quickly on *Splinter Cell* without vibration? Some of the more frightening games i.e. *Silent Hill*, *Fatal Frame*, etc. just wouldn't scare the bejesus out of me at 3 a.m. without vibration."

"*Resident Evil 4*, the rumble is good for this game cuz the game is pretty damn scary and the rumble feature kind of brings you back to the game with full attention from not having any action."



*"The rumble feature during tackles, blocks, and sacks adds to the game by making the tactile experience your physical connection to the game."*

"It's good in games like *Halo*, because of the intense nature of the game. It tends to raise the fear level, and actually will cause you to play better."

"I think the rumble feature adds fun to the game, makes the game scarier."

### **Tension**

"It adds to the tense moments in the game like when you are trying to stave off 3 or 4 zombies in *Resident Evil*. The rumble feature kinda scares you as well as the zombies especially when one of the zombies grabs hold of you and takes a bite!"

"It is often best used to give the user feedback or to make the game more immersive. The feedback is done through rumble when I get hit or when I perform an action. It can also be used to provide atmosphere. One of the best implementations of it that I have played made it do a heartbeat while in a very tense situation. It added very much to the scene."

### **Nervousness**

"In *Madden Football*.... when the kicker has a crucial field goal....feeling the heartbeat through the control makes the anxiety and pressure real."

"When you are at a certain point of a game and the rumbling starts and vibrates it makes it more exciting. I play *Tetris* and when the blocks are coming down and the music starts it makes me nervous sometimes."

### **Agitation**

"In *Outlaw Golf* I like how you can distract your opponent by taunting him which makes the controller vibrate and really can be annoying if you have a difficult shot."

### **Excitement and Exhilaration**

"In epic battle games, the coordination of loud, booming sounds coupled with a strong vibration in the controller is sometimes exhilarating, making the player feel that they are part of the action."

"The best use of the rumble/vibration, I think, is in sports games like *NFL Street*. When the players are tackled the controller shakes and gets everyone excited and the players are more aware and into the game."

"Crowd roars or foot stomping in football."

"It lets you know when something bad is happening, damage to a character and gives you an adrenaline rush it makes the game more exciting."

### **Surprise**

"*Need for Speed Most Wanted*, when you smash against another car or wall, it rumbles, and it's more realistic, and more fun, sometimes it startles me."

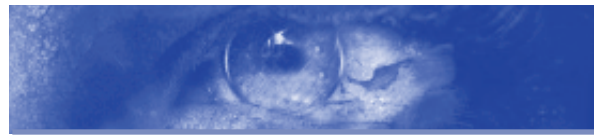
"It makes it feel like you are in the game. It gives you the shock that you need at the moment of surprise."

### **Anticipation**

"I think it adds to the game by heightening the sensation of anticipation and engagement. You watch younger kids play video games and their arms and legs are moving along with their whole bodies trying to persuade their character. I think that the vibration feature only enhances this feeling."

### **Rivalry**

"In *NCAA Football* games you can pump up the crowd to rattle your opponent and it makes the screen and the other players controller vibrate. It adds to the rivalry and spirit of the game."



...feeling the  
heartbeat through  
the control  
makes the  
anxiety and  
pressure real."

---



### **Disorientation**

"Shooters like *SOCOM* when explosions occur. It does add some realism to the disorientation that may occur around a real explosion."

### **Satisfaction**

"In *Madden '05*, when you get a big hit on someone the rumble happens and it is sort of like a reward for the big hit."

## **Atmosphere**

*Combined with graphics and sound, rumble can be used to create a palpable atmosphere to strengthen the illusion of the game.*

### **Spookiness**

"In *Resident Evil* games when there is danger or an attack it vibrates and adds to the already creepy aura."

*"Resident Evil 4, creating an eerie atmosphere and setting the scenes."*

### **Drama**

"Adds to the drama of the game, if you are hurt, you know it, if you hurt something else, or make a good move, the rumble usually indicates that for you."

"The rumble feature in *Command and Conquer 3: Tiberium Wars* provides awesome combat battle background sound and feel."

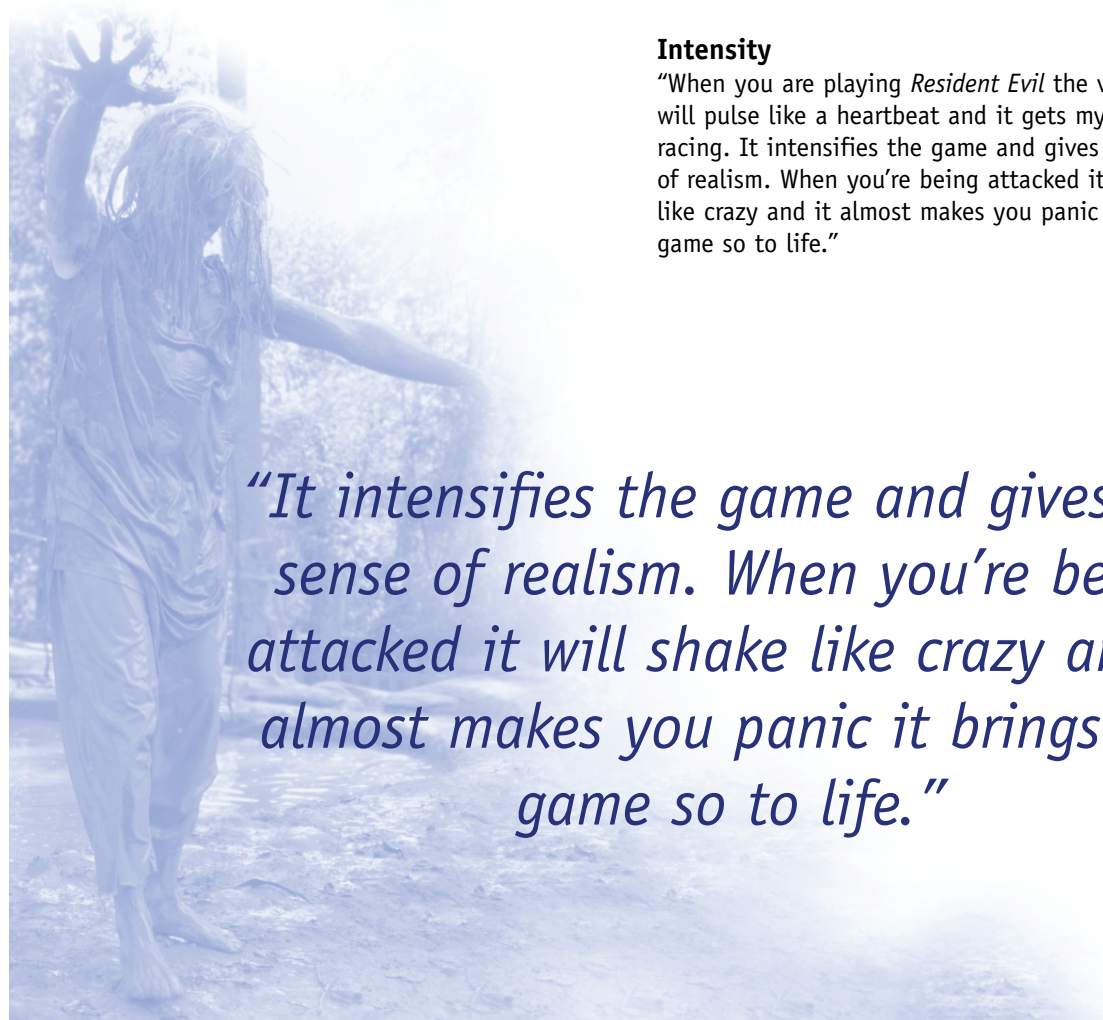
### **Suspense**

"I like it when I play *Resident Evil* because it puts more suspense in the game play."

"In Role Playing games, such as in the *Resident Evil* series of RPG's on the PlayStation 2... it adds to the suspense and excitement that the game already offers. Especially when things jump out at you and the controller rumbles ... it's a pretty fun little feature to have."

### **Intensity**

"When you are playing *Resident Evil* the vibration will pulse like a heartbeat and it gets my own heart racing. It intensifies the game and gives it a sense of realism. When you're being attacked it will shake like crazy and it almost makes you panic it brings the game so to life."



*"It intensifies the game and gives it a sense of realism. When you're being attacked it will shake like crazy and it almost makes you panic it brings the game so to life."*

## Top Ten Rumble Design & Coding Tips

Simply placing a rumble effect within a scene is not a foolproof method for increasing fun, realism, and engagement. Developers need to take some time to synchronize the effect with sound and graphics or to design the vibration so it supplies either a realistic simulation or an intuitive sense of its purpose. Often that means that effects should follow the mechanical, or physical, rules of the world you are creating. (If it's an imaginary world, creative physics apply.)

Tactile effect creation and placement is an art in the same way that graphic and sound creation and arrangement is an art. Designing interesting and/or realistic rumble effects is a skill that merits attention and recognition. It requires consistent application of good design and planning. Consider our top ten tips as a guide to start you on your way to good rumble implementation.

### **1. Synchronize vibration effects to audio and visual elements.**

Suspension of disbelief is easier to achieve when the audio, visual, and rumble elements of a game are well-synchronized, and when each part is as realistic as possible.

The code for the vibration effects system should be very similar to code for the sound system. Search the game code for all the places where sounds are played, initialized, or terminated and consider pairing those function calls with related vibration function calls.

### **2. When appropriate, use vibration alone to signal impending action.**

There may be times when there are no visual or audio cues, and vibration is all you have to signal the player that something is happening or about to happen. In a racing game, when something goes wrong with your car, you may not see it or hear it, but by using rumble, you can feel the engine vibrate a little differently or the steering wheel shake or resist, indicating it is time to go into the paddock.

### **3. Use a variety of effects.**

Create effects for more than just weapon firing, off-road terrain, and player damage. Vibration effects can be used for events and actions as diverse as a beating heart, a revving car engine, a crumbling wall, a star-

ting earthquake. The use of vibration effects strong and subtle can add much more dimension to a scene. Just remember to use them judiciously.

### **4. Don't forget to use simple effects.**

Extremely intricate effects are not always necessary to make a compelling game. Sometimes a very simple popping or clicking sensation can bring a scene to life and make for a more satisfying gaming experience. Applying subtle, but distinctive, rumble effects, such as for a door sliding open or closed, reloading a gun clip, picking up an object, or gearing up or down in a racing game, can bring that little extra energy and engagement to a scene. Varied simple effects consistently applied to distinguish like actions — to make the firing of each weapon feel even just slightly different or to enliven a grouping of player movements (throwing, using controls, reloading, etc.) — provide a detailed richness that doesn't come through if only a few wildly creative effects are used sporadically.

### **5. Tailor effects to real-world variables.**

When adding rumble to weapons, it's best to tailor vibration effects for specific weapon types. A machine gun requires a strong, pulsing vibration; whereas a pistol should produce short, tight vibrations; and a sword a light, feathery swishing. A good deal of information can be communicated through the sense of touch if you take advantage of it, and this touch channel can make your game vivid and interesting. An alert that the enemy has been detected could be made to feel like an alarm going off. An alert for low health could be made to feel like fading energy. The two sensations are different but intuitively understandable. Also for racing games, as terrain varies from gravel to pavement or from wooden to steel bridges, vary the terrain effects accordingly. For racing games use dynamic acceleration and deceleration effect code instead of effects with static parameters.

### **6. Don't be annoying.**

Poorly designed effects can be annoying and a waste of a gamer's (and, by corollary, a developer's) time. While a high-frequency buzzing vibration or a quick, strong rumble may be very effective for a certain element of the game, a continuous high-frequency buzz or rumble may eventually cause a player to become annoyed and quit playing or turn off all the effects in the game.

Just as true, however, is that too few effects will disrupt the tactile continuity of the game. Good tactile effect design requires a commitment to incorporate enough rumble as well as to use it effectively.

**7. Do not overdo multiple simultaneous effect playback.**

Just as too many beautiful sounds played simultaneously become a cacophony, too many compelling touch effects played together or too close to each other can overwhelm the player. Each individual sensation will lose its impact, and the gamer will tire of the feature because it has stopped contributing to the experience. Remember that tactile bandwidth on rumble controllers is not as sophisticated as gamers' auditory bandwidth. Gamers will not be able to distinguish 10 rumble effects when played simultaneously.

Layering can be tricky, especially with legacy rumble APIs. In some situations, apply the KISS principle and play one effect (or one well-synchronized complex effect) at a time.

**8. Create an effect priority scheme.**

Ensure that low priority effects can be ignored if higher priority effects are already playing. For example, if a big explosion is being felt, disregard effects like firing.

**9. Always allow for on/off control through your game menu.**

There may be many reasons a gamer prefers not to use rumble in a particular game or at a particular time. Accommodate those gamers by making it easy to turn off rumble.

**10. Play-test, play-test, play-test. And edit based on user feedback.**

Be careful about how or where you place effects and ALWAYS play-test them. You will generally find you

need to adjust magnitude levels either up or down to reach just the right experience that will provide enjoyment over long periods of game play. In many cases you will find your first set of effects overwhelming and needing rework or better synchronization. You will probably also find other areas of the game that would benefit from rumble effects. Remember that creating rumble effects is an art and takes experience, thought, and time.

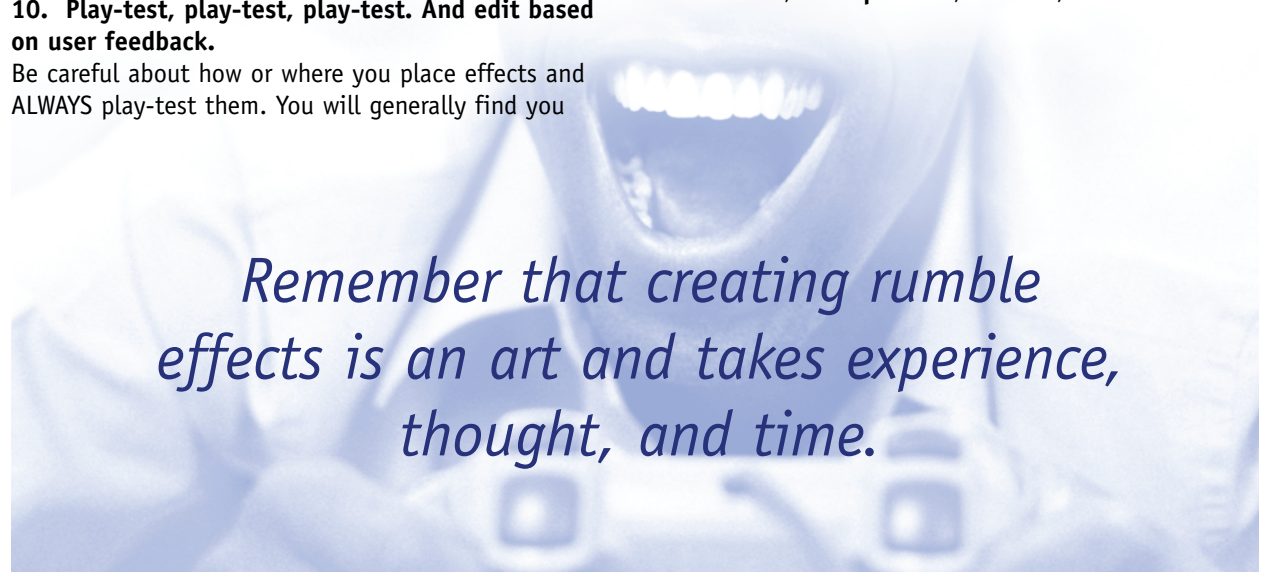
## Taking It to the Next Level

Even if you already employ good principles and practices of rumble design, Immersion's new TouchSense® vibration technology takes rumble to the next level. This next-generation TouchSense technology matches the realism of next-generation high-definition graphics and high-fidelity sound, offering a much wider range of rumble effects and improved synchronization with audio and onscreen graphic events. The results can help games come even closer to simulating the physical world. Called "ten times better than the rumbling on the PS2 or Xbox 360,"\* the technology includes:

- A new type of actuator design for the controller
- Middleware allowing design-once-deploy-everywhere functionality
- Immersion Studio® for Gaming authoring tool optimized for fast and intuitive creation of rumble effects

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\*Immersion Unveils Next-Gen Rumble Technology, by Sid Shuman, **Gamepro.com**, June 16, 2006.



*Remember that creating rumble effects is an art and takes experience, thought, and time.*

## Appendix A - Rumble Reference: Examples of Best Rumble as Reported by Survey Respondents

### Action and Adventure Games

TITLE	PUBLISHER/DEVELOPER	RUMBLE USAGE
Black	Electronic Arts / Criterion Games	<p><i>When your character is about to die, the controller lets out pulses like a heart beat.*</i></p> <ul style="list-style-type: none"> <li>• Alerts when hit or blocked</li> <li>• Machine gun intensity, recoil</li> <li>• Warnings when in imminent danger</li> </ul>
Devil May Cry series	Capcom / Capcom	<p><i>Cut scene rumble is something I wish every game had.</i></p> <ul style="list-style-type: none"> <li>• Alerts when hit</li> <li>• Variety of rumble levels for the different weapons</li> </ul>
Fatal Frame	Tecmo / Tecmo	<p><i>The heart beat effect is the coolest use of rumble I have ever felt.</i></p> <ul style="list-style-type: none"> <li>• Intensifies fear, tension</li> <li>• Alerts to enemy presence</li> </ul>
God of War	Sony Computer Entertainment / SCE Studios	<p><i>God of War without rumble takes away from the intensity and just makes the game appear like a moving slideshow at times. With the rumble, I feel the weapons in my hands.</i></p> <ul style="list-style-type: none"> <li>• Killing blows</li> <li>• Sword play, other weapons</li> <li>• Explosions</li> </ul>
Grand Theft Auto series	Rockstar Games / Rockstar North	<p><i>It gives texture to Rockstar's virtual playground.</i></p> <ul style="list-style-type: none"> <li>• Hit alert</li> <li>• Car crashes, inertia, collisions</li> <li>• Jumping off a high ledge or building</li> <li>• Thunderstorms</li> <li>• Air turbulence</li> <li>• Physical injuries and accidents.</li> </ul>
Medal of Honor series	Electronic Arts / 2051	<p><i>When there is a huge shootout, you feel the controller vibrating, making you nervous and causing you to go BERSERK.</i></p> <ul style="list-style-type: none"> <li>• Explosions from artillery fire</li> <li>• Tank movement</li> <li>• Hit alert</li> <li>• Enemy alert</li> </ul>

\*Gamer comments were edited or paraphrased to preserve the original meaning and intent.



TITLE	PUBLISHER/DEVELOPER	RUMBLE USAGE
Metal Gear Solid series	Konami / Kojima Productions	<p><i>When you meet Psycho Mantis and he moves your controller using his mind, it just adds so much more depth to the game.</i></p> <ul style="list-style-type: none"> <li>• Cut scenes, battles</li> <li>• Hit alert, with indication of where fire came from, supplies time to react</li> <li>• Enemy alert vibrates faster as enemies approach</li> <li>• Preparation for what happens next, “supplies the feel of the moment”</li> <li>• Helicopter, planes, motorcycles</li> <li>• Enemy pain when player puts them in a choke hold</li> <li>• Detection alert</li> <li>• Health alert through heartbeat</li> <li>• Sneaking up on the enemy creates suspense through heartbeat</li> <li>• Nanomachine massage after a button mashing segment</li> <li>• Cell phone calls</li> <li>• Mine detection</li> <li>• Vest rumbles when enemies are nearby</li> <li>• During sniping missions and boss fights to indicate damage being taken</li> </ul>
Ninja Gaiden	Tecmo / Tecmo Ninja	<p><i>It has the craziest rumble effects I’ve ever felt.</i></p> <ul style="list-style-type: none"> <li>• Indicates power of opponent</li> <li>• Landing on platforms</li> <li>• Attacking enemies</li> <li>• Sword fights, slashing</li> </ul>
Prince of Persia: The Sands of Time	Ubisoft / Ubisoft	<p><i>Adds to the atmosphere in remarkable ways.</i></p> <ul style="list-style-type: none"> <li>• Pillars falling, walls crumbling</li> <li>• Performing a counter attack</li> </ul>
Project Zero II	Ubisoft / Tecmo	<p><i>Wouldn’t be anywhere near as scary if it wasn’t for the heartbeat rumble.</i></p> <ul style="list-style-type: none"> <li>• Simulates character's heartbeat, which quickens and slows according to the situation, used to convey fear</li> <li>• When ghost is near</li> </ul>
Resident Evil series	Capcom / Capcom	<p><i>You can feel somebody creeping up on you, and if it didn’t have that, I probably would have gotten killed a lot sooner.</i></p> <ul style="list-style-type: none"> <li>• Gunshots, attacking</li> <li>• Floor creeks, heartbeat</li> <li>• From a dead quiet, it accompanies a monster crashing through the window, adding horror and reality</li> </ul>
Shadow of the Colossus	Sony Computer Entertainment / Sony Computer Entertainment	<p><i>Without the rumble, I wouldn’t feel like I’m holding on for dear life on this 100 foot creature.</i></p> <ul style="list-style-type: none"> <li>• Creates sense of scale, tension</li> <li>• Finding the weak point of a colossus</li> <li>• Feeling of giants approaching, walking around the player</li> <li>• Essential for tracking colossi, the purpose of the game</li> <li>• When horse riding, alerts if colossus is following</li> </ul>



TITLE	PUBLISHER/DEVELOPER	RUMBLE USAGE
Silent Hill	Konami / Konami Productions	<p><i>Because of how dark and scary it is, the rumbling just makes it more awesome!</i></p> <ul style="list-style-type: none"> <li>• Alerts when health is low, accompanies heartbeat</li> <li>• Jumps in cut scenes, feeling something that can't be seen</li> <li>• Puzzle solving</li> <li>• When about to be ambushed</li> <li>• Train</li> </ul>
SOCOM: US Navy Seals	Sony Computer Entertainment / Zipper Interactive	<p><i>Rumble is GREAT because it enables you to feel the difference between two guns with different fire rates very easily even when the difference is small.</i></p> <ul style="list-style-type: none"> <li>• Grenades and gunfire, even when weapons are silenced</li> <li>• Tank fire, bombs</li> <li>• Taking action</li> <li>• When zooming into a sniper scope, mimics player's heartbeat</li> <li>• Out of bullets</li> </ul>
Splinter Cell	Ubisoft / Ubisoft Montreal, Shanghai	<p><i>The rumble is part of game play mechanics.</i></p> <ul style="list-style-type: none"> <li>• Assists player in picking locks</li> <li>• Alerts when mines are near</li> <li>• When diffusing bombs</li> <li>• Rappelling</li> <li>• Gunfire</li> <li>• Danger warning</li> </ul>
Starfox	Nintendo / Namco; Nintendo	<p><i>Starfox 64 makes rumble packs a must, because it makes the frantic action game play more intense.</i></p> <ul style="list-style-type: none"> <li>• Shooting and explosions</li> </ul>
Tomb Raider Legend	Eidos Interactive / Crystal Dynamics	<p><i>It gives you great feeling when you are in danger.</i></p> <ul style="list-style-type: none"> <li>• Alerts player when cliffs and ledges are about to break away</li> </ul>
Zelda series	Nintendo / Nintendo	<p><i>Alerts me of vital hints and also works well during the battles to make the sword seem more real.</i></p> <ul style="list-style-type: none"> <li>• Within a fishing mini game, simulates the tug of fish biting and struggling on the line</li> <li>• Supplies hints to secret locations, acting as sixth sense</li> <li>• Horse riding effect</li> <li>• During castle destruction</li> </ul>

## Fighting Games

TITLE	PUBLISHER/DEVELOPER	RUMBLE USAGE
Fight Night Round 3	Electronic Arts / Electronic Arts	<i>Without rumble, the punches wouldn't have as big an effect. They would seem weak.</i> <ul style="list-style-type: none"><li>• Indicates strength of punches given and received</li></ul>
Soul Caliber series	Namco / Namco	<i>When my character is hit, it gives me a real sense of immersion in knowing what my character is going through.</i> <ul style="list-style-type: none"><li>• Alerts when player blocked or hit and sense of intensity</li><li>• Alerts for needing to dodge something</li><li>• Landing punches and sense of intensity</li><li>• Alerts when animal attacks from behind</li></ul>
Tekken	Namco/ Namco	<i>Feeling every kick and punch really immerses me in the gameplay.</i> <ul style="list-style-type: none"><li>• Alerts when player blocked</li><li>• Punches and their severity</li></ul>
The Warriors	Rockstar Games / Rockstar Toronto	<i>When robbing someone or getting arrested by the cops you use the rumble in different ways.</i> <ul style="list-style-type: none"><li>• Tagging, fighting, lock picking</li><li>• Needed for mugging people and breaking into stores</li></ul>

## Racing Games

TITLE	PUBLISHER/DEVELOPER	RUMBLE USAGE
Burnout 2	Acclaim / Criterion Games	<p><i>You get caught up tapping the B button and boom! your car explodes, and you feel the vibration.</i></p> <ul style="list-style-type: none"> <li>• Information on game status independent of visual and sound cues</li> <li>• Crashes and collisions</li> <li>• Off-road terrain</li> </ul>
Gran Turismo series	Sony Computer Entertainment / Polyphony Digital	<p><i>Without rumble, it would be hard to know when you are off the road, especially when you are checking who is coming.</i></p> <ul style="list-style-type: none"> <li>• Slight vibrations when turning corners</li> <li>• Bumping into other cars</li> <li>• Curbs, bumps, crashes</li> <li>• Terrain differences, making it easier to judge grip and stability</li> <li>• Traction and loss of traction</li> <li>• Wheel shimmy, giving information on when player is pushing the vehicle too hard</li> </ul>
Need for Speed	Electronic Arts / Electronic Arts	<p><i>Every time you get hit, you crash, you fall, etc. not only do you see it on screen but you feel it creating a bigger sense of awareness.</i></p> <ul style="list-style-type: none"> <li>• Car acceleration, shifting, speed, supplying sense of how much control player has</li> <li>• Alerts for police in the area</li> <li>• Terrain</li> <li>• Crashes and obstacles, indication of how hard the hit</li> </ul>
Project Gotham Racing 3	Microsoft / Bizarre Creations	<p><i>It feels great when driving over different terrains.</i></p> <ul style="list-style-type: none"> <li>• Indicates when running on the edge of a chicane or off the road surface</li> <li>• When another car behind or in the blind spot makes contact</li> <li>• Bumps, changing gears, crashes</li> <li>• Unevenness of streets</li> <li>• Acceleration/deceleration</li> <li>• Slides, collisions</li> </ul>

## Shooter Games

TITLE	PUBLISHER/DEVELOPER	RUMBLE USAGE
Battlefield 2	Electronic Arts / Digital Illusions	<p><i>The rumble makes explosions and gun fire seem like you're there.</i></p> <ul style="list-style-type: none"> <li>• Status of character and other events that may be off screen allowing players to focus on what is in front of them</li> <li>• Health/life indication alert</li> <li>• Signals sniping from a tower or bunker</li> <li>• Explosions, gun fire</li> <li>• Tank and vehicle driving</li> </ul>
Brothers in Arms series	Ubisoft / Ubisoft	<p><i>If enemy bullets are near, I can feel a long shake in the controller, and I also know that my position on the battlefield is not good.</i></p> <ul style="list-style-type: none"> <li>• Bullets flying and their proximity to the player</li> </ul>
Call of Duty	Activision / Infinity Ward	<p><i>The rumble shortens my reaction time.</i></p> <ul style="list-style-type: none"> <li>• Alerts when hit, helps player judge the level of damage taken</li> <li>• Weapons firing, explosions</li> <li>• Airplanes flying over</li> </ul>
Ghost Recon Advanced Warfighter	Ubisoft / Ubisoft	<p><i>The rumble makes me feel like I'm really in danger.</i></p> <ul style="list-style-type: none"> <li>• Hit detection</li> <li>• Weapons firing</li> <li>• Helicopter</li> <li>• Explosions and their proximity</li> </ul>
Halo series	Microsoft / Bungie Software	<p><i>You get an instant response for every 'wrong' step, and you also don't have to check on your life energy every now and then.</i></p> <ul style="list-style-type: none"> <li>• Energy level</li> <li>• The level of charge in weapons</li> <li>• Off-screen shooter location</li> <li>• Hit alert and severity of hits</li> <li>• Grenade launching</li> <li>• Explosions and sniper shots</li> <li>• Hitting someone with the butt of your rifle</li> <li>• Weapon fire and recoil</li> <li>• Rocket launching</li> <li>• Shaking of the ships during the film clips</li> </ul>
Killzone	Sony Computer Entertainment / Guerilla	<p><i>Uses the rumble to great effect when immersing you in the experience the game is trying to portray.</i></p> <ul style="list-style-type: none"> <li>• Explosion, gunfire</li> <li>• Hits</li> <li>• Damage received</li> </ul>

## Sports or Other Games

TITLE	PUBLISHER/DEVELOPER	RUMBLE USAGE
Madden series	Electronic Arts / Electronic Arts	<i>You can get the full experience of the field with rumble.</i> <ul style="list-style-type: none"> <li>• Tackles, with indication of strength</li> </ul>
Table Tennis	Rockstar Games / Rockstar San Diego	<i>The main serving mechanic is based on the vibration of the controller. Without it, the game becomes impossible to play (and less fun).</i> <ul style="list-style-type: none"> <li>• Alerts player if they are overspinning or aiming incorrectly</li> <li>• Indicates quality of returned shot</li> </ul>
Ace Combat	Namco / Namco	<i>If the controller doesn't stop shaking that means I'm in big trouble.</i> <ul style="list-style-type: none"> <li>• Missile hits, with increasing rumble for increasing action</li> <li>• Siren alerts</li> <li>• Player taking damage</li> <li>• How hard player is pushing the aircraft through varying throttle and g-force intensity</li> <li>• Stalls, turbulence</li> <li>• Jet engines and afterburner boost</li> </ul>
Jak and Daxter series	Sony Computer Entertainment / Naughty Dog Software	<i>The rumble works along with the graphics and music and makes you feel like you're there.</i> <ul style="list-style-type: none"> <li>• Breaking objects</li> </ul>
Ratchet and Clank series	Sony Computer Entertainment / Insomniac Games	<i>Adds to the explosive feeling!</i> <ul style="list-style-type: none"> <li>• Weapons</li> <li>• Damage to player and enemy</li> </ul>
Super Mario series	Nintendo / Nintendo	<i>Provides a realistic feel to this fun cartoon-like game.</i> <ul style="list-style-type: none"> <li>• When pulling tentacles off an octopus "feels like you are really holding it in your hand"</li> <li>• Using a hammer</li> <li>• Falling, kicking, gunfire, dying</li> </ul>
Wario Ware, Inc. Mega Party Games	Nintendo / Nintendo	<i>Many interesting uses for the rumble effect.</i> <ul style="list-style-type: none"> <li>• To distract other players</li> </ul>
Final Fantasy series	Square Enix / Square Enix	<i>In Final Fantasy VIII, when you press R1 at the right time when you attack an enemy, you feel like you've done something amazing.</i> <ul style="list-style-type: none"> <li>• Spell effects</li> <li>• Cut scenes</li> </ul>



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