Input Devices: Crash Course Games #24

Crash Course: Games
https://youtube.com/watch?v=rR_mmsfIzzs
https://nerdfighteria.info/v/rR_mmsfIzzs

Hi! I'm Andre Meadows and this is Crash Course Games. Today we are going to be talking about input devices and how they have a role in the complexity, sensitivity, and interactivity in games. In other words: we're going to talk about why controllers matter.

So, an input device is really just any hardware device that can be plugged into a computer, providing data and control signals to the computer. Basically, input devices are how people talk to the computer and tell it what to do. And a big part of gaming relies on the type of control the player has over actions within a game.

The player's intentions should be able to translate directly into the input device and the computer should be able to provide feedback from that input just as quickly. And it's that constant feedback loop from your brain, to your fingertips, to the input device, to the computer, to the action taking place on the screen, that is the foundation of gameplay.

[Theme Music]

So, each input device has its own qualities that make it better for certain functions than others. And the specific type of input device and how it's used can greatly impact gameplay. Even just the feel of a controller – its weight, shape, and button configuration – can have a big impact on the gaming experience.

For example, one study compared the use of a bongo drum vs. a standard controller in Donkey Kong: Jungle Beat on the GameCube. Both devices were designed for this type of gameplay and researchers found that the specific device used didn't actually affect the performance of the player. However, they did find that players were more engaged when using the bongos versus the controller.

The bongos helped players feel as though they were part of the game, playing a real instrument, while the controller still felt like an intermediary between the player and the game. This may shed some light on the success of gaming peripherals like those plastic guitars in Rock Band and Guitar Hero, but it also hits at the heart of controller design. Controllers must meet the needs of the game, but they also need to facilitate a positive gaming experience for the player.

And game controllers have come a long way since the early consoles, so let's start by breaking controller design into five eras of gaming: The Classic Era, the D-Pad Era, the Analog Era, the Motion Tracking Era, and the Modern Era.

Let's start with the Classic Era and one of the earliest arcade video games – Atari's Pong released in 1972. Pong had controllers that used a round wheel that could be turned to move a player's paddle up or down the screen. These controllers would become known as paddles for the object they were controlling.

But paddle controllers could only move objects in 1 dimension, which was great for games like Pong and Breakout but wouldn't work so great for a game like Pac-Man. Until the early 1980s, there still really wasn't a standard for game controllers. It was a period of trial and error to see what would work – the Atari 2600 alone had at least a dozen different controller designs in its lifetime.

One of the most well-known input devices of this time was Atari's joystick. The joystick could move in four directions, featured one button, and was simple enough that players could easily learn how to use it. But the joystick was also bulky and cumbersome. And in order to perform more advanced actions, the player would have to juggle both the joystick and paddle controller at the same time.

So, as game designers pushed forward towards more advanced ideas for games, the limitations of these devices were soon realized. In order to create games where players could move, jump, and attack all at the same time, a new input device would have to be created.

The D-Pad era was a step towards an advanced 2D input device allowing for better gaming on the part of the game design and the player. The D-Pad was the brainchild of Gunpei Yokoi, who created it for the 1982 Game and Watch version of Nintendo's Donkey Kong. Now, the original Game and Watch used just two switches that moved either left or right. But in order to move to more complex gameplay, they needed a way to move characters in four directions – not just two. Because the game unit was so small, the standard joystick couldn't be used and so Yokoi decided to add two more switches.

Unfortunately, this made gameplay feel awkward for players. It was difficult to remember which switch controlled which specific action. The solution was to connect these switches in a "cross-shaped, thumb-operated, micro – switched lever capable of moving in four directions. "And thus, the D-Pad was born and would reign supreme."

And the D-Pad era really was dominated by Nintendo with the basic design and configuration of the NES and Super NES controllers. These were used as inspiration for the majority of controllers to come. In addition to the D-Pad, the NES controller featured multiple buttons, which meant that games could now be designed so that players could perform separate actions, like, jumping and attacking an enemy at the same time. And the Super NES included shoulder buttons that allowed for even more complexity in game design, such as simultaneous input like aiming and firing in Super Metroid.

Moving forward, game creators again started looking to improve and challenge game design, this time moving into 3D. But to do this, they would need a controller that could handle that extra dimension. Enter analog joysticks. So, let's start by talking about the Nintendo 64 controller. I know some of you hate it because it's big and bulky or because Mario Party gave you blisters, but it's still an important part of this era.

Now we've talked about this before in our episode on immersive games, but the N64 controller was created specifically to handle the 3D worlds of games like Super Mario 64. It featured a D-Pad and shoulder buttons, but more importantly it featured a thumb-stick. Now, the thumb-stick for this controller is often referred to as an analog stick, but, as we mentioned in an earlier episode, it wasn't technically analog – it just had the attributes of an analog stick.

Either way, the change allowed for varying levels of input, more precise movements, and nearly 360 degrees of control which was crucial for navigating the 3D worlds. The N64 controller also introduced the Rumble Pak. This addition allowed players to engage three senses. They could now see, hear, and feel feedback from the game, making the controller and player feel more a part of the game.

But of course, the complexity of 3D games increased. Players needed to be able to precisely move around and look around the 3D environments in their games. Enter: PlayStation's Dual Analog controller, which featured two true analog sticks that allowed players to control movement and the camera with their thumbs for a more accurate and precise experience. The release of the dual analog controller gained interest from several game developers including the people behind Ape Escape – the first game to require use of both analog sticks.

We now move forward to the Motion Tracking Era, which made way for motion sensitive input devices. These devices tried to take

games to a more immersive level by extending them to the physical world. So, think devices like the Wii Remote, Xbox Kinect, and PlayStation Move. Let's go to the Thought Bubble.

Once again, Nintendo made a huge impact on the industry during this era with its Wii controller. This controller used an accelerometer and an optical sensor to track the remote's motion. So, instead of having to press a button to make an action happen, the controller took advantage of our natural movements, allowing the player to move their character through their own physical body movement. And the ease of use for the Wiimote made this device successful in a whole new demographic.

The controller was able to bridge the gap between more complex dual analog controllers and an older population that couldn't manage the large learning curve. For example, with the Wii, players could pick up the controller and perform a movement that they already know how to do, such as swinging the controller just like a tennis racket to hit the virtual tennis ball. Quite an evolution from the early days of Pong.

A few years after the Wii, PlayStation made their move towards motion tracking with well, the Move. Unfortunately, the Move didn't really come up with anything revolutionary, instead effectively iterating on the Wii controller. But it does show how the industry was starting to shift towards this more interactive style of gaming. And then there's the Xbox Kinect, which tried to capitalize on what the Wii was achieving with motion tracking. Unlike the Wii, the Kinect allowed the player to use their body as the controller by tracking the player's movements through an RGB camera, and range sensors, and even tracking their voice through a microphone.

And though it seemed it would have been a big step forward for immersive play, the Kinect didn't quite hit the mark. As journalist Paul Tassi of Forbes pointed out, "The Kinect was impressive in tech demos, but in actual living rooms, consumers quickly found the actual functionality of the device was limited, and rarely worth the purchase outside of a few voice commands (when they worked) and a few sporadic dance or sports titles." But hey – Dance Central was fun.

Thanks Thought Bubble! So this brings us to the Modern Era. Kinect sales are slumping and it is no longer required with the purchase of an Xbox One. The PlayStation Move hasn't been updated since 2010.

And Nintendo's latest console, the Wii U, has been a commercial flop reaching only 10% of the sales of the original Wii. It seems like the era of motion tracking controls are over. Well, except in the VR space – we talked about that in the VR episode. So PlayStation Move, you might have a comeback! We'll see.

But that doesn't mean control design innovation has stopped. Microsoft's head of Xbox accessories Zulfi Alam has touted that hundreds of millions of dollars were spent on some 40 improvements between the Xbox 360 controller and the Xbox One controller. Now, they may not look that different, but purportedly researchers tested the controller with hundreds of gamers to improve functions such as controller contour and weight, latency between the controller and console, and even the clickiness of the d-pad.

And Sony's Mark Cerny told IGN that when creating their DualShock 4 controller for the PlayStation 4, they actively sent prototypes to major First Person Shooter developers to help better inform everything from trigger pressure and trigger location to angle of the controller to optimize the experience for FPS players. So the world of game controllers seems to be continually iterating with a focus on player experience, but one of the biggest gaming platforms at the moment has seen little progress: mobile gaming.

Mobile games, which are primarily played on smartphones and tablets, don't have any sort of tactile feedback. And the industry has tried to respond. There is basically an entire sector of smartphone peripherals to make our devices feel more like a handheld with a d-pad and clicky buttons and everything. And many phone manufacturers have turned to haptic feedback in the form of short vibrations to give the player some sense that a button has been pressed. But most notably, it seems like developers are designing games that effectively use the screen and get around this problem.

Take Angry Birds for example. Angry Birds uses a control scheme that doesn't doesn't require tactility to play. The slingshot mechanism in that game doesn't require timing, but instead only aim which you can see and are given feedback directly on the screen. And games that do require more precise timing, like Fruit Ninja, again don't require clicks but instead swipes on the screen, which can be seen by the player.

So input devices have come a long way becoming increasingly complex and interactive. And with new devices such as the Quadstick – a hands-free input device designed specifically for quadriplegics – more players than ever are able to play games.

And who knows what's next. I mean there are even games out there right now that are powered by brain activity. That's right: mind control. Thanks for watching and I'll see you next week. I'm going to go play Qbert. On the arcade. Because that diagonal stick, that's the only way to play that. You can't D-pad or analog that.

Stan Muller: Crash Course Games is filmed in the Chad and Stacey Emigholz Studio in Indianapolis, Indiana, and it's made with the help of all these nice people. If you'd like to keep Crash Course free for everyone, forever, you can support the series at Patreon, a crowdfunding platform that allows you to support the content you love.

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