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*Gyroscope-Focused Mobile Game*

The following proposal will discuss various aspects of Rolling Star, including its concept, gameplay structure, intended audience, and more.

**Conceptualization and Purpose**

Rolling Star was born out of the desire to develop a video game concept with two key elements: a unique and unexplored method of gameplay, and a home on mobile platforms. Looking at various successful mobile games, one thing they share in common is the way that they make use of the smartphone’s unique features while remaining intuitive to play. This can range from the phone’s touch screen (see *Angry Birds*) to the GPS (see *Pokemon Go*). After some deliberation, it became the goal of Rolling Star to create a game along these lines with an oft-ignored feature as the primary method of control – the phone’s gyroscope.

The gyroscope is a standard feature found within most modern smartphones that allows the phone’s orientation to be easily detected. This is used for various purposes; mobile users can hold their phone in either a vertical or horizontal orientation depending on what they are doing, and certain preset functions of the phone are tied to gyroscope detective, such as a sleeping phone’s screen activating if it is turned upwards. Twisting and turning a phone around is a simple and intuitive action that many can grasp. Despite this, it has been underutilized as a core component of control in the gaming space.

The gyroscope is frequently incorporated as a secondary control method in various genres of games, such as racing or shooting games. However, I believe there is a fundamental issue with the usage of these controls on a mobile device. If players rotate their smartphone in order to steer a car or aim a reticle, the entire screen will move as a result of the smartphone unifying display and controller into one device. This can make it much more difficult for players to maintain their focus and see everything that they need to. As such, the challenge that Rolling Star takes on is creating a game where tilting the phone in certain directions does not impact the visibility of the playing environment negatively.

The turning point for the conceptualization of the game was the idea of having the environment stay static regardless of the phone’s orientation and tying the game’s camera to the player’s movement instead. This brought to mind the traditional “ball-in-a-maze” puzzle, in which a small ball is contained in a tightly condensed maze (often circular in nature), and the maze must be rotated in order for the ball to be guided from the outer layers inward. By tying the game experience to something physical, players would be more likely to intuitively understand the controls and goal of the game. Through further iteration and development, the concept for Rolling Star was fully born.

**Gameplay**

Rolling Star is a game that blends elements of platformer and puzzle games, while also befitting the casual genre in its simplicity. The game stands out from others of its kind in that players technically have direct control over the environment rather than a character. Nonetheless, a “player character” role is assigned to the equivalent to the ball in a ball-in-a-maze puzzle. The ball is placed in the outermost layer of a circular maze, and it is the goal of the player to direct that ball to the goal at the center of the maze.

Players are instructed to hold their phone screen in horizontal orientation to maximize the horizontal view of the level. From this position, if the player rotates the phone left or right, then the environment will turn with it, remaining static in its position on the phone screen. From there, a physics system placed on the player character will cause it to roll in tandem with the position of the environment (e.g. if the phone is tilted to the left, then the environment is slanted towards the left, and the character will roll in that direction).

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Figure 1: Colored diagram showcasing how the gyroscopic gameplay of Rolling Star functions. The environment stays static on the screen, but the character has a singular point of gravity, so they roll down the slanted terrain.

Gravity in Rolling Star is typically assumed to be pointing downwards, much like in real life. This makes the process of rolling the character across a horizontal plane intuitive in execution, but the character must also have some way to ascend vertically in order to reach the center of the level. With a ball-in-a-maze puzzle, this is typically done by tilting the puzzle upwards. However, if players are forced to tilt their screen too far upwards, the issue of not being able to see the playing field clearly still remains. As a solution to this, the character is instead given something akin to a “jump” function found in platformers. If players give their phone a quick shake in the vertical axis, the environment will briefly tremor as well, triggering a quick leap of the player character. This allows the character to quickly ascend levels without sacrificing visibility. Furthermore, the snappy nature of this jump compared to having them roll upwards allows for the implementation of avoidable hazards and level design that adhere much closer to the platforming genre.

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Figure 2: Colored diagram of the "jump" function in Rolling Star. A quick shake of the phone causes the environment in the game to shake as well, and this launches the player character upwards if they are resting on the ground.

The content of Rolling Star is divided into a level-based structure. When players boot up the game for the first time, they are presented with the story and then dropped into a basic tutorial stage that demonstrates the important concepts and controls of the game (this will be discussed further in the “Presentation and UI” section). Following this, strings of levels are encountered within self-contained worlds. Once all of the levels in a world are successfully completed in order, the player will be allowed to move on to the next world. A world’s levels are typically unified both in their visual theming as well as certain mechanical or gameplay elements that reoccur throughout the stages, so that players may gradually come to grasp with everything that the gameplay system of Rolling Star has to offer.

Diagram

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Figure 3: Sketched examples of various level concepts. A brief description of important symbols follows. The star-symbol is where the player spawns in at the beginning of the level. The vortex-symbol is the goal the player must reach. Lines indicate flooring the player can traverse on (and likewise, gaps in the lines indicate holes the player can fall through). Arrow signs and danger signs are decorative elements to direct players’ attention. Small diamonds indicate common currency collectibles, while numbered comet-shaped objects indicate level-specific collectibles. The cloud-like objects are semi-solid platforms; the lined part is solid and cannot be passed in that direction, while the bumpy part isn’t solid and can be passed in that direction. Jagged triangular lines indicate harmful spikes. Rectangles with key holes cannot be opened without a collected key. Some platforms and devices are marked with dots and arrows to indicate that they move and follow a path. Hazards in the final level include cannons that rotate to target onto the player before firing, and spiked walls that move at varying speeds if you approach their elevation.

There are multiple fail states that exist within a level of Rolling Star. The main character has a health system players much keep track of. Health can be lost by running into dangerous hazards, or by falling out of bounds in stages where there might be gaps to cross on the outer layer. The player character has a default of 5 health points (designated by the five points of the star; for each point of health lost, one chunk of the star will lose its luster), and if all of them are lost, the character is knocked off the screen and the level must be retried from the start. Certain stages may also feature unique fail states tied to other tracked elements, such as a time limit, or a control limit for how much you can rotate or shake a stage. Unlike health, these fail states are a singular pass-or-fail method; if the player does not clear a level within the time or control limit, they are automatically stripped of all their health and must restart the level from the beginning.

Completion of a level provides players with an in-depth ranking system that informs them of how they performed. The ranking system is divided into several categories: health, time, score, and control. Health rewards players who take little to no damage within the level. Time rewards players based on the time it took them to complete a single successful run of the level, with certain benchmarks in place for every individual level that can be cleared. Score rewards players who go out of their way to grab a set of special collectibles which are placed throughout levels in areas that typically demand advanced maneuvers. Finally, control rewards players based on the total cumulative degrees in which the environment was rotated to clear a level. Much like with time, specific benchmarks to pass for control are set for each level. Players are evaluated and rewarded based on their performance in these criteria. Although the player does not need to clear every category in one run in order for their best results to be tracked, those who do manage such a feat will receive a special, otherwise-hidden marker on the level to denote their expertise.

**Story**

Befitting the game’s casual nature and gameplay-first focus, the plotline of Rolling Star is minimal, yet provides just enough depth to encourage the player to continue their adventure. The player character is a shooting star, known as Astrol, who is falling towards Earth in order to grant the wishes of people. However, a cluster of space debris appears in Astrol’s path. Try as they might to avoid it, Astrol eventually makes a direct collision with the debris and gets knocked far away from their path towards Earth. It is the player’s goal to help Astrol navigate through the expanses of space and guide them back to Earth.

Diagram

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Figure 4: Storyboard for the opening cutscene of Rolling Star, viewed upon first booting up the game.

After players clear a world, they are given a brief, picture-based cutscene as a reward for their accomplishments. These cutscenes tend to focus either on Astrol’s progress in navigating back to Earth or other comical events they find themselves in, and they also usually provide a glimpse of what the next world will be like. As previously stated, Rolling Star is not meant to be a game with a sophisticated plotline, but the addition of simple cutscenes helps to reinforce the player’s goal and also provide a pace breaker in between challenging levels (akin to the between-level cutscenes found in early arcade games such as *Pac-Man*).

Diagram

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Figure 5: Concept art and final design for the playable character, Astrol. Their name is a portmanteau of the words "astral" and "roll".

**Presentation and UI**

In order to give Rolling Star its own identity and separate it from its physical inspiration, the game takes on an outer space motif for much of the game’s visual elements. The “ball” is replaced with a rounded star character, the mazes that players navigate are contextualized as abstract formations of space debris, and the backgrounds of levels are often darker stretches of space that provide contrast with the brighter platforms Astrol navigates atop. As players progress further and further into the game, the background and theming of the levels shift dramatically; since space is a vast and unexplored frontier, it provides ample creativity and reason to keep players engaged. The focus on space as the setting also meshes well with the game’s focus on innovation as well as the importance of gravity and ascension in the gameplay.

The audio design of Rolling Star also takes cue from its outer space motif. The game’s soundtrack is comprised primarily of synthesized instruments, befitting the otherworldly environments. Despite this, the compositional structure of the soundtrack would be more in line with pre-existing genres that are familiar to a wide audience, as opposed to a more experimental soundtrack typical of sci-fi material. Menu music will generally be more subdued, while stage music will be more energetic and light-hearted to fit the action-focused environment. Audio design also plays a vital role in communicating the movement of the player character, Astrol. As players move their environment further and Astrol gains speed, their rolling sound effect grows more pronounced and is accompanied by a twinkling noise (other games such as *Super Monkey Ball* or *Katamari Damacy* use sound design similarly). This sound is accompanied by increased visual effects on Astrol to sell the idea of playing as a shooting star.

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Figure 6: Mockup of the game's title screen, featuring key art of the main character Astrol traversing a maze in space. Note the visual effects and trail that signify Astrol is moving at a high speed.

When a player boots up Rolling Star, they are greeted to a title screen displaying the logo and key art of the game, at which point the player is instructed to hold their phone in the proper orientation and tap the screen to continue. If this is their first time playing the game, the intro cutscene depicting the story plays. Immediately after, they are dropped into a tutorial stage, where non-intrusive text appears to guide the player on how the controls work in a safe environment.

This environment is also where players are introduced to the in-game level UI for the first time. During levels, minimizing the amount of space that UI functionality takes up is important so that as much of the level as possible is visible. By default, the top-right corner of the screen features a button to pause the game (though options allow this to be switched to either the top-left or both corners, to accommodate for players with different dominant hands). The pause screen freezes all action, provides detailed statistics about your performance so far, and gives players the option to continue, retry, or quit the stage. If players hit continue from the pause menu or lock the game and open it back up during a level, they are given a window to place their phone in the correct orientation before gameplay continues. Likewise, the bottom-right (or bottom-left) corners are home to recalibration buttons; pressing these allows the gyroscope and direction of gravity to be manually reset if it ever decalibrates during gameplay. The top middle of the screen provides a semi-transparent display of the collectibles in the stage, as well as time and control information that proves pertinent to clearing levels efficiently.

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Figure 7: A mockup of the UI within a level, using the tutorial level sketch provided above as an example.

If a returning player opens the game, the title screen will give them the option to immediately move on to a level they have not cleared, or enter the main menu. Because of the game’s casual nature, the ability to quickly get in and out of gameplay as well is crucial, and as such menus need to be designed extremely efficiently. In a general rule of thumb, Rolling Star’s menus are designed to not require more than three clicks to reach a desired option. The main menu is divided into several components; the largest of which takes players to the level select. Other options on the main menu include access to a shop for purchase of items using either in-game or real-world currency, play stats, training through a replay of the tutorial stage, and an options menu for adjusting things such as volume, level menu orientation, and gyroscope sensitivity.

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Figure 8: A mockup of the game's main menu, accessible if returning players choose not to access uncleared levels from the title screen. The level select is the largest option and marked in a red color to signify its importance. The shop, statistics, tutorial, and options are located in smaller blue buttons to the right.

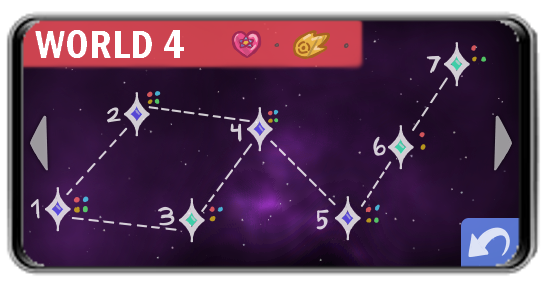


Figure 9: A mockup of the level select screen. The organization of levels takes the appearance of a constellation, with levels being represented as stars. The star's inner color denotes its status: red means incomplete, green means complete without all rank criteria met, blue means complete with all rank criteria met, and rainbow means complete with all rank criteria in a single run. Small dots next to each level indicate which rank criteria have been met, and if every level in a world has a certain criteria met, a medal will be awarded next to the world name. Tapping or swiping by the left and right arrows moves to a different world, and the back button returns the player to the main menu.

**Audience and Platform**

Given the casual nature of this game, the main age ranges that are being targeted as the audience for this game (based on the categories for the ESA’s *2020 Essential Facts About the Video Game Industry*) are “under 18” and “18-34”. These age ranges combined make for over 50% of the video game market. The “18-34” range is focused on because this age range has an extremely high percentage of smartphone ownership in various advanced economies according to Pew Research articles, while the “under 18” age range is being targeted thanks to the casual and simple-to-understand nature of the video game, and the fact that its genre is more accessible to this audience than genres popular with older video game players, such as shooters or action games.

While Rolling Star does not have any plans to cater specifically to one gender over the other, as the balance between male and female video game players is close to equal, it is expected that the game will be more popular with women. Women in the age range of “18-34” are much more likely to play both smartphone games and casual games compared to their male counterparts. However, this is not to say that there is not a potential male audience for Rolling Star, especially in the “under 18” age range where younger kids are more likely to play casual games due to not having access to other genres preferred by older men such as action-adventure games or shooters.

The decision to make Rolling Star a mobile game has various reasons. In the interest of attracting a wide audience, it should be noted that the smartphone is the most common device used by adolescents for video game play according to the ESA, at 61%, compared to 52% or 49% for using a dedicated gaming console or PC respectively. Furthermore, the emphasis on the gyroscope for the control scheme of the game means that the game wouldn’t fit as well elsewhere. Although some dedicated video game consoles feature gyroscope support within their controllers, none of these controllers feature a screen on them, meaning that players would feel a disconnect between the movement of their controller and the action that occurs in the game.

With regards to mobile phone platforms, the two largest by far are Android and iOS. It should be no surprise that these two are top priority in providing support for the game. In particular, Android is the first platform of choice for several reasons. For one, it has a much larger userbase compared to iOS. Furthermore, according to Statista, pre-existing video game players are far more likely to own an Android device compared to an iOS device. Of course, iOS support does have its merits. It is the second-largest mobile platform, and according to TechJury, video games have a higher download rate on this platform compared to Android. In the interest of prioritizing one platform first, though, Android comes out on top.

Given that this proposal concerns a mobile game, it is important to discuss the monetization of Rolling Star. The mobile game market is very different compared to console or PC games when it comes to pricing. Whereas it is the norm for players in those markets to pay premium prices for their video games, research from Statista indicates that free-to-play games actually account for the bulk of mobile game revenue compared to even cheaply-priced games. Many of the largest games on both Android and iOS are completely free of charge to download, and instead feature other methods of monetization. Rolling Star should remain free-to-play on both Android and iOS platforms in order to remain competitive, and monetization can be accomplished through other means, such as in-game purchases (character cosmetics, power-ups, etc.) or advertisements in between play breaks.

**What’s Next?**

In creating this proposal, I have focused on explaining the core essentials of Rolling Star. These include its purpose, gameplay, basic structure, and presentation. However, there is plenty of room for the scope of this game to grow depending on the level of success and investment it receives. The following is a list of future considerations and features that can help to expand the game’s popularity and replayability but betray the current scope of the project:

* Daily and/or weekly challenges (a steady stream of new things for players to do in between major content updates)
* Advanced cosmetic features (current ideas for monetization and/or in-game currency usage is restricted to power ups and basic character cosmetics such as simple costumes or color changes, but this can be expanded on further as new content is added)
* Endless mode (a randomly-generated, endless expanse of stage that players are encouraged to travel as far in as possible, allowing for theoretically new gameplay loops even for players who have cleared every level)
* Boss encounter stages (currently, there are no plans for typical boss encounters in Rolling Star, but the game’s controls do have all the necessary mechanics (movement, a jump attack, and health) to support platformer-esque boss encounters)
* Leaderboards (For advanced players who wish to take their gameplay to the next level, leaderboards that display the best performance on levels from players around the world is a valuable resource)
* Multiplayer support (The ability to interact with multiple players across the globe is a critical component of many of the most successful mobile games, but incorporating such a feature within the gameplay constraints of Rolling Star would require a lot of time and consideration)

**Citations**

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