

# Engaging the Players with the Use of Real-Time Weather Data

Envolvendo os Jogadores Através do  
Uso de Dados Meteorológicos em Tempo  
Real

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## Resumo

Este artigo apresenta um jogo, os Feiticeiros do Tempo, que recorre a dados meteorológicos reais para melhor envolver os jogadores. Como o jogo é influenciado pelo estado do tempo atual a atenção dos jogadores não se foca apenas no ecrã, mas também no ambiente em que estes estão inseridos. Olhando para o exterior, ou sentindo a temperatura que faz lá fora, um jogador poderá decidir quando e como jogar.

No contexto do jogo, os jogadores assumem o papel de um feiticeiro e combatem outros feiticeiros equipados com um grimório de encantamentos. Cada feitiço fica mais forte se o elemento meteorológico com que este se encontra relacionado estiver presente no local do duelo.

Para facilitar a mobilidade dos jogadores, os Feiticeiros do Tempo são uma aplicação para telemóveis.

*Palavras-chave:* tempo, meteorologia, entretenimento, jogos pervasivos, jogos baseados na localização, jogos para telemóveis.

## Abstract

This article presents Weather Wizards, a game that uses real-time weather data as a way to engage players in the gameplay. As the game is influenced by the current weather the player's attention will not only be focused on a screen but also on the environment around her. By just looking out the window and by feeling the temperature outside the player may decide when and how to play.

In the context of the game, the player assumes the role of a wizard and, equipped with a grimoire of spells, duels other wizards. The spells become stronger if the weather element they are related to is present at the duel location.

To enhance the mobility of players, Weather Wizards is implemented as a mobile application.

*Keywords:* weather, meteorology, entertainment, pervasive games, location based games, mobile games.

## 1. Introduction

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Pervasive games are games that merge with the real world. According to (Magerkurth 2005) a pervasive game is a “*genre in which traditional, real-world games are augmented with computing functionality, or, depending on the perspective, purely virtual computer entertainment is brought back to the real world*”. There are diverse ways to bring together games and the real world. One may capture sound and video from the outside. With a video camera it is possible, for example, to detect faces and gestures, to track movement or to make use of augmented reality with markers. Another possibility is to use the amount of sound the microphone is detecting, the sound wave or the frequency spectrum, or resorting to speech recognition in order to influence the game. The player’s location, activities or emotions provide other forms of real world input to the game. Another option is to use the real weather. Here, the focus will be on that particular form of real world input, the weather. A game that makes use of this real world element is presented in the next section.

## 2. Weather Wizards

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Weather Wizards is a competitive game that interfaces with users via a mobile application. Here, the player is a wizard. She duels other players, resorting to the spells in her grimoire, at a certain duel location. Each possible duel location corresponds to the real location of another player. The wizard’s chance of winning the duel will be influenced by the real weather at the duel location.

### 2.1. Spells

Each wizard possesses a grimoire with spells. Newbies have only one basic attack spell. The basic attack spell is not dependent on weather conditions, but it is weak. However, as a player enters more duels she gains coins and, with those coins, she can pay the fees at Wizard School and attend classes to learn other spells. The really powerful spells are the weather spells. There are weather attack spells and weather defensive spells. The weather attack spell types are: clear sky, rain, snow, fog, thunderstorm, thunderstorm with rain, thunderstorm with snow, hot, warm and cold. So if the player has the clear sky attack spell in her grimoire, and the sun is shining at the duel location, the clear sky attack spell will absorb energy from this weather condition and will become stronger. Similarly, if the wizard knows the cold attack spell and the temperature is low at the duel location that will result in a stronger attack to the

rival wizard. As weather attack spells will lose strength at locations where their specific weather element is not present, players will stand a higher chance of winning a duel at locations where the weather matches the weather attack spells in their grimoire.

As for the weather defensive spells, those have the same categories as the weather attack spells, but their role is to defend the wizard. A thunderstorm defensive spell, for instance, will shield the wizard against thunderstorm attack spells from rivals.

The wizard can become more proficient on each spell type. For example, just after learning the rain attack spell the strength of this attack is low. However, as a player wins more coins she can go back to Wizard School and train a chosen spell to raise its level. As the level of a weather attack spell rises the strength of that attack will increase. It is also possible to upgrade the level of a weather defensive spell. A low level snow defensive spell will hardly divert any strength from an incoming snow attack spell. However, as the snow defensive spell's level rises the amount of damage to the defending wizard will decrease.

Not all spells in Wizard School can be learned by all wizards. Some spells can only be learned after the wizard reaches a certain level. The wizard's level increases as she gains more experience from fighting other wizards.

## **2.2. Duels**

Each duel occurs at a certain duel location. That location corresponds to the real location of one of the two opponent wizards. The duel background shows the real weather at that location. Each wizard will take turns to cast an attack spell on the rival wizard. So, in a certain round one of the wizards is the attacker and the other is the defender. In the next round the roles are reversed. Sometimes, as in this game magic is dependent from luck, an attack might miss the target. If the attack does not miss then the life of the defending wizard will decrease. The duel ends when the life of one of the wizards is equal to zero or after a maximum number of rounds has elapsed.

The attack spell cast by a wizard is chosen randomly from all the attack spells in that wizard's grimoire. The player can activate and deactivate attack spells in her grimoire. If the player attacks another wizard at a sunny location, the snow attack spell will become weaker. However, even if the snow attack spell is weaker it may still be chosen as the one to cast. Therefore, when attacking another wizard at a sunny hot location, a good strategy to win is to

activate the clear sky attack spell and the hot attack spell and deactivate all the other attack spells.

In what concerns defensive spells, there is no use in deactivating them because they work passively. A thunderstorm defensive spell will always shield the wizard against thunderstorm attacks. The best strategy for a wizard is to have all her defensive spells activated.

When a player decides to start a duel the game will present her several random wizards indicating, for each of them, their location and the current real weather at that location. The player chooses one of them and the duel begins. If the player does not find a suitable duel location, from among the random presented ones, she can use the search option. With the search option the player can look for wizards nearby her, wizards with the same level, with a lower level, or with a higher level or wizards at locations with specific weather conditions.

The player will always gain experience when the duel ends. However, more experience is awarded when defeating higher level wizards. Players who attack weaker wizards will gain less experience. A wizard also receives experience when she is defeated. Similarly to what happens in victories, a wizard will learn more when facing higher level wizards.

### **2.3. Masters and Lackeys**

Higher level wizards become experienced enough to be able to orient other wizards. When a player defeats another wizard the victorious one becomes the master of the defeated. Serfdom is not entirely devoid of advantages for the lackey. A lackey receives a health boost from the master. The stronger the master, the greater the boost. A stronger master will have stronger lackeys and others will find it harder to defeat those lackeys.

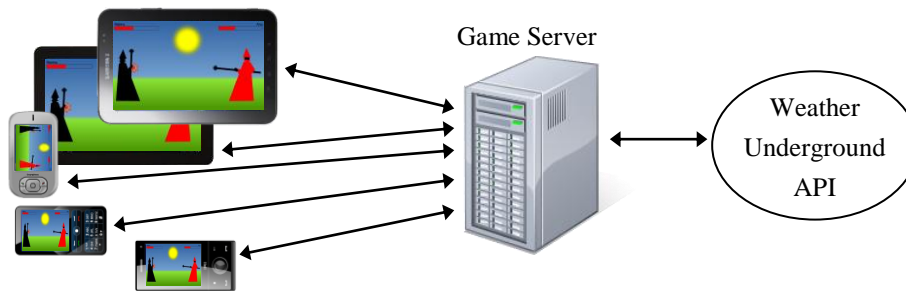
### **2.4. Implementation**

Weather Wizards integrates an Android application and a server part. All the users' data is stored in the server. The Android application installed in the players' mobile phones contacts with the server via XML. To obtain the current weather, at a given latitude and longitude, we used Weather Underground's API<sup>1</sup> (Figure 1). The latitude and longitude are supplied by the Android application on the player's mobile phone. We chose a mobile phone application so that it is easier for the player to play the game anywhere and anytime. The framework, in our

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<sup>1</sup> <http://www.wunderground.com/weather/api/>

game server, used to process the data retrieved from Weather Underground, was already presented in (Reis 2010).



**Figure 1:** Mobile clients accessing the Weather Wizards game server.

### 3. Related Work

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Other games have already used weather as an element of gameplay. *Weatherlings*<sup>2</sup> (Sheldon 2010) is an educational forecast game based on weather related creature cards. The weather data is not real time but based on past records. This means the player cannot just look out the window and decide when to play and how to play as is the case in *Weather Wizards*. The game *Heroes of Koskenniska* combines mobile and sensor technologies to raise environmental awareness among visitors of a Biosphere Reserve in Finland. However the temperature, humidity and illumination sensor data is not the focal point of the game but just a mere accessory to the game's storyline. Unlike ours, this game is also a localized solution that cannot be played everywhere (Laine 2011). *Epidemic Menace* is about a lethal virus that moves according to the wind direction and strength (Broll 2006). The game is played inside a campus and during a certain amount of time. It is, again, a localized solution that makes sense only in a certain context. In *Black & White* the weather in the game matches the real weather outside the player's house<sup>3</sup>. In *AgriVillage*, an internet game for fostering agriculture environmental awareness, the player decides what to sow according to the current weather and the forecast for the next month, but the weather is simulated by the game. Real weather data was not used (Yongyuth 2010).

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<sup>2</sup> <http://ubiq.mitstep.org/weather>

<sup>3</sup> <http://www.gamesindustry.biz/articles/microsofts-peter-molyneux-interview?page=2>

## 4. Conclusions and Future Work

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Traditional games are played at a certain place, during a certain time and with certain people (Montola 2009). The game Weather Wizards, presented in this paper, can be played everywhere, or at least everywhere where there is cell phone coverage, and all the time. In what concerns the social expansion, the game can be played by all people who have an Android mobile phone.

Weather Wizards revolves around duels where the players' powers are affected by the current weather at the duel location. Each wizard owns a grimoire filled with the spells learnt at Wizard School. As the game is dependent on real weather the player may decide if it is a good time to play by just looking out the window and then using the search function to look for nearby wizards. Furthermore, this is a game where the screen is not the only focus of attention because the player's attention will also be focused on the environment around her.

In the current implementation we are only using one weather service provider. In future implementations other providers will be considered in case one of them is down. User tests will also have to be conducted to show how appealing the use of the weather is to players.

## 5. References

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- Broll, W., Ohlenburg, J., Lindt, I., Herbst, I., and Braun, A. (2006). "Meeting technology challenges of pervasive augmented reality games". Proceedings of 5th ACM SIGCOMM workshop on Network and system support for games, Article 28.
- Laine, T., Gimbitskaya, A., Sutinen, E., Choi, J., Yong, K., and Lee, C., (2011) "Environmental sensor network for a pervasive learning space in a Finnish biosphere reserve", Proceedings of the 5th International Conference on Ubiquitous Information Management and Communication, Article 88, 6 pages.
- Magerkurth, C., Cheok, A., Mandryk, R. and Nilsen, T., (July 2005) "Pervasive games: bringing computer entertainment back to the real world", Comput. Entertain., 3:4-4.
- Montola, M., Stenros, J., and Waern, A. Pervasive Games: Theory and Design. Morgan Kaufmann, 2009.
- Reis, S., Romão, T., and Correia, N., (2010). "Pervasive play for everyone using the weather", Proceedings of the 7th International Conference on Advances in Computer Entertainment Technology, 104-105.
- Sheldon, J., Perry, J., Klopfer, E., Ong, J., Chen, V., Tzuo, P., and Rosenheck, L., (2010). "Weatherlings: a new approach to student learning using web-based mobile games", Proceedings of the Fifth International Conference on the Foundations of Digital Games, 203-208.
- Yongyuth, P., Prada, R., Nakasone, A., Kawtrakul, A., and Prendinger, H., (2010). "AgriVillage: 3D multi-language internet game for fostering agriculture environmental awareness", Proceedings of the International Conference on Management of Emergent Digital EcoSystems, 145-152.