Heliodoro Tejedor Navarro

Senior Software Engineer

heltena@gmail.com
https://www.heltena.com
https://github.com/heltena
https://www.linkedin.com/in/heltena

Personal Skills

Communication with physicians, scientists, developers, students...

Technical Skills

C++, Swift, Objective-C, Python, Accelerate

UI: SwiftUI, Flutter

Strong understanding of low-level architecture

Research in medicine, biology and complex systems

Proficient in video game design and implementation: Unity, Shaders, Metal, OpenGL

Develop and deploy backends: Docker Compose, Django, Flask, MySQL

Education

Master's Degree in Computer Engineering: Computer Security and Intelligent Systems
Universitat Rovira i Virgili, June 2015

BS, Degree in Computer Engineering
Universitat Rovira i Virgili, June 2005

Languages

English: Fluent

Spanish: Native

Catalan: Native

Full CV:
http://www.heltena.com/Helio.pdf

In my previous role as a Senior Developer at **Northwestern University**, I developed user-friendly applications for scientists and physicians, performing cutting-edge research in **medicine**, **biology** and **complex systems**, mainly for macOS and iOS platforms.

During this time, I have developed five apps that are now available on the app store: Rainflow, Find My Understudied Genes, Earthtunes, TobbStop, and FlyEye Silhouette, which ranks in the top 150 apps in Education.

I am proficient in Swift, Cocoa, SwiftUI and frameworks like Accelerate, enabling me to develop efficient algorithms and user-friendly applications.

Projects

Rainflow | 2024

http://rainflow.amaral.northwestern.edu

Rainflow is an interactive macOS app that addresses the reproducibility challenge in flow cytometry by leveraging commercially available reagents as internal controls to identify poor-quality samples and align signals across several days. This enhances automated cell-type analysis algorithms and unscrambles genuine biological variations.

The app is implemented in SwiftUI and uses Accelerate Framework (BLAS) to efficently implement the K-Means and Gaussian Mixture algorithms.

https://github.com/amarallab/FCSDecoder

http://github.com/heltena/KYAlgorithms

Find My Understudied Genes | 2023

http://fmug.amaral.northwestern.edu

Find My Understudied Genes (FMUG) is a data-driven tool to help biomedical researchers identify understudied genes and characterize their tractability for future research.

It is implemented in Flutter and uses SQLite in the user device to provide fast queries.

Earthtunes | 2020

http://sites.northwestern.edu/earthtunes

Earthtunes is an iOS app that allows users to listen to normally inaudible seismic sounds from Earth beneath us. Earthtunes was highlighted in a 2023 **BBC** article:

https://www.bbc.com/future/article/20231219-iceland-volcano-what-the-sudden-eruption-sounded-like-as-it-tore-open-the-earth

It is implemented in SwiftUI and uses **DSP** algorithms for processing large amounts of seismic data.

FlyEye Silhouette | 2016

http://silhouette.amaral.northwestern.edu

Silhouette turns raw microscopy data into cell-specific measurements that are suitable for quantitative analysis. To generate each measurement, FlyEye Silhouette automatically identifies all cells within an image then quantifies the properties of each identified cell.

Top #150
in Education

The app was implemented in **Objective-C** and Cocoa for macOS, then converted to Swift. It uses OpenCV and **C++** to efficiently segment the image stack.

ICU Checklist | 2016

Pilot demonstration designed for aiding physicians of the **Northwestern Memorial Hospital** in the decission-making process during their patient visits at the Pulmonary ICU.

The pilot was performed using a backend server and an iOS app that provided physicians with real-time access to **Electronic Medical Record** (**EMR**) and a Checklist for each patient visited.

Heliodoro Tejedor Navarro

Senior Software Engineer

heltena@gmail.com
https://www.heltena.com
https://github.com/heltena
https://www.linkedin.com/in/heltena

Full CV:
http://www.heltena.com/Helio.pdf

TobbStop | 2014

http://www.tobbstop.com

TobbStop is an app to help patients **quit smoking**. It was developed by a multidisciplinary team of **health experts**, software engineers, game designers and graphic designers. It is an e-health app that includes the latest gamification and mobile learning technologies.

It is implemented in Unity for Android & iOS platforms.

KYEngine | 2012

https://github.com/heltena/KYEngine

Game Engine implemented in C++ and OpenGL for iOS platforms. It has been used on games at Mifune Games SL.

Full Experience

Senior Developer at Northwestern University
July 2016 - July 2024

Post-Baccalaureate Research Fellow at Northwestern University
July 2015 – June 2016

Visiting Scholar, Chemical & Biological Department at Northwestern University
March 2014, June 2015

Tutor and Counsellor at "Master's Degree in Video games design and programming" at Universitat Oberta de Catalunya
February 2020 – Present

Tutor and Counsellor at "Post-graduate Video game design and programming" at Universitat Oberta de Catalunya
November 2008 – January 2020

Freelance iOS programmer
May 2012 – January 2018

Lead programmer at Mifune Games SL
January 2011 – April 2012
Develop video game "Supergay & the attack of his ex-girlfriends" for iOS platforms.

Programmer at Mifune Games SL
August 2009 – December 2010
Develop Flash video games.

Adjunt professor at Universitat Rovira i Virgili
September 2006 – August 2010
Teaching "UI Design" and "Computer Graphics" in Computer Science Degree.

Programmer at Mifune Games SL
July 2009 – August 2009
Develop video game "Dr. Planet" for iOS platforms.

Co-funder and administrator at Eidola SL
September 2006 – February 2009
Develop hardware and software solutions for Human-Computer Interaction.

Engineer at PLC'Soft SL
January 1999 – August 2002
Develop SCADA solutions for chemistry industry.

Oracle programmer at Level Data SL
June 1998 – December 1998
Migrate COBOL database to Oracle.

Heliodoro Tejedor Navarro

Senior Software Engineer

heltena@gmail.com
https://www.heltena.com
https://github.com/heltena
https://www.linkedin.com/in/heltena

Publications

PlanetSim: A New Overlay Network Simulation Framework
P García, C Pairot, R Mondéjar, J Pujol, H Tejedor, R Rallo

International Workshop on Software Engineering and Middleware, 123-136 https://doi.org/10.1007/11407386_10

Dynamics and heterogeneity of a fate determinant during transition towards cell differentiation
Nicolas Pelaez, Arnau Gavalda-Miralles, Bao Wang, Heliodoro Tejedor Navarro, Herman Gudjonson, Ilaria Rebay, Aaron R Dinner, Aggelos K Katsaggelos, Luís AN Amaral, Richard W Carthew

Elife 4, e08924 https://doi.org/10.7554/eLife.08924

Aging is associated with a systemic length-driven transcriptome imbalance
Thomas Stoeger, Rogan A Grant, Alexandra C McQuattie-Pimentel, Kishore Anekalla, Sophia S Liu, Heliodoro Tejedor-Navarro, Benjamin D Singer, Hiam Abdala-Valencia, Michael Schwake, Marie-Pier Tetreault, Harris Perlman, William E Balch, Navdeep Chandel, Karen Ridge, Jacob I Sznajder, Richard I Morimoto, Alexander V Misharin, GR Scott Budinger, Luis A Nunes Amaral

Nature Aging 2 (12), 1191-1206 https://doi.org/10.1038/s43587-022-00317-6

A network approach to discerning the identities of C. elegans in a free moving population
Peter B Winter, Renee M Brielmann, Nicholas P Timkovich, Helio T Navarro, Andreia Teixeira-Castro, Richard I Morimoto, Luis AN Amaral

Scientific reports 6 (1), 34859 https://doi.org/10.1038/srep34859

Long-term patterns of gender imbalance in an industry without ability or level of interest differences
Luís AN Amaral, João AG Moreira, Murielle L Dunand, Heliodoro Tejedor Navarro, Hyojun Ada Lee

PloS one 15 (4), e0229662 https://doi.org/10.1371/journal.pone.0229662

Ratiometric sensing of Pnt and Yan transcription factor levels confers ultrasensitivity to photoreceptor fate transitions in Drosophila
Sebastian M Bernasek, Suzy SJ Hur, Nicolás Peláez-Restrepo, Jean-François Boisclair Lachance, Rachael Bakker, Heliodoro Tejedor Navarro, Nicelio Sanchez-Luege, Luís AN Amaral, Neda Bagheri, Ilaria Rebay, Richard W Carthew

Development 150 (8), dev201467 https://doi.org/10.1242/dev.201467

Meta-Research: understudied genes are lost in a leaky pipeline between genome-wide assays and reporting of results
RAK Richardson, HT Navarro, LAN Amaral, T Stoeger

eLife 12 https://doi.org/10.7554/elife.93429

Certifications

Sun Certified Web Component Developer for the Java 2 Platform, Enterprise Edition
Sun Microsystems, January 2009

Sun Certified Programmer for the Java 2 Platform, Standard Edition 6.0
Sun Microsystems, August 2008

Fiction Publications

Los viajes del Alma (The trips of the soul, novel)
Helio Tejedor

Caligrama 2019

https://www.amazon.com/-/es/Helio-Tejedor/dp/8417813551

Full CV:
http://www.heltena.com/Helio.pdf

Heliodoro Tejedor Navarro

Senior Software Engineer

heltena@gmail.com
https://www.heltena.com
https://github.com/heltena
https://www.linkedin.com/in/heltena

Full CV:
http://www.heltena.com/Helio.pdf

Other Publications in Spanish

Introduction to the video games, September 2011
Jordi Duch i Gavaldà, Heliodoro Tejedor Navarro

Universitat Oberta de Catalunya

Abstract

In this didactic module we present an introductory point of view of the world of video games.

First of all, we delve into video games by focusing on the cultural point of view they represent in our society. We will see a brief history of video games, the genres that exist and their presence as a cultural and consumer product.

Next, we will delve into the study of the necessary steps that must be taken to publish a video game. We will present the entire process of conception, implementation and sale. We will also do a brief study of the current market.

Finally, we will analyze the basic hardware and software that a video game developer needs to know, as well as the tools necessary to create a video game for these platforms.

Sound, interaction and networks, February 2012
Jordi Duch i Gavaldà, Heliodoro Tejedor Navarro

Universitat Oberta de Catalunya

Abstract

In this module we will delve into all the interaction mechanisms involved in a video game. We have divided this work according to the direction of the information flow that occurs in the different types of interaction:

- User to video game
- Video game to user
- Video game to video game

In the *user to video game* interaction, we will explain how to use the keyboard, mouse, joystick, sensors and multitouch systems. There are other kinds of interaction in this section, such as the microphone and gestures, that we will not study because they deviate from the objective of the module.

Video game to user interaction is perhaps the most abundant. We will start by looking at how to provide information to the user using the screen (which is known for usability). We will continue explaining ways of working with audio: ambient sound, special effects, mixers... To finish this section, we will talk about feedback mechanisms, which are mostly force feedback.

In the last section, we will see the *video game to video game* interaction, where we will review the basic network communication API (TCP/IP and sockets), different communication mechanisms (TCP, UDP, peer to peer) and we will go into detail on how to use high level libraries to communicate various processes. Finally, we will explain what are the requirements to develop a persistent online game.

Logic of the video game, February 2012
Jordi Duch i Gavaldà, Heliodoro Tejedor Navarro

Universitat Oberta de Catalunya

Abstract

What differentiates a video game from any other type of application is not its graphics or its sound, but the set of challenges and rules that stimulate interaction with the user. With the elements explained so far, we still cannot implement any game. These elements are only about add-ons that will mainly help the user feel more integrated into the game and have access to as much information as possible in order to play.

Heliodoro Tejedor Navarro

Senior Software Engineer

heltena@gmail.com
https://www.heltena.com
https://github.com/heltena
https://www.linkedin.com/in/heltena

The part where the development of the game is controlled is what we call the logic engine. This part, as more important than all those described above, includes the description of the attributes of all the elements that participate, and all the rules and conditions that we have placed in the game. It continuously looks at the actions that the players and the elements controlled by artificial intelligence have taken and decides if these actions can be carried out and what is the result of executing them.

Inside the game logic engine, three very important elements come together:
- The integration of all the components that we have seen so far
- Management of all game data
- The application of the rules of the game

We will see in detail how these three elements are implemented, which will be the heart of our game.

In addition, the part of the logic engine is the one that is most linked to the creative process of the game and is where some professional profiles are not so familiar with advanced programming. Scripting languages are used to separate the creative part from programming, which we will see in the last part of the module.

Artificial Intelligence, February 2012

Jordi Duch i Gavaldà, Heliodoro Tejedor Navarro

Universitat Oberta de Catalunya

Abstract

A game must offer challenges to the user. In order to introduce these challenges in a video game, a series of Artificial Intelligence (AI) technics must be used in our video games. These techniques should decide which are the best options that the elements of the game can take based on the conditions of the environment that surrounds them.

It will be the responsibility of the programmers to reach a compromise on the difficulty of the challenges so that the player does not consider the game boring because of its simplicity or complexity. In addition, the difficulty of these challenges has to be increased in a manner consistent with the evolution of the player, to maintain the intensity from the beginning to the end of the game.

There are a great amount of AI techniques that have developed in parallel in various fields over the years: genetic algorithms, expert systems, path finding, neural networks, multi-agent systems, logic, etc. The techniques that we must use for a game depend a lot on the type of game we are designing, the importance we want to give to the AI within our game, as well as the amount of resources that we have available for it.

In this module we are going to introduce the concept of Artificial Intelligence, its history and its relationship with the main modules of the system. Then we will analyze in detail the main techniques used in video games. We will see some practical examples of the use of these techniques in specific genres.

We have grouped these techniques into four large groups, although some of them could be classified into more than one:
- How to move around the environment.
- How to decide what to do at all times.
- How to learn from the environment and from mistakes.
- How to work in a team.

Normally, there is always a balance between the precision and the time necessary to calculate it, so we will always leave open the choice of the most suitable technology for each particular case.

Full CV:
http://www.heltena.com/Helio.pdf