Marcus Dillavou

https://line72.net

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GitHub: https://github.com/line72/

LinkedIn: https://www.linkedin.com/in/markdillavou

Skills

Languages

	P	U	I
Python	★★★★★	★★★★★	★★★★★
Ruby	★★★½☆	★★★☆☆	★★★★½
Java	★★★½☆	★★★☆☆	★★★½☆
C	★★★★★	★★★★☆	★★★★½
C++	★★★★½	★★★☆☆	★★★★☆
Objective-C	★★★★☆	★★★☆☆	★★★☆☆
C#	★★☆☆☆	★★☆☆☆	★★★☆☆
Elixir/Erlang	★★★★★	★★★★★	★★★★★
Javascript	★★★★½	★★★½☆	★★★★½
Bash	★★★★★	★★★★★	★★★☆☆
Php	★★☆☆☆	★★★☆☆	★★★☆☆
Lisp	★★☆☆☆	★★☆☆☆	★★★★½

Platforms

	P	U	I
iOS	★★★★☆	★★★★☆	★★★★½
Android	★★★★☆	★★★★☆	★★★★½
Linux	★★★★★	★★★★★	★★★★★
Web	★★★★☆	★★★★☆	★★★★½
AWS	★★★½☆	★★★★½	★★★★½

Frameworks

	P	U	I
React	★★★★½	★★★☆☆	★★★★½
Rails	★★½☆☆	★★☆☆☆	★★★★½
Leaflet	★★★★☆	★★★☆☆	★★★★½

Tools

	P	U	I
Emacs	★★★★½	★★★★★	★★★★★
Vi(m)	★★★½☆	★★★☆☆	★★★★½
Android Studio	★★☆☆☆	★★★☆☆	★½☆☆☆
XCode	★★★☆☆	★★★☆☆	★★☆☆☆
Git	★★★★½	★★★★★	★★★★★
Bzr	★★★★½	★★★★★	★★★★½
Jira	★★★★☆	★★★★★	★★★☆☆
Trac	★★★★½	★★★☆☆	★★☆☆☆
Sed/Grep/Awk	★★★★½	★★★★★	★★★★☆
Docker	★★★★½	★★★★★	★★★★½
PostgreSQL	★★★★☆	★★★★★	★★★★☆
DynamoDB	★★★½☆	★★★☆☆	★★★☆☆
QGIS	★★★☆☆	★★★☆☆	★★★★½
GeoJSON	★★★★½	★★★☆☆	★★★★½

Legend   P: Proficiency   U: Usage   I: Interest

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EDUCATION

UNIVERSITY OF ALABAMA AT BIRMINGHAM
MASTER OF ENGINEERING WITH A FOCUS ON SUSTAINABLE, SMART CITIES

UNIVERSITY OF ALABAMA AT BIRMINGHAM
BACHELOR OF SCIENCE IN COMPUTER SCIENCE

WORK EXPERIENCE

HELP LIGHTNING (FORMERLY VIPAAR)
FOUNDER AND LEAD ENGINEER/ARCHITECT   JUNE 2010 - CURRENT

DUTIES

Manage and lead a team of fifteen (15) engineers locally and internationally; Write up requirements and directly hire engineers and IT team; Design and lead development of all software and products; Design all technical requirements for infrastructure; Work with and manage contractors working in remote locations; Design internal development processes.

PROJECTS

HELP LIGHTNING

Help Lightning lets you visually collaborate with friends or colleagues over video just as you would in real life; using your hands. Help Lightning allows you to communicate with others from anywhere in the world, instantly and better than ever. Using augmented reality, participants in a video call can interact directly with each other in the same scene. A typical use case is for participants in remote locations to work together to solve a physical problem.

Help Lightning is available for both iOS and Android and is currently available for free in the Apple App Store and Google Play Store.

Help Lightning iOS: Developed in Objective-C. Built all the communications layers, rendering engine, and state management. Managed a contractor who helped developed the initial UI. Have continued all aspects for feature development, maintenance, and releases. Uses a combination of "voip" mode and APNS (Apple Push Notification Service) to make sure the application is always available to receive incoming calls and messages.

Help Lightning Android: Developed in Java using latest Google standards, including Material Design. Built all the communications layers, render engine, and state management. Uses GCM (Google Cloud Messaging) to handling receiving calls and messages when the application is in the background or not running.

COMMUNICATION SERVER

Designed and developed our communication server, used by all clients and 3rd parties. Built in Elixir and Erlang, this handles all authentication, authorization, real time messaging and communication, database storage, and signaling. It is a multiprocess, highly scalable application running in the cloud, designed for high throughput. Uses a custom communication protocol on top of persistent TCP connections over SSL.

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DEV OPS

Manage CI/CD of all products through TravisCI, Terraform, and AWS.

VIP

Our legacy hardware product. This is the initial hardware version of Help Lightning. Used a combination of off the shelf hardware and custom hardware that ran my own custom Linux distribution. All software was developed in C and C++ for low latency and high throughput, as this was designed to do HD resolution in a surgical environment.

UNIVERSITY OF ALABAMA AT BIRMINGHAM

PROGRAMMER/ANALYST II   JUNE 2003 – AUGUST 2012

DUTIES

Develop visualization and simulation software under contracts with various clients and agencies (US Department of Defense, NASA, Alabama Department of Transportation, UAB Medical Center, NIH); Apply for grants; Research and education; Present research at conferences; Teach programming classes.

PROJECTS

MINICAD

Geometry CAD and Grid Generator. Developed in C, C++, and Python utilizing wxPython and OpenGL. MiniCAD is designed for creating/importing geometries and building water-tight grids (meshes) for Computation Fluid Dyanmics (CFD) simulations. In use at NASA Marshall and various other DoD organizations.

CASEMAN

Case Management tool for running a large amount of simulations on various DoD High Performance Computing Clusters. Developed in Python and Twisted for asynchronous communication. CaseMan had to run on a wide variety of cluster configurations and support a wide variety of clustering tools and queueing systems. CaseMan supported over 15 CFD simulation packages and managed everything from prepartion, to submission, to monitoring, and post analysis.

AUGMENTED REALITY

Various augmented reality systems, including a system for adding in 3D content into the surgical view to aid surgeons. An augmented reality system for training combat medics. Various other medical related augmented reality simulations.

VIRTUAL INTERACTIVE PRESENCE

Designed to allow experts to export their expertise to a remote site through virtual reality technologies. Licensed by VIPAAR for commercialization.

SCIENTIFIC VISUALIZATION

Regularly create scientific visualizations for simulations performed throughout the department to be displayed on our stereographic and high resolution tile displays.

PUBLICATIONS

SHENAI, M., DILLAVOU, M., SHUM, P., ROSS, D., TUBBS, S,. SHIH, A., "VIRTUAL INTERACTIVE PRESENCE AND AUGMENTED REALITY (VIPAR) FOR REMOTE SURGICAL ASSISTANCE." NEUROSURGERY. MARCH 2011.

SHIH, A.M., ROSS, D.H., DILLAVOU, M., GOPALSAMY, S., AND SONI, B.K., "A GEOMETRY-GRID GENERATION TEMPLATE FRAMEWORK FOR PROPELLANT DELIVERY SYSTEM". 42ND AIAA/ASME/SAE/ASEE JOINT PROPULSION CONFERENCE AND EXHIBIT, SACRAMENTO, CA, JULY, 2006.

SHIH, A.M., SHUM, P.C., DILLAVOU, M., NOACK, R., SONI, B.K. AND POWER, G., "CASEMAN: A CASE MANAGEMENT TOOL FOR CFD APPLICATIONS". THE DOD HPCMP USERS GROUP CONFERENCE 2006, DENVER, CO, JUNE 26-29, 2006.

PATENTS

VIRTUAL INTERACTIVE PRESENCE SYSTEMS AND METHODS

INVENTORS: GUTHRIE, B; DILLAVOU, M; SHUM, P; ROSS, D; SHIH, A
PATENT #: 8,520,024
STATUS: AWARDED IN 2013

SYSTEM AND METHOD FOR MANAGING SPATIOTEMPORAL UNCERTAINTY

INVENTORS: DILLAVOU, M; SHUM, P; GUTHRIE, B; SHENAI, M; DEATON, D; MAY, M
PATENT #: 9,959,629
STATUS: AWARDED IN 2018

SYSTEM AND METHOD FOR IMAGE REGISTRATION OF MULTIPLE VIDEO STREAMS

INVENTORS: DILLAVOU, M; SHUM, P; GUTHRIE, B; SHENAI, M; DEATON D; MAY, M
PATENT #: 9,886,552
STATUS: AWARDED IN 2016

SYSTEM AND METHOD FOR ROLE-SWITCHING IN MULTI-REALITY ENVIRONMENTS

INVENTORS: DILLAVOU, M; DEATON, D; MAY M
PATENT #: 9,710,968
STATUS: AWARDED IN 2017

SYSTEM AND METHOD FOR ROLE-NEGOTIATION IN MULTI-REALITY ENVIRONMENTS

INVENTORS: DILLAVOU, M; MAY, M
PATENT #: 9,940,750
STATUS: AWARDED IN 2018

BOARDS

TRANSIT CITIZENS ADVISORY BOARD (TCAB)

http://bhamtcab.org
Work with bus riders, the BJCTA Board, and the Executive Director for increased permanent funding in order to provide excellent transit service that meets the needs of all citizens and improves their quality of life.

TRANSPORTATION CITIZENS COMMITTEE (TCC)

http://www.rpcgb.org/transportation/mpo/
Local citizens involved in the transportation planning process. Provide the MPO's elected officials with recommendations concerning regional transportation programs and projects, research, and public outreach.

ACTIVITIES

CODE FOR BIRMINGHAM – FOUNDER AND BRIGADE LEADER

http://www.codeforbirmingham.org
We aim to strengthen the community and government of Birmingham by volunteering to organize, develop, and deploy civic technology.

PROJECTS

OPEN DATA POLICY

Code for Birmingham initially focused on collecting and opening as much data as possible for the city of Birmingham. We gained the attention of the city's IT department and worked to convince them of the value of an open data policy. The city then created a committee, including members of Code for Birmingham, to develop an open data policy. The policy became active in 2016 and all departments now have guidelines on how to publish data in open, machine readable formats to the city's new data website.

https://data.birminghamal.gov/

COALBOL MINER

Tool that won the Birmingham Smart Cities Hackathon for helping the city convert data from old proprietary formats into modern, open formats.

https://github.com/CodeforBirmingham/Birmingham-CoalbolMiner

CLICK THAT HOOD

A game developed by Code for Louisville. I contributed the Birmingham neighborhood data set.

https://line72.net/index.php/projects/birmingham-neighborhoods/

PERSONAL PROJECTS

MONTCLAIR

React based progressive web app (PWA) for tracking Birmingham's bus system in real time. Available through the web and also as a native Android and iOS app.

https://montclair.line72.net
iOS: https://itunes.apple.com/us/app/montclair/id1418953482?mt=8
Android: https://play.google.com/store/apps/details?id=net.line72.montclair

SARDINES

React based progressive web app (PWA) for comparing the density of Birmingham, AL with other cities throughout the world. Sardines shows where the current population of Birmingham lives and where it should live based on the desired density. This is important for understanding why so many public services, like public transportation, struggle in Birmingham.

https://sardines.line72.net/

DV8

A small python library for working with real time bus information available through systems powered by Availtec. Includes scripts for doing analysis and visualization.

Example analysis: http://blog.line72.net/2017/07/26/visualizing-the-on-time-performance-of-birminghams-bus-system/
Github: https://github.com/line72/dv8

SUBTE

A visual editor for managing GTFS data. Developed in python and Gtk+3. Created to help map Birmingham's bus system and create GTFS data for trip planning.

http://line72.net/index.php/software/subte/

GTFS MAPPING OF BIRMINGHAM BUS SYSTEM FOR TRIP PLANNING

The goal of this project was to create GTFS (General Transit Feed Specification) data for Birmingham, AL's public transit system that can but used for trip planning on sites like Google Maps/Transit or with Open Trip Planner. To do this, I had to catalogue 1000s of bus stop locations around Birmingham, map them to routes and time tables, and generate GTFS data. This project consisted of several different websites I built, and used crowd-sourcing to help collect data. After about 18 months, I had a complete system up and running and was able to give my data over to the transit authority so they could continue updates and maintenance.

http://line72.net/index.php/projects/bjcta/

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