

Nick Spreen

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Main Languages

TS, Swift, Python

Technologies

Web Frontend

React,
Vue,
Angular

Mobile

SwiftUI,
UIKit,
WatchOS,
Flutter,
Jetpack Compose

Cloud Infrastructure

Kubernetes,
Terraform,
AWS Lambda

Backend

Express,
Nest,
FFmpeg,
Django

Databases

PostgreSQL,
DynamoDB,
Prisma,
Redis

🎓 Education

- 2019–2020 M.Sc. Thesis, BrombergLab Rutgers University, NJ, Grade 1.0
2017–2020 M.Sc. Computer Science, TUM, High Distinction Grade 1.2
2014–2017 B.Sc. Computer Science, TU Braunschweig, Grade 1.9

🏆 Awards & Scholarships

- Oct 2019 DAAD IFI Graduate Exchange Scholarship
Jun 2019 Apple WWDC Scholarship Grantee
Apr 2019 Winning the UTUM MakerSpace TechChallenge

💻 Web & Desktop Projects

- 2021-2022 immowelt Profi Card: MapBox Vue.js Components
Nest.js, AWS Lambda, Terraform, Vue, Mapbox
2022-2023 Vectornator: Web Services Cloud Architecture Overhaul
Nest.js, AWS Lambda, Terraform, DynamoDB, Redis
Oct 2019 Bio-No.de: Web Platform for HPC Task Submission
Vue.js, VuePress, Rete.js, Bootstrap, ServerSentEvents
Nov 2018 Braintree: Info Screens for the Economic Faculty in Münster
Angular, CSS3, Django Forms, Django Admin

📱 iOS & Mobile Projects

- 2023-2024 Senior Freelance Consultant @ Wimyx: Shazam for Concerts
React Native, Ignite, FFMpeg
2022-2023 Founder & CEO @ Hockey: All In One Messenger
SwiftUI, Flask, Matrix, SQLite
2022-2022 Founder & CTO @ Pineapple: Social Video Conversations
SwiftUI, Prisma, GraphQL, Kubernetes
2021-2021 Founder & CTO @ Bubble: Social Video Commenting
Swift, Django, Kubernetes, GCP, FFMpeg, GitHub Actions
Apr 2021 EU Digital COVID Certificate Wallet & Verifier iOS Apps
Swift, GitHub, EC Crypto, CBOR, COSE, QR Code
2020–2021 Founder & CTO @ School Night: Audio Streaming iOS Social App
Swift, WebRTC, Redux, IGListKit
Jun 2020 6tudio: Mobile Partner App
Swift, Postgres JSON Storage, IGListKit, AVFoundation
2018–2019 Eventmatch: Social Event Finder on iOS
Swift, WebSocket, Google Maps API, Social APIs

Full-Stack Consultant

Nick Sreen

As an experienced technical founder and CTO, I have built more products from scratch than most.

I find it hard to resist good product ideas. Thinking of a technical challenge on Friday, I often find myself deploying a demo of a new product by Monday.

Wanting to find out how things work & improving my own skills are two of my driving forces. All of these experiences have turned me into a driven entrepreneur and a top-tier freelancer.

Full-stack engineer is a difficult term to use. For many it means jack of all trades, master of none. I strive to be the exception to the rule, and have shown excellence across the stack.

My specialty is **iOS app** development, where I won the Apple WWDC Scholarship Award in 2019.

On the web, I've worked on many **Vue.js** projects. Immowelt's proficard stands out as one of the most interesting challenges.

The backend is where I've started my tech career, and I've seen many server-side technologies over the years. I've built countless **AWS Lambda** micro-services for Linearity to reduce their cloud spent by 90% while drastically reducing their downtime incidents. In 2020 I wrote a master's thesis on **Kubernetes**, and between container orchestration and server-less infrastructure I've worked with many different architecture paradigms.

Professional Projects

Full-Stack Engineering Consultant – Wimyx React Native App **Wimyx, Q2 2023 – Q1 2024**

Record video as an attendee of a Wimyx enhanced concert and send videos with enhanced audio to the artist. Wimyx is for artists and their fans who are experienced creators. Those that want to hear their videos sound the best and share this experience. Mix the artists' concert audio into your video and create the best concert video to date.

In a matter of months, Nick rebuilt the Wimyx iOS with a modern React Native code base and the ignite template. Leveraging state of the art practices and standards, he made the best-in-class designs a reality and shipped a working app to the app's customers within tight time constraints. Nick also migrated Kubernetes clusters to newer storage solutions and assisted on backend development.

Keywords: React Native, TypeScript, PostgreSQL, Kubernetes, Ignite

Web Development Consultant – New Pupper Post Designs **Innoveghtive Inc, Q1 2024 – Q1 2024**

PupperPost is designed to be the easiest way to start and maintain your own blog. It's easy because PupperPost is a native app for your Mac, iPhone and iPad. That means it looks great, it's fast, and it's nicely integrated. You create a new post in the app, and everything you edit will render into a web page as soon as you Save.

Nick helped redesign the themes for Puppet Post's vanilla, technical, modern, academic, and vintage looks. All five designs are optimized for maintainability and offer a light and dark mode theme. Built with SCSS and deployed without any need for client side javascript.

Keywords: SCSS, PostCSS, Node.JS, HTML

Swift iOS Development Consultant – StreamKit Video Editing Pipeline **Lofi Labs, LLC, Q2 2023 – Q3 2023**

Promote and Grow your Twitch Channel – StreamKit makes it easy to share Twitch clips to TikTok and Instagram, track your channel's growth, and identify your biggest fans. Edit your Twitch Clips in seconds and post directly to TikTok and Instagram.

Choose from Blur, Split cam, Freecam, and more. StreamKit's video templates will get you up and running in no time.

All of these Twitch stream VOD editing styles were enabled by Nick's AVKit and FFMpeg experience in Swift. Nick helped the StreamKit team to rebuild their video encoding pipeline natively on device to not only reduce backend processing time and bandwidth but also enhance the encoding performance right on the user's device.

Keywords: AVKit, AVMutableComposition, Swift, FFMpeg, H265

Backend Development Consultant – One Sec Research Cloud Storage **Riedel.wtf GmbH & Berkeley University, Q1 2023 – Q3 2023**

Distracting apps made less appealing – scientifically. Every time you try to open your favorite apps, wait. Take a deep breath in, and let it out slowly. One Sec gives you the chance to pause and think twice – before you get sucked into an endless loophole designed to draw you in for hours again.

The effectiveness of One Sec has been confirmed in a peer-reviewed scientific study with the Max-Planck Institute and Heidelberg University.

To conduct this study, Nick supported the One Sec company by providing a scalable and price-efficient cloud storage solution for their research project. The endpoints were used for research projects with the Max-Planck institute and the Berkeley University in California.

Keywords: S3, AWS Lambda, Express, Node.JS, Typescript

Backend Development Consultant – Structured Cloud **unorderly GmbH, Q1 2023 – Q2 2023**

Structured is the ultimate visual day planner app designed to help people take control of their everyday lives with just a few taps. The heart of the app is the minimalistic-designed timeline, which provides the user a smooth and intuitive overview of the day. With over 7 Million downloads, 220,000 active subscribers and 180,000 App Store Ratings (4.8 average rating), Structured is the #1 most downloaded day planner on Apple devices.

Nick helped the company break away from the Apple platform and CloudKit by building a backend that stores millions of users' data platform agnostic and in a way that's cheap, scalable, and easy to migrate to.

Keywords: DynamoDB, AWS Lambda, Express, Node.JS, Typescript

Mobile Development Consultant – QR code generator **Code for Change, Q2 2023 – Q3 2023**

Code for Change leverages a unique, offline Front-End Web Dev curriculum for school learners and a network of enthusiastic partners. We are running dozens of Coding Leagues which inspire and motivate learners to teach others and themselves to code.

In environments where an internet connection can be a luxury, Nick supported the company in developing fully offline ways of sharing and storing code contributions by students. With one click, an offline QR code gets generated that includes all code and meta data in a compressed binary format so that the teacher can check and validate submissions.

Keywords: Vue.js, Node, Vite, Sass, Zxing

Founder & CEO – All In One Messenger **Hockey Labs, Q3 2022 – Q2 2023**

For many of us, Instagram has become the first way to connect with people that you don't know that well yet. Instagram messages however are a subpar user experience, and the DMs add to an already extensive list of messaging apps we use every day such as iMessage, WhatsApp, Line, WeChat, LinkedIn and Twitter DMs. We all have at least a few of them on their home screen.

Together with his co-founder Ben, Nick built one messenger to unite all chats and conversations to bring friends from all apps into one great & consistent experience. One interface to talk to all of your friends, regardless what networks you have in common.

The focus for this project was to build a messenger app that's as functional as iMessage & WhatsApp, while building a UX & UI that feels modern and fun to use.

Keywords: Matrix, SwiftUI, Python, Flask, Ansible, Synapse, Postgres, SQLite

WatchOS & Android Wear Developer – RefConnect Realtime Watch App Riedel, Q1 2022 – Q3 2022

Riedel Communications, founded in 1987, designs, manufactures and distributes innovative real-time networks for video, audio and communications. Its products are used for broadcast, pro-audio, event, sports, theater and security applications worldwide. The company is known for pioneering digital audio matrix systems, as well as SDI and IP-based media networks. Riedel is headquartered in Wuppertal, Germany and employs over 700 people in 20 locations throughout Europe, Australia, Asia, and the Americas.

As a part of an R&D project, Nick together with his colleague Frederik built a realtime architecture to relay messages from in-stadium architecture to a central cloud-hosted server to then send messages to a smartwatch that's worn by the referee during the game. The project had strict limits on round-trip message delays that Nick and his partner were able to meet. A goal was shown on the watch in less than 1s after it's been detected by the goal-line technology.

In a second iteration of the project, Nick converted the watch application to be run on a Samsung watch with Wear OS.

Keywords: watchOS, Wear OS, Django, Daphne, WebSockets, Kotlin, Swift

Web Backend Development – Micro Services Cloud Architecture Overhaul Linearity, Q1 2022 – Q2 2023

Linearity GmbH is the developer of Vectornator an advanced vector design app that unlocks the power of vector graphics for everyone. With its powerful tools, deep integrations and intuitive user interface it enables you to create high quality illustrations, logos, marketing materials, app interfaces and almost anything you can imagine.

The Vectornator app and all of Linearities services frequently call web-based micro services for parts of their functionality. Nick took over from an inexperienced backend development team to fix & maintain the existing flawed Kubernetes infrastructure. Over time he replaced all of the services with more easily scalable, maintainable, and cheaper AWS Lambda services. As a result, all of Linearity's cloud hosting costs were cut by 95% with zero downtime and no interruption to the user experience.

Today, all of Linearity's web services are invoked more than 500,000 times a day by tens of thousands of daily users. Additionally, AWS Cloudfront and Cloudflare have been used to rebuild the website architecture to support multiple web hosting solutions under one main domain and offering a seamless web experience.

Keywords: Cloudflare, Cloudfront, Webflow, Ghost.io, Storyblok, Nest.js, Express, AWS Lambda, Terraform, DynamoDB, S3, Redis

Full-Stack Web Engineering Contractor – Telesto Immowelt GmbH, Q3 2021 – Q1 2022

Immowelt is one of Germany's largest online estate agencies with an holistic approach to real estate business. Not only offering through their portal everything related to property and real estate but also giving realtors a powerful CRM software (realestaPRO) that helps them to manage their daily business more effectively. In 2021, Immowelt joined forces with Europe's leading real estate websites to improve their platform and their data analysis. For one of the first projects leveraging this new data-driven approach, a project was created to improve agent's visibility.

Nick supported Immowelt in building the architecture and software system to make real estate agents more visible on all of Immowelt's web applications.

Keywords: Nest.js, Typescript, AWS Lambda, Terraform, Vue.js, Mapbox, DynamoDB, Akamai CDN

Founder & CTO – Social Video Conversations Pineapple, Q1 2022 – Q3 2022

After working on the Bubble App in 2021, Nick was a perfect candidate to expand on that background by partnering up with Pineapple's CEO Jared to build the Pineapple app. Similarly to the ambitions of Bubble, the goal is to make people feel more personal & accountable by shifting existing conversations to the video medium. Pineapple is a platform for five strangers to start discussing important and deeply personal topics from all areas of life.

Nick supported Jared in building an app while iterating on the core feature set as the vision for what Pineapple was going to be crystallized. Nick expanded on an existing Prisma & Nexus backend service while restructuring the frontend project to follow SwiftUI best practices.

Keywords: SwiftUI, Prisma, GraphQL, Nexus, Postgres, DigitalOcean, Mux.com

Founder & CTO – Bubble Video Commenting Bubble Studios, Q1 2021 – Q3 2021

While the world of content creation and consumption has developed drastically over the last few years, the comments-section has been largely untouched. Bubble envisions a world where everyone's given a voice through short, round face-videos on any content. Comment a website, a TikTok video, or a picture you took on your last vacation and share it with the world.

In just a couple of months, Nick built a feature-complete v1.0 of a consumer social iOS application. As the leading full-stack engineer, Nick built a Kubernetes micro-service architecture to process, render, and deliver video files globally. Through the use of many GCP technologies, latencies and performance were improved >15x by employing Google's CDN services into the ingress configurations. The iOS application renders multi-layered videos in real time with Apple's AVMutableComposition framework.

Keywords: GCP, Kubernetes, Celery, Google CDN, FFMpeg, Django, Swift, AVKit, nginx, Redis, PostgreSQL

iOS Development Lead – EU Digital COVID Certificate Wallet & Verifier EU Commission & T-Systems, Q2 2021 – Q2 2021

During the COVID-19 pandemic, the EU decided to standardize digital vaccination certificates in the form of a mobile phone app. The goal of this project was to standardize development of all EU member countries by defining one standard, one protocol, and provide a working stack in form of ‘template’ repositories for all involved platforms.

In early 2021, Nick kicked off the open-source development of this application as the lead iOS developer. An open-source approach and ECC-encryption were key to the success of the multi-platform project. For all user-facing data, QR Codes were used and stored base45-encoded COSE data to make the graphical representation of vaccine certificates as compact as possible.

The three iOS repositories Nick created for the project can be found at <https://github.com/eu-digital-green-certificates/dgca-wallet-app-ios>

Keywords: Elliptic Curve Cryptography, CBOR Data, COSE Signatures, Swift, COVID-19, Certificate Pinning, QR Code Scanner

Founder & CTO – School Night School Night, Inc., Q4 2019 – Q1 2021

School Night is a social platform that creates a fun way for friends to talk to each other. Eliminating barriers of phone calls, and connecting people in the moment, it bridges the gap between synchronous and asynchronous communication. Together with his cofounder, Nick built the company and its product over the course of a year, successfully raising \$1M+ for initial funding. School Night’s product is based around a scaling WebRTC server deployment on AWS. For the front-end side, a signaling client with iOS WebRTC support was built in-house.

Nick lead School Night as product-engineer and CTO. Being part of daily operations as well as designing a robust software architecture to help the company iterate and build great software fast. As part of a two-person founder team, Nick shared the responsibilities for School Night’s investment, marketing strategies, product vision, employment, and recruiting.

Keywords: WebRTC, Kubernetes, Swift, Django, Docker, Redis, Postgres, iOS, Python, AWS

Mobile front-end developer – 6tudio mobile partner app

6tudio, Q2 2020 – Q3 2020

6tudio makes animated short films ready for new distribution channels. Focusing on shorter films for publishing on social media platforms, it enforces a strong & close connection between virtual characters and their viewership.

Since all of 6tudio's animated characters are paired with a celebrity partner, they are heavily involved in all steps of the animation process. They provide assets and source material for the animations and review every produced medium. With the mobile partner app, 6tudio is able to streamline the asset ingress and review & approval processes with closer and more personal connection to all celebrity partners.

Nick helped 6tudio make the jump into the mobile world. Advising the company on all things Apple, and helping them throughout the App Store approval process. Nick lead the engineering efforts on a Swift-based iOS application with responsive and reactive media-playing elements. Nick designed and engineered 6tudio's first outreach into the mobile world, building a robust and scalable software architecture for future projects.

Keywords: APNS, Postgres JSON, Apple App Store Review, iOS, Auth0, Swift, AVKit, Carthage, AWS S3

Data science engineer – Activity mining

Kutalla, Q4 2018 – Q4 2019

Kutalla is a TUM alumni start-up founded in 2018. Its mission statement is to detect, identify and eliminate inefficient processes from all layers of an organization. Most companies don't have a good grasp on the time they spend and waste on inefficient tooling and manual & labour-intensive tasks in their organization. Kutalla takes state-of-the-art data science to aggregate and analyse activity data from entire companies to make qualitative statements about the processes happening in an organization.

Nick engineered the platform which enables Kutalla to process and aggregate all customer data in a GDPR and DSGVO compliant manner. Once the pilot was complete and data started coming in, Nick lead the data science engineering to find patterns and tool chains in company & department behaviour to identify and eliminate labour-intensive tasks.

Nick designed a large-scale data aggregation architecture in SQL, as well as front-end and back-end software to gather data into Kutalla's format.

Keywords: Vue.js, D3.js, Postgres, Django, C++, C#, .Net Core

Full-stack Web Engineer - WIWI InfoScreens & other projects **Braintree IT Solutions, Q3 2017 - Q3 2018**

BrainTree is your consultant and service provider for the digital transformation of your company. We offer you software development at the highest level. Tailored to your needs, we develop individual software solutions that leave nothing to be desired. We always use future-proof technologies, adapted to your problem.

Nick was part of Brain Tree's engineering team for a year, contributing to all of BT's consulting projects for that period. As a full-stack engineer, he mainly worked on Angular web projects with a Django backend, and NativeScript iOS projects using Node.js in the mobile ecosystem. All of these projects were deployed as scaling services in AWS' cloud environment.

Keywords: Node.js, Angular, REST, AWS, Django, Swift

Full-stack engineer – New iOS app & REST server **Eventmatch, Q2 2019 – Q3 2019**

Eventmatch is a TUM start-up founded in 2017 aimed at bringing people together in the real world. In 2019, the app got a major overhaul and started with a fresh codebase on both iOS and Android.

Nick lead the iOS and server-side engineering for the new version. Responsibilities included requirement analysis, architecture, full-stack development, and dev ops for a redesigned cloud deployment on GCP.

Keywords: Swift, iOS, Django, REST, SQL, Stripe, Google Cloud Platform

Front-end developer – Embedded kiosk touch interface **HARTING KGaA, Q3 2016**

In its new 2016 research project, HARTING expanded the vending machine line up with a smart touchscreen interface. In this project, the kiosk shows a dynamic interface that's optimized for the user interfacing with it. For example, a face detection API is used for rudimentary filtering, showing children only the items to purchase which they're allowed to buy. The project was based on a Raspberry Pi integrated touchscreen system.

As lead developer for this project, Nick designed an architecture to facilitate the needs of this dynamic interface. Nick ensured an easily accessible UI which allows the user to select items to be dropped on the cash register's conveyor belt. The UI is optimized and filtered according to facial features returned by Microsoft's Face API.

Keywords: QML, QtQuick, C++, JS, MQTT, Linux, Raspberry Pi

Front-end developer – Dynamic QML interfaces

HARTING KGaA, Q3 2015

HARTING is a hidden champion, providing the entire world with industrial connectors for electrical wires and more. As a future-focused enterprise, HARTING puts a lot of resources in its R&D departments. In 2015, a new undertaking was started, to standardize the software component of all showcases for fairs and more. This new structure allows a dynamic assortment of new technology showcases to be controlled and configured from a single Android device.

Nick's role was to build the generic architecture to facilitate dynamic and changing UIs for all sorts of technologies. This framework is future-proof, and allows new technologies to be added with simple XML files. These files are dynamically loaded to create an ever-changing UI on an Android tablet. Nick lead this project, contributing his experience in C++ and JS development.

Keywords: QML, QtQuick, C++, JS, MQTT, Android

Passion Projects

Circa.lol – Talk to me.

Discover a new dimension in social networking with Circa.lol, the app that transforms your smartphone into a social compass. Pointing you toward real people in real-time, Circa redefines how we connect and interact in the digital age. Our moving compass directs you to the nearest active Circa user around you. Forget missed connections or wondering "what if"; with Circa, you get instant access to people who are as engaged in the app as you are.

Connect instantly via in-app texting with those around you. If they're on Circa, they're looking to chat now. Turn fleeting digital interactions into meaningful face-to-face conversations. We only show your pin when you have the app open. Location data is deleted as soon as you lock your phone or open a different app.

<https://circa.lol>

Keywords: *SwiftUI, Django, Geo Spatial Indexes, PostgreSQL, Vue.js*

Seen.Works – Recording reactions for all messages you read

Replacing read receipts with reaction videos. Seen is a messenger that makes you feel closer to your closest friends. The checkmark becomes tappable to reveal how your message made your friend feel. Videos get blurred out until you're ready to react. Give your messages a unique feel by setting your own bubble color. Crafted in 7 days and built using SwiftUI.

<https://spreen.notion.site/www-seen-works-78c03f0bb1c945278634536613a044c8>

Keywords: *SwiftUI, FFMpeg, HLS Packaged M3U8 Streams, Django, Twitch build in public*

Werewolf

Werewolf is a social deception board game that involves a narrator. With a web version of the classic game, Nick built werewolf.guru to replace the narrator. Your phone acts as the party leading you through the game and won't make any mistakes. The witch gets to select who to use their potion on, and the hunter picks who to shoot right there on their phone. This game always makes for a fun game night and now everyone gets to play.

<https://werewolf.guru>

Keywords: *Redis, Node.JS, Typescript, Express, Vue.js*

Hyperlocal

YikYak is a social app that many still remember. Jodel is the lesser known German counterpart that still draws in millions to this day. With his background as a user of Jodel for many years, Nick set out to apply a new spin on the campus based anonymous community app and launched the Hyperlocal app under the Hockey brand umbrella. Launching at NYU and Columbia, the go to market experiment gave Nick plenty of hands on grassroots marketing experience.

<https://try.hockey/>

Keywords: *AWS Lambda, Geo Spatial Indexes, SwiftUI, DynamoDB*

Advent of Code

AOC is a yearly coding challenge that's nine years running in winter of 2023. Every day of the advent season in the month of December, one new coding puzzle is released. Nick has been solving all of the 225 puzzles earning 450 stars in total. In 2022 he started streaming the solutions on twitch and uploading the attempts on YouTube. Nick wrote his own CLI in Python to assist with downloading the puzzles in markdown and submit them straight from the terminal.

Open source at <https://github.com/yspreen/adventofcode>

Keywords: *Python, Numpy*

°C °F Temperature Widget

After moving to the US in 2022, Nick has been experimenting with different ways to become fluent in the Fahrenheit temperature unit. In 2023 he built a small widget to put on the iOS home- or lock screen which shows the current temperature in both units at the same time. It's free to download and offers several modern designs to choose from.

App Store at <https://apps.apple.com/us/app/fahrenheit-celsius-widget/id6447822042>

Keywords: *Swift, SwiftUI, WeatherKit*

Leetcode

In 2023 Nick picked up Leetcode challenges as a new source of coding challenges. Starting with the challenges with the lowest acceptance rate, it's a good way to keep up practice when it comes to algorithms and data structures. You can see one of the more interesting challenges and Nick's solution writeup at <https://leetcode.com/problems/steps-to-make-array-non-decreasing/solutions/3631347/p/>

Profile at <http://leetcode.com/yspreen/>

Keywords: *Python, JavaScript*

Späti Guide

When living in Berlin, Nick was looking for a small side project to get real-world experience with two technologies he wanted to add to his tool belt. He built Späti Guide in a couple of weekends to get familiar with Flutter and the AWS CDK. Later he also used it as a practice project to translate the infrastructure to Terraform.

Spätis are late night convenience stores in Berlin that are frequently sought out to buy alcoholic beverages. Späti Guide has a realtime compass that points you to the closest store in Berlin that's currently open and near you. The beer bottle spins when you move the phone and guides you to the right store.

App Store at <https://apps.apple.com/us/app/späti-guide/id1587126815>

Keywords: *Flutter, AWS Lambda, AWS CDK, Terraform, DynamoDB, Express, Typescript*

Paint95.xyz

Nick rebuilt the iconic interface and functionality of Windows 95 Paint in the browser. While it was still operating, everyone could use the website to reuse the nostalgic graphics program and then turn the created artwork into an NFT. You can create the NFT in only one click and 100% for free. The resulting pictures were stored decentrally on the IPFS.

Nowadays the website still allows you to explore the nostalgic interface of Windows 95, and the NFT portion has been replaced by an easy PNG download.

Keywords: *Ether.js, OpenSea, NFT, JS Canvas, Typescript, IPFS*

Bio-No.de – Containers and HPC for Biological Data Science

Bio-Node is a platform that makes the power and versatility of HPC cloud computing accessible to biological researchers. Nick built a self-scaling Kubernetes-based system on GCP in his Master's thesis at Rutgers. The system allows users to submit containerized tasks through a web-interface and makes use of a highly distributed computing cluster to execute these tasks.

Open source at <https://github.com/bromberglab/bio-node>

Keywords: *Kubernetes, Vue, Django, GCP, Dev Ops*

GSpy – Modular PyQt5 Plugin Desktop Framework

In a six-month deep dive, Nick focused on replacing existing software tools at the aerospace chair of TU Braunschweig with a single plugin framework written in PyQt5. The modular framework allows the application to be easily extensible, offering a plugin interface for new components for both UI and business logic. The application is integrated in a scientific environment to allow recording of all actions and measured data throughout the pipeline. Nick built the cross platform application on both Windows and Linux and contributed numerous initial modules to the plugin framework.

Keywords: *Python, Qt, PyQt 5, Cross Platform*

Covid-Info.page – Crowdsourced Rules Database for COVID

When the global lockdowns continued in January of 2021, Nick decided to build a platform to keep people informed about the local restrictions in the area. The platform is built on user-submitted data only. Being more of a tool for rule curation and submission, rather than having few people maintain all the current information. Nick's main goal for the project was to build a platform with the restriction of zero runtime costs, that's only using client-side technologies, and still allows for content submissions.

Keywords: *Vue.js, Github Actions, Bootstrap 4, Progressive Web App (PWA)*

Four in a Rowdc – Apple WWDC Scholarship Grantee

For the WWDC 2019, Nick created a small game using Apple's SpriteKit. The four in a row implementation allows the user to play a friend, or fight a surprisingly clever AI. With this submission, Apple sponsored Nick's attendance in the developer conference in San Jose, CA.

Keywords: *Swift, Xcode Playground, Spritekit*

knok – iOS Chat App

knok is a text messenger that connects people in the moment. As such, it only allows you to message friends that are currently using their phone. Turning off the screen and placing it in your pocket automatically turns knok in silent mode and you can no longer receive texts. Nick made use of some esoteric combinations of iOS APIs to detect active usage of an iOS device to enable this magical texting experience.

Keywords: *iOS, Swift, Websockets*

Dub – iOS Camera App

In 2019, Apple announced a new developer API to access camera feeds of both the front- and back-facing camera at the same time. In a team of two, Nick and his UX design partner built a simple app which took picture-in-picture photos and videos in high quality. The app made use of the Snapkit APIs for easy sharing, as well as the Apple Metal shaders for efficient processing of the video streams.

Keywords: *iOS, Swift, Snapchat API, Metal*

Aucuro – Harvesting Robot

Using (and hacking the use of) Franka Emika's REST API, Nick controlled a 6-axis robot-arm to aid in the harvest of cucumbers. The robot is equipped with a webcam, and will detect and harvest fresh pickled cucumbers. Implementation on Cython made use of OpenCV functionality to detect and locate cucumbers precisely.

Keywords: *Cython, OpenCV, Robotics, REST API, Computer Vision*

Checkoutinator – Asset tracking

Participating in the TUM Techchallenge, Nick reverse-engineered the OPCUA protocol of a HARTING UHF reader to automate the checkout process of tools in a Makerspace. Every tool is equipped with an RFID tag to automate tracking and theft detection. Everything was implemented on a Raspberry Pi in Python.

Keywords: *RFID, UHF, Raspberry Pi, Python, OPCUA*

Double or Nothing – Chrome extension

For the 2018 Microsoft Creative Hack, Nick built a Chrome extension to gamify the Amazon purchase experience. An added button allows you to add some fun to your online shopping. Instead of hitting the One-click-purchase button, the user can select the Double-or-Nothing button. For the price of one item, they will now either receive two – or none at all! Payment is handled through the PayPal API.

Keywords: *Chrome Extension, JS, PayPal API*

Spotify Podcast Listener – Chrome extension

Nick saw an opportunity in enhancing the listening experience for a Spotify podcast. The podcast contains breaks in which the user is encouraged to play some music. Nick built a chrome extension that enhances the Spotify web player to allow timestamping of songs to be injected into the playback of the podcast. The library for these timestamps is user-extensible.

Keywords: *Chrome Extension, JS, Spotify API*