Pramod is a graduate student at Stanford University in California. He is pursuing a Masters in Computer Science concentrating in Artificial Intelligence and Human-Computer Interaction.

He is a recent graduate of the Georgia Institute of Technology in Atlanta where he researched wearable computing and augmented reality.

Pramod has developed numerous full-stack experiences across web, desktop, mobile, and wearable platforms with significant professional experience at organizations like SpaceX and the CDC.

He is interested in work at the intersection of HCI, AI, and computer graphics.
## Table of Contents

**RF-Pick**  
Wearable RFID verification system for warehouse order-picking  
3

**Tangible Teleportation Company**  
Building hardware & software for social telepresence  
4

**Project Miranda**  
Supporting citizens during traffic stops by police  
5

**Remembrance Agent & Glass Notes**  
Note-taking Android app for Google Glass w/ contextual A.I. recall  
6

**Graphic Design Portfolio**  
7

**One Moment Apart**  
Award-winning 48-Hour film production  
8

**Safety**  
Smart wearable technology to end campus violence  
9

**Georgia Tech Score**  
Easy, mobile, & comprehensive solution for judging poster sessions  
11

**dARts**  
Play darts in augmented reality  
12

**RichCaptions**  
Symbolic math captions for educational videos  
13

**Twitter Sentiment Analysis**  
Understanding user sentiment to aid mental health diagnosis  
14

**Analysis of BCG and ECG Signals**  
Work with Professor Jim Rehg and UC San Francisco  
16

**Constraint Satisfaction Problems**  
Follow up from Georgia Tech’s A.I. course for undergraduates  
17

**Traveling Salesperson Problems**  
Python Package created for Contextual Computing Group  
18
RF-Pick
Wearable RFID verification system for warehouse order-picking

Abstract:
» Order picking accounts for 55% of the annual $60 billion spent on warehouse operations in the United States.
» Reducing human-induced errors in the order fulfillment process can save warehouses and distributors significant costs.
» We investigate a radio-frequency identification (RFID)-based verification method wherein wearable RFID scanners, worn on the wrists, scan passive RFID tags mounted on an item’s bin as the item is picked; this method is used in conjunction with a head-up display (HUD) to guide the user to the correct item.
» We compare this RFID verification method to pick-to-light with button verification, pick-to-paper with barcode verification, and pick-to-paper with no verification.
» We find that pick-to-HUD with RFID verification enables significantly faster picking, provides the lowest error rate, and provides the lowest task workload.

Contributions:
» Integration of novel wearable system with HUDs
» Comprehensive and rigorous HCI user study
» Embedded systems and networking programming
» Application of software engineering principles to increase development speed and system robustness

Advisor:
» Professor Thad Starner, Technical Lead, Google Glass

View through Google Glass
Meet Tangible, a new communication medium that brings you the physical presence of a loved one over distance, filling the gap between video calls and real life.

At Tangible, We’ve built a wearable haptic garment that uses immersive haptics to allow you to literally “reach out and touch” your loved ones during video calls.

Through a new form of remote sensation, what we call Social Touch, you can convey emotions and share media together in a new, more emotionally-satisfying way.

We are a venture capital-backed, growing team of designers and engineers passionate about a human-first approach to computing.

As Head of Software, I am responsible for needfinding, prototyping, architecting, developing, and deploying our mobile app. Through a real-time database connection between two remote mobile devices, our companion apps are able to effectively mediate haptic interactions between two remote haptic garments.

I am also involved in user interviews, business strategy, graphic design, and a variety of other tasks as our business requires.
Summer 2020 was witness to mass protests following the unlawful murders of unarmed Black and minority Americans. Many people interrogated by police are not aware of their rights, nor when a seemingly innocent may become heightened or dangerous.

We created a mobile application that presents users with their Constitutional, Fifth Amendment rights and monitors the audio and video of the encounter to register racism and detect escalating tensions between police officers and I was responsible for the UX and UI design, mobile app development, generating PDF “after-action” reports (4th screenshot), and putting together our demo video.

We won two hackathons associated with the University of Washington for our work. More details on our work can be found on Devpost.
Remembrance Agent & Glass Notes

Note-taking Android app for Google Glass w/ contextual A.I. recall

A Desktop Remembrance Agent

The concept of a Remembrance Agent (RA) was first outlined by Rhodes and Starner in 1997 as a system that would automatically present contextually-relevant notes, documents, and contacts.

In 1997, it became more evident that the perfect memory of computers could augment the evolutionarily-honed intuition of humans. Computers began to take more and more of a role in note-taking, planning, and managing contacts. However, all this information was typically not indexed in a way useful to people; documents would need to be remembered by file name and needed to be scanned through file structures when required. Rhodes sought to bridge this gap by conceptualizing and developing a wearable RA.

Rhodes focused their work on wearable RAs, systems that could live with you and help you live a more productive and information-rich life.

In this project, I implemented Rhodes’ RA for use on any desktop computer.

Usage is streamlined for non-technical users. No knowledge of programming or editing of config files is required. A simple GUI presents all the features and settings you’d need to use:

The core algorithm used to determine the similarity between two documents is TFiDF, or Term-Frequency Inverse Document Frequency: documents are weighted by both the frequency of a word in a document and the frequency of the word in the larger corpus of documents (i.e. a “document database” in this project’s parlance).

Upon clicking the first button (my meeting notes with Professor Abowd at Georgia Tech), the RA client will open the corresponding Google Doc in Chrome:

As you type, every five seconds the prior 60 characters of your keyboard buffer are sent to the RA. Suggestions are presented as clickable buttons. To the left of each suggestion is the relevance score of that document accounting for contextual factors like date and subject of a document (these factors can be re-weighted in the code as done by Rhodes).

A Head-Worn Remembrance Agent

Part of my experiment of living with a Head-Worn Display involved integrating this suggestion-generating software into a custom note-taking app for Google Glass.

More details as well as links to the open-source code can be found with my writing on Remembrance Agents.
Graphic Design Portfolio

- Physically-accurate light dispersion through a prism
- Abstract hall with a person
- Newton’s cradle with physics
- Neon sign with camera effects
- Displacement effect
- Fog effects at a bus stop
- Modeling a Rolex
- Jellyfish modeled and animated
- Abstract pill rendered in a studio
- Apple Watch: modeled, textured
- MacBook Pro: modeled, textured
- Baymax: modeled, textured
- Complex grungy/cyberpunk scene with advanced texturing/modeling
One Moment Apart
Award-winning 48-Hour film production

One Moment Apart follows a young woman and her brother as she becomes a more independent photographer. This film was entirely scripted, shot, and edited in over one weekend in Redmond, WA.

I worked as a Composer (for which we earned Best Music), Script Supervisor, and Production Assistant on this film. We won all major categories at the Seattle 48 Hour Film Festival. We will be representing Seattle in a national-level film competition, Filampoolza 2021.
Safety
Smart wearable technology to end campus violence

Grand Prize Winner of HackATL 2016
Technology & Entrepreneurship Competition at Emory University

Problem identified:
» Almost one in four women and one in 20 men experience sexual assault in college
» Students are often in situations where a smartphone is not accessible for help

Solution created:
» Discrete, wearable button programmed to alert friends, family members, & campus police
» Complimentary smartphone app that manages student’s notification prefs. & tracking
» Comprehensive business and financial plan for producing physical products
Hardware renderings:
» Won competition of dozens of teams & six semifinalists, presented to venture capitalists
» Identified an underserved market need in need for a real & permanent solution
» Co-founded a startup (GoSafely, LLC) that has now raised over $20,000 in funding
» Users slide open and press the shielded blue button. Pressing the button once alerts friends and family. Pressing the button twice alerts local police through Wi-Fi or a cellular network.
» The device can be added to a keychain for discrete and easy access in times of emergency.
» We prototyped the plastic casing and internal electronics within the two day hackathon.

Mobile app:
» Users can manage their Safely tags from their mobile phones via Bluetooth.
» Users can also trigger a more specific safety warning (e.g. EMS) from their mobile app. After an event is triggered, interested parties can track a user’s location in real-time.

Achievements:
» Won competition of dozens of teams & six semifinalists, presented to venture capitalists
» Identified an underserved market need in need for a real & permanent solution
» Co-founded a startup (GoSafely, LLC) that has now raised over $20,000 in funding

Technologies used:
» Ionic Framework
» AngularJS in TypeScript + HTML/CSS
» SolidWorks CAD + 3D Printing
Georgia Tech Score

Easy, mobile, & comprehensive solution for judging poster sessions

Problem identified:
» Managing the evaluation of poster sessions and design expos is a logistical nightmare
» Collecting and processing paper-based evaluation sheets is long, laborious, and error-prone

Solution created:
» Created a highly-automated system for collecting information about judges and presenting teams/students
» Includes comprehensive integration with email systems
» Provides visualizations and raw Excel values for team evaluations in a fraction of a second, allowing for rapid Advisor:
» Dr. Amit Jariwala, Director of Design and Innovation

Sponsor:
» School of Mechanical Engineering, College of Engineering, Georgia Institute of Technology

Automated the generation of judges’ nametags, a key pain-point for those running the Expo.
dARts

Play darts in augmented reality

» Created an iOS application in one weekend to have fun in the virtual space!
» Uses ARKit to overlay SceneKit objects in the virtual world.
» Allows user to select detected walls to place a dartboard.
» User then taps on dartboard to throw virtual “darts” at the virtual dartboard.
RichCaptions
Symbolic math captions for educational videos

Problem identified:
» Online education is rapidly gaining momentum
» Video captioning systems are limited to displaying simple plain-text
» Math/science students learn better by reading semantically-useful symbols

Solution created:
» Create web application where content creators can easily caption their videos in LaTeX
» Allows anyone on the internet to watch these captioned videos without cost

Illustrative example:

Design paradigms & technologies used:
» REST API design and docs with Django REST framework
» Material Design front-end with AngularJS + Javascript/jQuery
» YouTube <iframe/> API
» LaTeX, KaTeX
Twitter Sentiment Analysis

Understanding user sentiment to aid mental health diagnosis

Motivation:
» The United States, in particular, features extremely high costs for healthcare
» Public awareness and support mental health care is increasing

Solution created:
» Pipeline to gather tweets on two polar topics to understand users’ sentiment towards them
» Demonstration that identifies those users who use depression-indicative language
» Useful to mental health professionals to identify long-term trends in user’s mental health

Pipeline overview:
1. **Data collection**: Collected nearly 4,000 tweets from the Twitter Developer API and labelled them based on hashtags present. For example, tweets containing “depressed” (or related hashtags) will be labelled as belonging to the “depressive-indicative” class; tweets containing “happy” (or related hashtags) will be labelled as part of the “non-depressive-indicative” class.

2. **Understand the user’s position in the Twitter community**: Call the Twitter API to gain information about the user's followers, followees, average retweet counts, and more.

3. **Data analysis**: Send each of the 4,000 tweets through IBM Watson's Tone Analyzer API to gain more dimensions of sentiment information about each tweet.

4. **Classification model**: Use the labelled data to discriminate between tweets that are “depressive-indicative” or not in terms of their language characteristics. Trained classification model with scikit-learn’s k-Nearest Neighbors implementation.

5. **Classify an unknown user**: Given an unknown user, generate visualizations and an overall classification of their Twitter tweet language.

Technologies used:
» Python + Django web framework
» scikit-learn & IBM Watson intelligence APIs
» chart.js & Material Bootstrap
Analyzing tweets for @barackobama

Profile overview
- Followers: 77510571
- Followees: 834144
- Tweets/day: 4.3833
- Average favorites: 0.0500
- Average retweets: 1878.0950

IBM Watson Tone Analyzer

Emotional tone

Overall classification
From his/her language and status within the Twitter community, @barackobama is likely
Ambiguous (56.57)

On a scale of 0 (indicative) to +100% (standard) for this particular class with an 85% accuracy.
Analysis of BCG and ECG Signals

Work with Professor Jim Rehg and UC San Francisco

Problem identified:
- Increased adoption of wearable heart-rate sensors opens opportunity to understand mobile health behavior
- Classification of arrhythmias and other heart complications saves lives and costs

Solution created:
- Pipeline to input, clean, de-trend, process, and fit ballistocardiogram (BCG) and electrocardiogram (ECG) waveforms to Hidden Markov Models.

Technologies used:
- MATLAB + DSP Toolbox
- Python hmmlearn

Visualizations:
- De-trended signals and labelled R and S peaks
- Overlaying S-to-S ECG complexes
- HMM applied to processed ECG signals
Constraint Satisfaction Problems
Follow up from Georgia Tech’s A.I. course for undergraduates

» Efficient C# implementation of CSP available publicly at https://github.com/p13i/CSP.
» Features extremely-readable, well-documented, and professional C# code.
» Includes comprehensive unit test suite and continuous integration with Travis CI: [build passing]
» Features sample usage of library solving Sudoku puzzles, including this “expert” puzzle:

```
  . . . | . . . | . . 4
  . . . | . . . | 5 2 .
  . . . | . 6 . | 8 1 3
----------|--------|--------
  . 7 . | . 2 6 | . .
  . . 4 | . 5 3 | 7 8 .
  3 2 . | . . 8 | . .
----------|--------|--------
  6 . 5 | . 7 . | . . 1
  . . . | . . . | 2 3 .
  4 . . | . . . | . .
----------|--------|--------
2 5 3 | 8 1 7 | 9 6 4
8 1 6 | 4 3 9 | 5 2 7
9 4 7 | 2 6 5 | 8 1 3
----------|--------|--------
5 7 8 | 1 2 6 | 3 4 9
1 6 4 | 9 5 3 | 7 8 2
3 2 9 | 7 4 8 | 1 5 6
----------|--------|--------
6 8 5 | 3 7 2 | 4 9 1
7 9 1 | 6 8 4 | 2 3 5
4 3 2 | 5 9 1 | 6 7 8
- Running Expert 1...
I-- Finished test in expert-1 after 249433 steps in 2646 milli-seconds.
I-- PASS Expert 1
```

Console output
Traveling Salesperson Problems
Python Package created for Contextual Computing Group

» Created globally-available gt-tsp package: [https://pypi.org/project/gt-tsp/](https://pypi.org/project/gt-tsp/)
» Features extremely-readable, well-documented, and professional Python code.
» Includes comprehensive unit test suite and continuous integration with Travis CI: build passing
» Employed TSP solver to generate pick paths for novel sparse order-picking study, visualizing the shortest pick paths inside a model warehouse (dense graph) environment.