In a world of constantly evolving technology, my journey into the world of computer science began with an experience that would be considered quite ordinary today: my first online purchase. As I pressed the “Buy Now” button, I was filled with the rush of making a new purchase, but at the same time there was also this sense of wonder.  I kept thinking about what went on behind the scenes that a simple click of a button would result in a package arriving at my doorstep. This curiosity which was sparked in me that day would later shape my academic and career aspirations.

My curiosity about online transactions led me to explore computer science further. During my junior college, I pursued computer science as a vocational subject, delving into programming, compiler processes, and computer architecture. I learned about the conversion of human readable-code into machine-byte code, the integration of hardware and software for GUI operations, and the fundamentals of computer architecture. Despite limited exposure to computers due to my middle-class background, I compensated for what I lacked with after school hour doubt solving sessions with my professors and extra lab hours, ultimately achieving top scores in computer science and gaining a deep understanding of the fundamental concepts taught in these subjects.

I pursued my undergraduate degree in Computer Science at MES College of Engineering, Pune, affiliated with the esteemed Savitribai Phule Pune University. During my first year, I had the opportunity to delve into the fundamentals of programming and data structures, discovering their practical applications in problem solving. I developed a particular interest in data structures and their adaptability to solve various problems depending upon the unique characteristic of each data structure being used. Having learned some of these concepts beforehand in junior college, I was able to share some of knowledge with my classmates which helped me gain a deeper understanding of these subjects. Additionally, I became a member of my college’s Google Developer Students Club, where I actively participated in coding competitions and hackathons, further honing my skills and cultivating a genuine interest for practical application in real world scenarios.

During my second year in college, as the first wave of COVID-19 pandemic hit my city, leading to a sudden shift in online classes. While this transition disrupted many of the extracurricular activities I had been engaged in, I tried to make best of a difficult situation and use the extra time to further my knowledge and skills. It was during this period that I decided to take online course to delve in web technology, the very field that had sparked my initial interest in computer science. I learnt how to create fully functional websites, mastering the ReactJS framework for front-end development and building robust backend servers using NodeJs. These servers not only handled authentication and API calls from the front end but also seamlessly interacted with databases, allowing for data storage and modification. To leverage the skills acquired during the lockdown, a classmate and I initiated a start-up venture, providing services to the local businesses transitioning to online platforms due to the pandemic. Our first significant client, Cyberking Capitals, an investment consultancy company, entrusted us with their project. In my role as the system architect, I was tasked with ensuring that our product not only met all the client’s requirements but also maintained high-quality standards. This experience proved invaluable in developing my technical and project management skills, setting the stage for my future endeavours in computer science.

Cyberking was in need of two websites, the first one a brochure website where they could showcase their services and people would signup to request a callback(these were called “leads” in the system), the second a management website where the employees of the company having different roles(telecallers,managers,admin) could be signed up and the leads would be batched and assigned to different telecallers so they could get in touch with them and do the processes of the company. The initial implementation was quite straightforward, we built the frontend in React where the admin could register new telecallers and managers, their credentials were stored in an encrypted manner in an SQL database. On the frontend, the registered users could view and update the information of the leads assigned to them, the managers were able to see the work of the telecallers under their management and the admins had birds eye view of the system as a whole and also some additional telemetry information, like the no of new leads added, no of leads onboarded with them successfully etc. The registration of new users, assignment of leads to telecallers, viewing and updating the lead’s information was achieved by making calls to backend server’s api which was built using NodeJs and ExpressJs. The backend acted as an interface between the PostgresSQL database and the frontend, doing intermediate processing like authentication, pagination of the records fetched from the database and some processing of data from the database to extract information which needed to be shown to the admins. The system worked seamlessly for upto 10,000 leads being processed at a time. As the number of leads being processed at a time jumped up from 10,000 to upto 50,000 in the following months after the first deployment, the system started having performance issues. We had used react hooks to manage the application state on the frontend, and hence the overall state of the frontend and the components were closely coupled. State was being drilled down to the child components through the parent components and even slight changes in the state meant that every parent and child component associated with it would be re-rendered, and for records more than 50,000 it took a lot of time for the components to re-render making the UI look like it was lagging ruining the user experience. To tackle this problem we decided to use Redux which is a javascript library which used to maintain and manage centralised application state. As the application state was now centralised and decoupled from the components, components would extract from the state the data that they needed without the need for it to be drilled down through a hierarchy of components. Also instead of changing the entire application state the components would interact with only specific parts of the state and make changes to only those parts, and only components associated with these specific parts of the application state would be re-rendered. This reduced the no of components being re-rendered unnecessarily and made the UI experience more seamless for the end-user. As the scope of the project increased more new features and components were being added to the frontend the number of network calls made to the backend started to increase, which introduced a latency while loading up the UI. To resolve this issue I decided that we should incorporate GraphQL into our project. This allowed us to define how the frontend made calls to backend and fetch the exactly the data that was needed, as a result the number of network calls made to the backend reduced significantly. The next challenge that we faced was that of slow querying of data stored in the database. As the amount of data stored in the database increased over time, it took longer than expected to filter and fetch data from the database. Around the same while we were looking for solutions to this issue, I was learning about the subject of DBMS in our college curriculum. I got to learn about Entity Relationship Model and how real world entities and the relationships among them were mimicked in the database. I learned about normal forms of the database and how using the concept of normalisation, one could reduce data redundancy and also help in writing sql commands which could query the database in a much more efficient way. With this new found information and perspective we inspected our database and found that for some of the tables we had not formed the entity relationship correctly, additionally I also found that the tables in our database were not normalised correctly which was resulting in data redundancy and also preventing us from writing optimised queries. Realising the mistakes we had made we went back to the basics and mapped the entities and relationships of the entire system from scratch, we identified the functional dependencies of the system and using them normalised the tables as much as possible and created them in a separate database with their own optimised queries and we migrated from the old database to the new one in a step-by-step by manner. Also some of the operations we were performing for extracting telemetry information for the admin used to access the database frequently so we offloaded these tasks from the server to the database itself using stored procedures. All these changes improved the performance of the system significantly and made the user experience seamless.

Apart from this, as an organisation we also faced some non-technical problems, being novice entrepreneurs we had limited knowledge when it came to scheduling and planning. Initially we were using the basic waterfall methodology as our software development process but as the size of the project increased and the deadlines started to get more stringent, and the requirements were changing quite frequently, we quickly realised that this was not the way to move forward. To compensate we ended up working for more amount of time than what was needed if we had planned and scheduled things properly. Fortunately, around the same time in our college we were learning about Software Project Management. I got to know about the different software development models that were currently used in the industry and also about the requirement gathering techniques and how the requirements get documented in periodically. Upon having some discussion session with our seniors who were already working in a professional capacity we got to know about the agile methodology. We quickly adopted this methodology in our organisation. We started having requirement gathering discussions with the client every 15 days and maintained them in a well-documented service level agreement document. The requirements were split into individual pieces by me, into different stories which could be worked upon independently. We started having effort estimation meetings with the entire project team once a week to plan out the deadlines and schedule the work that needed to be done. Because of the improved scheduling, I was able to keep working on the project while also simultaneously keep up with the classes conducted by the college.

All these challenges faced during our start-up venture not only helped me to gain and master new skills but also gave me a chance to apply practically some of the concepts that were being taught to us in college and gain a comprehensive understanding of those concepts and why we were learning them in the first place.

During my final year of engineering, I had started researching about the future of web technology and came across terms like web3 and decentralised apps. On further research, I found out about the block chain technology, I was really impressed by the potential of this technology to enhance security, transparency and trust in digital systems. I got to know about the wide range of applications block chain has from its foundational role in establishing crypto currencies to its extension into supply chain, healthcare, and finance and beyond. I think this is not only a technological innovation, but it’s a revolution which is going to change how we interact with data and assets in the digital realm. Fuelled by this interest in the technology I chose “Bitcoin Price prediction using ML” as my final year project.

The dataset that we used was a time series type of dataset having historical data of bitcoin prices over the years. We decid54ed to use Recurrent Neural Network(RNN) as our machine learning model, which is a special class of neural networks which can operate on sequential data, and as our data was of time series type it was a good match. One serious limitation of RNN is that it cannot capture long term dependencies and to overcome this we used Long Short Term Memory(LSTM) which can be considered as an extension to RNN as a form of memory. The default behaviour of the LSTM is remembering information for prolonged periods of time, this information was then fed into the RNN to find dependencies in the long term. As bitcoin price data is quite volatile we used 10-fold cross validation, and validated the activation function on each fold to get the best activation function out of those evaluations. The Mean Absolute Error of this model came out to be 0.0043s which was significantly less than the previously implemented models.

Despite being very active academically, I was equally passionate about sports, especially soccer. Being a very competitive person, the game provided me with an outlet for my competitive spirit, and allowed me to push and exceed my boundaries and fostered personal growth. Playing football instilled in me the values of hard work and persistence, and made me realise that no success comes without hardwork. These principles have stayed with me and transcended the field , influencing various aspects of my life. As an introverted individual, stepping onto the field and playing in front of a crowd and securing victories helped me bolster my confidence, and taught me the transformative power of stepping out of one’s comfort zone. As a part of the team, we achieved many milestones, finishing as runner-up in the AIT Sports Fest, a state-level inter-collegiate tournament, and clinching victory in the Shahu Trophy, another prestigious state-level soccer tournament organised by AISSMS College are some of the notable ones.These experiences reinforced the notion that teamwork, determination and self-improvement are integral components of success, both on and off the field.

After graduation I have been working as a fullstack developer at the well reputed Persistent Systems Limited. As a part of this organisation I have been working on an online prescription system project in the healthcare domain. As I started out as a junior backend developer who was in charge of implementing business logic in the backend as per the client’s requirements. I was quickly promoted to a full stack developer where I was put in charge of implementing end to end functionality of new features and modules. I also worked on PowerShell scripts to transform and migrate data between two azure database resources. During my time working for the company I have had the chance to learn about many standards and regulations that are enforced on digital systems which access and exchange healthcare data like electronic health records and personal health records. Currently, I am in the process of writing a research paper on how blockchain can make the storage and exchange of this healthcare data between various healthcare entities secure, efficient and more interoperable so that the patients can be given the best possible treatment.

Considering the combined technical knowledge I have gained during my undergraduate studies, my experience being a part of a start-up environment focused mainly on web technology, my current role as a full-stack developer, and learning about blockchain technology and its potential to create digital platforms that are more secure, interoperable and private. I am driven to pursue a career where I can combine these skills together. I aim to become a blockchain developer developing decentralized applications capable of revolutionizing the current industry standards. These applications have the potential to make digital platforms more secure, interoperable, and private, making trustless, censorship-resistant, and globally accessible software solutions a standard, shifting the ownership and control of any digital information from centralized entities to a distributed network of users. However, I firmly believe mastering this skill begins with mastering the basics. Blockchain technology is built upon the fundamental concepts of computer networking, cryptography, and distributed systems. Consequently, I am convinced that pursuing a master’s degree in computer science is a crucial step towards gaining a comprehensive understanding of these core concepts, providing me with a competitive edge and the foundation to excel as a blockchain developer in the future.

College specific paragraphs describing how I checked their programme and how it very impressive and I am convinced that it would be helpful to me and include some work of the professors working there