Mobility

cloudyBoss Problem Statement | 3D mobility

Context: The performance KPI brought forward by 2D driverless proponents all have a same fundamental fault at their core: they assume a shift to driverless mobility will immediate equate to a decrease in Traffic. This is fanciful in the short-term (as driverless cars would likely share a decreasing pool of road infrastructure with existing conventional traffic) and potential fatal to the entire driverless business case. One of cloudyBoss advanCITY mobility feature articulates around a comprehensive 3D driverless mobility framework. Mobility short-range foldable 3D passenger drones combined with a grid of smart multi-modal exchange buildings

and roof-integrated land-pads are the fastest way to quickly and efficiently decongestion the largest metropolis while optimising/containing rail/road infrastructure usage across all other areas (smaller towns and rural areas).

Hack: define the general specifications and logic for a system in charge of a fleet of 3D pods including a safe 3D traffic control system to manage anti-collision processes, safe emergency landings, safe landing and take-off flows, pads storage coordination over a grid of roof-top landing pads.

Problem Statement 1 - *Find Energy Alternatives*

Context: A renewable economy would present a definitive solution to climate change, pollution and energy sustainability. Studies show that 100% renewable transport providing the same service as global transport in 2014 would demand about 18% less energy. India's transition to a carbon-less public transport system will provide even more environment and cost benefits as the share of fuel inefficient road transportation has a huge share in the overall modal mix. However, the conversion of the present transport system is one of the most difficult aspects of such renewable transition. The Government wants to enable speedy transition to zero emission vehicle transport. Currently, there are around 40,000 public transport buses operating across India, of which 80 percent operate in the top eight cities. However, the number of buses is not sufficient for a country of India's size and has led to the rapid growth of personal vehicles, bringing tremendous traffic congestion and pollution.

Hack: Identify and establish a sustainable business case for the alternative sources of fuel and energy storage, with specific focus in public transport. Design and develop an efficient modal mix of transport options using already existing modes such as e-buses, bio-fuels, shared mobility options, hybrid cars while envisioning emerging technological breakthroughs across the globe.

Problem Statement 2 - *Helping Smart Cities in becoming more mobile*

Context: Cities across the globe, especially emerging markets, will witness significant urbanization. In the next 15 years, India will see about 200 million people migrating to cities, which is almost equal to current combined population of UK, France and Germany. Such mass scale urbanization has stretched the cities on mobility. With number of vehicles increasing in cities manifold over the last decade, the average speed of commute has come down drastically. In peak hours, the average speed of 12-15 kmph in most congested spaces begs rapid resolution in a future proof way, if we must make our cities more

livable. Clearly, citizens are feeling the pain, with mobility emerging as the #1 issue in the "*voice of the citizens*" across multiple cities in the smart cities challenge, where it was by far the biggest problem raised by the citizens during a comprehensive citizen engagement exercise with more than 3 million inputs.

Hack: Pune and Delhi are among the metro cities categorized as Smart Cities by Government of India. With mobility being identified as #1 challenge in Pune and Delhi, other priority areas identified within the transportation theme as reflected from citizen inputs are: improved and more available public transport, reducing commute times, improvement in traffic discipline, enhanced parking facilities, greater share of NMT (Non-motorized transport) and pedestrian friendly roads. Design and develop ideas on how technology can solve mobility related challenges to make cities like Pune and Delhi more mobile and livable.

Relevant Data Sources:

- http://opendata.punecorporation.org/Citizen/CitizenDatasets/Index?categoryId=27
- http://opendata.punecorporation.org/Citizen/CitizenDatasets/Index?categoryId=30
- http://opendata.punecorporation.org/Citizen/CitizenDatasets/Index?categoryId=51
- http://opendata.punecorporation.org/Citizen/CitizenDatasets/Index?categoryId=49
- http://opendata.punecorporation.org/Citizen/CitizenDatasets/Index?categoryId=27

Problem Statement 3 - *Accident Prediction System (hardware or software-based)*

Context: The number of road accidents in India have not met with any great positive development yet. According to some statistics, road accidents killed more than 38,000 people across the nation only in 2016. To reach the target of UN for reducing the number of road accidents to at least half, we have to overcome a good number of challenges. According to the specialists opinion, there are many reasons of occurring a road accident including ignorance of drivers and passengers regarding traffic law, untrained drivers, vehicle without fitness, unmarked road, driving different speed vehicles in the same lane, occupying road and footpath illegally, uncontrolled road crossing by pedestrians, not using foot over bridge, overtaking tendency of drivers, driving from the wrong side, driving in deep fog, competition between vehicles to go faster, unawareness of passengers, carrying too much weight, driving by helpers etc. Besides, the faulty road construction, mechanical fault of vehicles, slow speed in highway, not abiding traffic rules, using mobile or headphones while driving are some other reasons of road accidents. We must have to solve these problems to achieve the target of reducing road accidents to at least half in the near-future.

Hack: Ideate, design and establish a sustainable yet critical business (hardware or software-based) solution for predicting or forecasting the probability of a road accidents in the nearest time horizon henceforth greatly preventing the loss of life and human capital.

Relevant Data Sources:

- https://data.gov.in/catalog/total-number-persons-killed-road-accidents-india
- https://toolbox.google.com/datasetsearch/search

FinTech

cloudyBoss Problem Statement | InsureTech for AI/ML

Context: The accuracy of predictive financial performance with short or long trade or forex operations conducted via ML components might vary greatly depending on a wide range of factors and externalities. A specific branch of InsureTech might provide a solution to such accuracy problems.

Hack: define the general specifications, dataset structure (would ML be involved) and overall controller logic for one or more InsureTech components able to determine both a minimum insurance premium over an optimal assessment period to cover claims against occasional FinTech ML inaccuracies.

Problem Statement 1 - *Build a new payment platform for all humans*

Context: Belgium is one of countries that are well-equipped when it comes to e-payments. There is great infrastructure in place and most Belgians do use electronic channels on regular basis. However, given recent technological advances, there is tremendous opportunity to increase adoption of mobile payment solutions and generally provide a better user experience in India.

Hack: Keeping this in mind, identify and establish a sustainable (and future-proof) technology solution for facilitating such improved services that are by-default designed to be accessible to all, ***including youth, students, elderly people, families, physically impaired people, and the currently unbanked such as refugees and other disadvantaged groups.***

Problem Statement 2 - *Finance Management Dashboard for SMEs and Professionals*

Context: SMEs and independent professionals face a tremendous administrative burden with regard to the management of their finances — think invoicing, payment, expense management, accounting, financing, and managing cash flow and liquidity. While there are many solutions available in the market that solve individual aspects of this wider challenge (such as online accounting software), the fragmented nature of the market makes it difficult for banks to play a more proactive role supporting their customers.

Hack: Candidates are required to design and develop ideal banking services that should be integrated in end-to-end financial management platforms, so that more-and-more tasks can be automated henceforth more data can be leveraged for providing better insights and horizon forecasting, and therefore, optimising the liquidity. In this challenge we are looking for solutions that could help banks serve their SMEs and professional customers better, especially with regard to:

- sending/receiving the invoices digitally
- facilitating the decision to pay the invoice
- initiating payments
- tracking open invoices and payment status
- optimizing expense management of employees
- keeping a real-time overview of the cash flow and liquidity
- optimising working capital needs
- decreasing Days Sales Outstanding

- predicting and solving liquidity issues
- connecting to tax and accounting platforms

IoT - Internet of Things

cloudyBoss Problem Statement | IoT and Personal Security
Context: IoT possibly combined with other technologies such as blockchain provide opportunities to solve personal security use cases by identifying abnormal situations (for example, abrupt gyroscopic change or other abnormal movement signals) and immediately raising notifications with emergency services including precise location. There are however 2 main issues with such solutions, one of false flags, the other of network coverage.

Hack: propose compelling solutions to the 2 main problems (false flags, network coverage) preventing the mainstream adoption of IoT-based personal security solutions.

Problem Statement 1 - *When Blockchain meets IoT*

Context: Supply Chain management systems have been in place since the medieval times, however, no full-fledge supply chain network has been ever built on a blockchain. Being a very cumbersome procedure, the supply chain management systems often require a lot of paperwork for repetitive record keeping and to operate, consistently. Therefore, introducing a technology that relishes completely on paperless and indestructible record keeping methods, could change the way modern supply chain networks operate across the globe.

Hack: Keeping this in mind, identify and build a sustainable (and future-proof) technical solution for facilitating the development of blockchain and IoT-based supply chain management system.

Problem Statement 2 - *IoT <3 Security*

Context: In this 21st Century, university campuses are not completely secure and the entirety to handle its security isn't dependent on the appointed security officers. There are many challenges often faced by the security officers, such as:

- How will the security officers keep a record of all the objects on the campus at any point in time?
- If any damage occurs to that object, how can it be notified to security immediately?

A smart security system for university campuses should ideally detect and alarm in any sorts of emergency like fire or earthquake on the campus and the security officers should get an alert that there is some kind of emergency and an immediate action is required.

Hack: You are expected to develop an economically suitable wireless and cloud-based IoT system to solve these problems. Candidates are also required to complete at-least 2 challenges out of the following (not limiting to):

- Identify specific technologies and integrate them in your IoT-based system for realtime motion tracking of different kinds of entities present on the campus including moving entities .
- Use the tracking mechanism to ensure a safe escort passage for the students in time of crisis.

- Link all surveillance systems (including CCTVs) and sensors around the campus covering the whole university to avoid any blind spots.
- Extend the scope of hack to identify priorities or multitask events.

Artificial Intelligence/Machine Learning

Featured Problem Statement
cloudyBoss Problem Statement | Quantum-based AI/ML
Context: While considerable inroads have been achieved since 2007 in AI/ML/DL breaking from the stagnating prior period, current machine learning processes still require considerable storage and processing resources, and generalised AI at the edge remain an elusive prospect in the context of current conventional IT infrastructure (cloud or not).

Post-Boolean quantum computing (PBQC) proposes a significant departure from conventional QC via the superposition of an infinite series of scalable digits into one single qubit state. Conventional (or higher level such as complex, quaternion or octonion) primes seem a good candidate around which to articulate scalable digits. Materialising PBQC use cases would enable inter alia true generalised AI at the edge.

Hack: propose and describe a general framework including fundamental mechanics of a Post-Boolean algebra for scalable digits applied to PBQC.

Problem Statement 1 - *User Behaviour Analysis*

Context: Every company that allows users to interact with their website or mobile application would seek out to conduct an internal research on its users. This research can include (not limiting to):

- Knowing the motivation that brought new users on their website or mobile application.
- Devoting huge capital in conducting extensive analysis on studying the user behaviour patterns and periodic interaction with their products.
- Understanding what acts as an catalyst in users losing interest from their products or platforms, therefore, work on the measures to mitigate the catalyst in the shortest stint.

And on the basis of these datasets, they would want to conclude on their user behavioral studies and feedbacks. After losing interest, not every time a user would take part in filling the feedback form or a survey to tell the company what led them to lose interest in the product or platform. Therefore, to streamline this workflow and automate the feedback record procedures, a company must opt in for creating an internal system to study the user behaviors with their products and based on that develop new horizons for their platform.

Hack: Build an intelligent and smart-learning algorithm that learns from user interaction patterns on the product and forecasts the expected behaviour and feedback of the user based on the aforementioned information.

Problem Statement 2 - *Voice Assistant for farmers*

Context: 21st century offers so much technology then why should farmers be left behind? In India, according to a recent study, 11 crore farmers are on the internet and use internet (mobile internet) for

various things like social media, weather forecast, seeds revolution etc. Indian Agriculture Department have set up 5 lakh call centres across India. These call centres receive calls from farmers in huge number asking about advanced seeds, market prices, weather forecast, weeds, pesticides etc.

Hack: You are supposed to develop a smart voice assistant that is able to understand the local language of the farmer and answer his/her queries in his/her local language itself. The voice assistant should be intelligent enough to support multiple Indic languages and make the conversation look more like human interaction.

EdTech

Featured Problem Statement
cloudyBoss Problem Statement | DNA storage

Context: Latest advances in AR/VR combined with biocomputing and BMI (Brain Machine Interface) point to a zero-device future society set to revolutionise inter alia the way we learn.

2015 experiments in ETH Zurich have demonstrated that data storage on DNA provide a 100,000x efficiency factor respect to conventional SSD storage: while there are stil unsolved issues in the areas of sub-visualisation and sub-vocalisation, there are also unsolved operational challenges in terms of DNA-based storage such as I/O operations.

Hack: propose and describe the fundamental mechanics of a DNA-based storage I/O protocol.

Problem Statement 1 - *Build a Decentralized University CMS*

Context: The 21st century offers so much technical potential to developers then why should the universities be left behind? In India, almost every university operates in their centralized systems behind closed doors. An ideal solution should be having replace the current system with a completely decentralized system for managing the university certifications like transcripts. No more chances of fraud. No need for an intermediary to have control. No need for the parties to trust each other.

Hack: You are supposed to develop a smart decentralized CMS (can be built using IPFS or blockchain, but not limiting to) that could be placed in use to manage the various university certifications cross-platform in real-time without any chance of explicit damage to those certificates. Organizations issue credentials to students, who can then allow recruiters, companies, and other interested parties to verify the results submitted to them.

Problem Statement 2 - *How to teach kids about Blockchain?*

Context: Blockchain is considered to be the next big thing in 21st century. With its limitless power and applications, it brings a lot of confusion in its understanding. Kids are gradually becoming digitally smart and know things that a CS graduate couldn't answer. Understanding blockchain might be tough for beginner but with applying technology in teaching blockchain, we can fulfil our goal and teach anyone about Blockchain. CryptoZombies are again doing great things by simplifying learning of building Ethereum-based DApps.

Hack: You are supposed to create a web/mobile app that simplifies understanding of blockchain so much that even a layman kid should be able to understand it. No technology limitation. Use anything (VR/AR, AI/ML etc) that simplifies the learning. Your app should include the following but not limited to

Blockchain

Featured Problem Statement

cloudyBoss Problem Statement | Quantum resistant unchained DLT

Context: While high expectations about blockchain-based DLT (distributed ledger technology) have built up over the past 10 years, QC (quantum computing) is set to disrupt the public key cryptography methods underpinning the BFT properties at the core of blockchain technology.

In addition to very poor TPS (Transaction Per Second) performance issues and inter-operability challenges, forking and hacking incidents signal some of the practical limitations with obsoleting 1st generation blockchain ecosystems. The advent of QC (Quantum Computing) might further precipitate their demise. This is because blockchain largely relies on conventional public key cryptography both at block and/or permission levels. Public key cryptography protocols are themselves based on the assumption that it is very difficult to factor large integers.

While developments in post-quantum cryptography, characterized by a return to symmetric key encryption, attempt to mitigate future quantum attacks, it is QC's very infancy and uncovered features that might compromise current cryptography efforts, ultimately leading them out of context.

Hack: propose and describe the fundamental mechanics of an unchained Quantum-resistant DLT protocol.

Problem Statement 1 - *Secure E-Wallets*

Context: E-Wallets are the best replacement for cash and credit/debit cards. With its flexibility and ease of use, the user base increases everyday. With increase in user base, security has come to risk. Everyday a lot of transactions are made. New balances are added and deducted. This needs to be most secure. Let's unleash the power of blockchain and put the E-wallet on Blockchain. Allow no middle man to access.

Hack: Make an E-Wallet web/mobile app with (at least) minimum basic features like adding/deducting balance, purchase things, send money to different address, receive money from address, transactions history etc. Make sure not to use the traditional databases as it will not go with the theme. If you think you require a centralised database for some data, you can use it (with enough justification to convince the judges).

Problem Statement 2 - Identity Ownership Management

Context: The Government issues multiple identities for its citizens – a PAN card, Aadhaar, Birth and Death Certificates, Driving Licenses and so forth. Multiple Agencies are currently custodians of this identity. Some of the agencies are as follows:

- Issuing authorities: Income Tax Department (PAN), UIDAI (Aadhaar), Road Transport Authority (Driving License) and so forth.
- Users: Phone companies, Banks, Payment platforms, Hotels and so forth.
- Integrators: DigiLocker.

In the current design, identities are owned and stored by the Government. Additionally, ID's are shared by citizens with various user agencies, opening up data to security risk. Instead of this ownership of identity by issuing agencies, is it possible to design a mechanism whereby the citizen owns his/her data – fingerprints, address and so forth – which is he then able to share with different issuing and user agencies for the purpose of issuing identities and verification?

Hack: Develop Identity Ownership Management software that has proper verification and ownership management. User should be able to share his identity to different ownership agencies requiring for it. They should be able to verify it. Remember, the user is the one who ultimately owns his identity and data. Only he can give access to other issuing agencies.