Domains for B-Hacks : A product hackathon

1. **Intelligent Security**

IIIT Allahabad has recently installed a network of security cameras throughout the campus. The cameras take continuous videos of the surroundings. Each building has at least a guard while the institute has a central security office. The developed application should use the security cameras and provide the following functionality

a) Detecting incoming and outgoing people and raising an alarm in such cases. This will be especially useful for night-shift guards to get more alert on such alarms.
b) Detecting bags carried by the incoming and outgoing people and raising alarms in such cases
c) Detecting unusual activities like mobs of people gathered around, anomaly detection in crowd, etc.
d) Detecting stray animals like dogs from the camera images and raising alerts so that the guards can take the necessary action.
e) Conversion of night images into day images for easier view by the on-duty guard.
f) Any other idea that you may have.

2. **ERP Solution for IIIT Allahabad**

IIIT Allahabad has recently decided to have an in-house ERP implementation, so that every work in the entire institute is done using a single software only, with multiple modules that seamlessly integrate with each other. While you are free to develop as many use cases as possible, the following are the suggestive modules to develop:

a) COW Office automation with the functionalities ***** MK *****
b) R&D and PhD office automation with functionalities **** PC *****
c) Leave approval **** HOD ****

3. **Health Care**

a) A lot of information about diseases is available on the web. In modern times, it is usual for people to web search their symptoms to get information about different possible diseases. You need to make a text/voice-based system which will hear the symptoms of a person, find out all possible diseases, ask user relevant questions to get to a few possible diseases, enable a user to get more information/cure/preventions, etc. about the diseases.
b) Most hospitals throw away medical data (ECG reports, blood tests, doctors' prescription, etc.) that can be invaluable to make a machine learning based

system for the future. IIIT Allahabad has recently acquired a Big Data Analytics Centre, a High-Performance Computing Centre and a Cloud Computing center which can be used to host such data. You need to create a system wherein every possible medical data can be stored and retrieved in a convenient format.

c) The medical devices are getting compact and into the hands of the common man. Therefore, in the future, you may mostly be able to take different sensor readings and see if you're healthy or how fatal a disease is. A My-signals Hardware kit (http://www.my-signals.com/) will be provided. You need to ask the user to put different sensors, take sensor readings and give warnings if there are health issues. The readings may be logged with time to report if health is improving or not. Make specific use cases for specific health conditions and users. (by prior application and based on selection only)

d) **Intelligent natural language search for all of Dr. Reddy's Laboratories (**https://www.drreddys.com/**) R&D data:** They plan to develop an application that can help the organisation with their R&D data, which can extract the useful information from the slides and build knowledge from it using NLP tools. Integrating it with web application will help staff to access it anywhere any data can be visualized with help of graphs and charts using web libraries. Such automated application will save the time it takes to manually look through PPTs and prepare reports.

4. Schools and Education

a) A lot of students in schools fancy getting their hands on the technical stuff and are unable to do so due to a lot of unstructured information on the web. The aim is to make (i) Codechef style programming platform with tutorials starting from the basics (ii) Peer-reviewed software and website development platform where they can get scores by using crowd evaluations (iii) Open ideas where the students can pick any problem and solve it in a collaborative manner. The students should get ranks, scores, digital certificates, and online personalized mentorship.

b) The weaker students in schools and colleges face problems that cannot be solved by online resources and tutorials and needs a personal mentor. The portal lets the students upload their problems anonymously. The mentors bid for the problem. Thereafter the portal maps the student to the mentor for personalized sessions online/onsite. The services may be chargeable.

c) There are numerous colleges in India who cannot provide quality education to all its students for various reasons, while the basic course curriculum is similar across universities. Here you need to make a Virtual University System which would make courses across multiple skills of students and

multiple levels of difficulties selecting from the online coursewares available. The portal will then conduct its own evaluation at regular cycles and award the students credits. The evaluation may be online but resistant to cheating/proxying. The credit system must be designed and developed. Thereafter, the portal will let the students select from a set of projects as additional credits. Each project must be mentored by a geographically wide audience and peer evaluated.

d) An efficient way to take attendance of a particular class. Any mobile app which allows efficient way of taking attendance of the whole class. The main aim of the app is to avoid any kind of cheating while taking attendance.

5. Robotics for retail

a. A smartphone directs motorists to the place that they want to go. Can the smartphone also direct people to the product that they are looking for in a supermarket/shopping mall? The GPS cannot be used indoor, but numerous robotics techniques can use vision and sensors in a smart trolley. The smartphone can be used to get voice interaction.
b. Use vision sensing to find and point to the brands and items in the shopping list or those that one prefers.
c. Use IoT based smart sensors installed at home and shopping habits to auto-populate the things to buy in a shopping store.
d. Using cameras installed at a supermarket, automatically detect theft.
e. Make a robot that plays with the kids. Can use vision or any other sensing that makes interesting games.

6. Smart Home

Today people are looking at ways and means to better their lifestyle using the latest technologies that are available. Any new facility or hope appliance that promises to enhance their lifestyle is grabbed by the consumers. The more such facilities and appliances are added, it becomes inevitable to have easy and convenient methods and means to control and operate these appliances.

1. Conventional wall switches are located in different parts of a house and thus necessitates manual operations like to switch on or off these switches to control various appliances. It gets virtually impossible to keep track of appliances that are running and also to monitor their performances. High expenses to pay utility bills and travel costs. The system reduces the costs associated with the utility because the user can turn off and turn on the

electricity from the user's location without having to go back to their homes.

2. Inadequate Security. Home automation can enhance the security of the residents and their property as well as reduce the risk of criminal cases.
3. Waste of time to open and close the door using the keys. This system allows for the opening and closing of the door by using a mobile phone either by SMS or a phone call (Keyless).

7. Waste Management [http://home.iitk.ac.in/~anubha/H13.pdf]:

Solid waste management is a major problem of all urban areas in India. Based on available information regarding solid waste management in major cities in the country, the most potential extent of waste generation and its removal policies shall be made through digital technology and an intelligent and efficient plan of action can be visualized and developed as a model.

- **Waste Generation, gathering, segregation: -** Could technology Create methods to keep a check of coverage of households from which solid waste is to be gathered. Could technology become a role player in providing proper input points where dumping of waste should be done when waste is being generated in specific geography? Could it help the government identify the efficiency of solid waste management system they have placed in action? Extent of Coverage by which waste gathering has been done. Can Technology play a role in identifying the main sources of segregation of waste and once segregation is done can take care of assigning labels to the waste and probably provide specific addresses where it should be transported, or identify landfills where they should be collected. Can Technology at least help imparting knowledge on the way waste should be segregated into wet and solid waste, and within solid waste into rubbish or not usable and reusable and hazardous substances?

- **Waste Collection:**- Could Technology help identifying and growing on analyzing how much waste was collected at a collection center and how much was recovered. How much waste was dumped at a land fill and what would be the best method of avoiding waste being dumped at landfills. What portion of Landfill based waste could be reused for better purposes? Can Technology help in finding better methods (which are more scientific methods) of managing solid waste by municipal bodies in specific regions

- **Waste Transportation:-** Could Technology keep a track of the way Waste is being transported?

- **Waste Processing and Waste Disposal: -** Could Technology Keep a track of the way waste is being disposed of and could technically be built for efficient processing and Disposal of Waste?

- **Building PPP and promoting PPP: -** Solid Waste Management could never be a success if worked on only by the government it needs active private, public and people participation. Could Technology be used to promote the correct methods and bring in better-committed processes from people to make solid waste management a better process? Can Technology play a role in improving the reception of public messages on solid waste management services? Can Technology build Education and Information around Solid Waste management processes built by the local governing bodies? Can Technology build a platform to create better reception for community-led solid waste management work? Can Technology become a tool for training and capacity building amongst audience and officials on the way solid waste management should be done!!

7. **Track live teacher/professor/employee:** In colleges/offices, students/colleagues face a lot of problems when they have to meet a professor/colleague when we need to get signatures on applications or we have to present a proposal regarding any event, or for personal doubts, as we don't know the coordinates of the faculty at a current situation. IIIT-Allahabad has CCTV cameras all over the institution which can be used to track the coordinates of the faculty/employees when they enter any of the computer centers or academic buildings. Also, other options can be provided through which faculty can themselves update their coordinates. This will make the work of students as well as faculty a lot easier.

8. **ML for School - Handwriting/Speech assessment, Automated Copy Correction:** Conventionally, copy correction in various schools and colleges is done either by teachers or teacher assistants which is usually a tedious as well as somewhat partial. Also, many students get better marks due to their good hand-writing which is quite unfair. To simplify this tedious task and make the system non-partial, a software can be developed in which the hand-writing in all copies will be converted to a single hand-writing and then apply NLP to match it to the correct answer and marks will be awarded accordingly.

9. **Water Management**

[https://www.aicte-india.org/sites/default/files/sihwinners.pdf]: By the conventional method of water supply system, Governments water resources department can just supply water without having any control and accountability of water utilized by the consumer thereby resulting in huge loss for Revenue Department on water taxes. Supplying water without having knowledge on demand for water will obviously leads to water wastage. At present time, there is no proper plan, procedure and system for water accountability When accountability is not maintained in a systematic way, we cannot expect a perfect water taxation system. In every case related to economics, as consumption of services increases, Amount to be paid for services should also increase. But, it is not happening realistically in case of water supply service. Both large scale and small scale Consumers are being subjected to same charges. Though there's a proposal for use of water meters, which is cost sensitive and fetch only for single purpose of metering. Motivated by the limitations of proper system, This project will be developed by keeping up the main Aim of "water conservation" and also regularity along with "Regulation, Accountability, Taxation and Monitoring concepts" will be implemented for every drop of water. This proposal will finds an alternative, for making efficient use of every drop, paving a path for real time governance.

10. Centralised Garbage Management System

Hardware innovation challenge for B-hacks is to make a prototype version of centralized garbage management system which can be deployed in various part of city. The hack should enable the administrator of the system to monitor the level of garbage in each and every dustbins deployed in the city using a web based monitoring system and the data of the dustbin should keep on updating realtime.

Deliverables :

Smart-dustbin: The dustbin should be equipped with a sensor which can measure the level of garbage in it and report how much that dustbin is filled in percentage. Further the lid of the dustbin should open up automatically whenever a person comes near it throw garbage in it. Finally the microcontroller of the smart dustbin should be able to sent the data of sensors to the server.

Web Monitoring System: The web interface of the system should be able to show were all the dustbin are deployed in the map of the city with accurate location. Further upon clicking on a specific dustbin UI should be able to tell how that dustbin is filled in percentage and how frequently it is used. Also when a dustbin is completely filled up then it should give a notification to the administrator of the system along with the location of the dustbin which is filled up.