Abstract:

Energy is the currency of development and energy development is critical to a country's economy. One of the major drivers of Indian Energy Sector is Coal India, the aim of this project is to develop an integrated web-based solution to address one of the major contemporary problem faced by Coal Ministry. The problem statement asked for a technical solution to enable Double Blinding of Coal Samples sent for quality testing in lab. Double Blinding can simply be defined as a process of addressing the sample in such a way that there is no communication between Sender and Receiver, effectively blinding them to status and destination of samples. In simple words, after successful blinding, Receiver cannot trace the source of sample and Sender cannot determine its destination. This method thus ensures unbiased testing of samples as no entity has full information of transaction. Double blinding of samples will be a valuable asset to the Ministry of Coal as it ensures honest, unbiased testing of samples and therefore will save immensely on compensation expenditure. In order to seamlessly implement this process we use a dedicated Pseudo-Random Generator Algorithm to create and assign untraceable unique Id to samples making them invulnerable to interception and source-tracing, such samples are then delivered to destination labs. At the lab, only a person with valid credentials will be able to fill testing reports and only after successful submission of report the final table with both Source and Destination of sample will be accessible. Thus, our project delivers an intuitive web-based solution that can effectively implement, manage and monitor this process.

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1. Proposal Summary [Provide a brief one paragraph overview of the proposal, i.e. the idea and the problem it may solve and brief project plan.]

We have built a web-app using Python's Flask library with a SQL database as backend which will serve as the manager to Double-Blinding process. We also use a dedicated Pseudo-Random Generator to assign unique Id. to samples. Samples marked using our software will be untraceable and will be invulnerable to inception by malicious entities. Thus, movement of coal samples to and fro from industry to lab will be effectively Double Blinded ensuring unbiased results. As discussed before, the project intends to deliver a web-app with effective backend database to facilitate 'Double Blinding of Coal Samples'.

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2. Briefly state the Objectives and Proposed Approach [Describe how the proposed project addresses the problem. Clarify the current status of the innovation.] The description should cover the following points:
1). Strategy and/or methodology of work.
2). Scope and boundaries of the work, including any issues that will not be covered.
3). Data analysis (sample size,data collection)

The objective of the project is to deliver an interactive web-based solution to facilitate Double Blinding of coal samples. The web-app must be capable of:

- Providing an interface for login of various entities (Ministry, Industry and Lab)
- Generating a unique untraceable Id. to mark coal samples.

- Make sure that if the sample is intercepted in transit, no foreign party is able to access its details (Source, Destination etc.)
- Enable a lab user to login using valid credentials and then fill the report corresponding to sample delivered (The lab technician must be blinded as to source of sample)
- Once the report is submitted, generate a full comprehensive report of sample transaction with details such as Final Report, Source, Testing Lab, Testing Technician etc.

The web-app is able to fulfill all the above objectives in following ways:

- Sender logins to portal using his/her credential and generate a unique Id.
- Unique Id. is generated using pseudo-random generator
- This unique Id. is attached to sample and it is sent to destination lab
- Since, the sample has no source details it cannot be traced by any malicious agent
- On receiver's end (Lab), the report filling form will be accessible only to the technician with valid credentials.
- On submitting the form, the software will generate a complete report of sample transaction along with quality report generated by lab.

Currently, all the described algorithms and methodologies are ready to use, the database is also ready, but front-end of the app is bare-minimum and has potential for further development.

The app has almost limitless scope and can be used to manage any supply chain that requires Double-Blinding like Medicine, Resource Testing and Quality Assurance.

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3. Novelty [Explain how your idea is innovative and how it is different from the existing products in the markets or current state-of-the-art. Tabular representation of the difference between your idea and the other products in market or competitive product which are under development will be appreciated. Concrete market data is encouraged.]

The central innovation of our project is a Pseudo-Random Generator that will be used to generate unique Id. for samples.
Traditionally, this is achieved using various Encryption standards, our method has following advantages:

	Pseudo Random Generator	Standard Encryption Algorithm
1.	Computationally inexpensive	Computationally expensive
2.	Easy to implement	Harder to execute
3.	No need to lookup in database during generation	Lookup necessary
4.	More secure as number generated are totally random	Less secure as mathematical formulas used

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4. Opportunity
[What is the potential societal and market impact? Provide details of the problem you propose to solve.]

The project has an immense economic and social potential as it addresses one of the critical components of Supply Chain Management (Quality Assurance). Double Blinding can be used to essentially make the testing process invulnerable to malicious foreign agents. Unbiased testing will lead to higher quality of products which further boost the economy, Moreover this method will also make the system resistant to corruption. The simplicity of solution is also its critical feature, since the web-app is relatively simple, it can be easily repurposed to serve the needs of other industries that require Double Blinding.

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5. Challenges or risk factors associated with the project.
[What are the challenges and risk factors that you envision which may affect this project?] What are the critical success factors/potential barriers.

The only challenge to our project is that it is still in prototype stage and there are many non-functional requirements that need to be addressed before full scale deployment.

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6. Has any preliminary work been carried out? Give status of work done? If no, please provide the background details

The project currently has a fully functioning prototype web-app which has following capabilities:

- Sender logins to portal using his/her credential and generate a unique Id.
- Unique Id. is generated using pseudo-random generator
- This unique Id. is attached to sample and it is sent to destination lab
- Since, the sample has no source details it cannot be traced by any malicious agent
- On receiver's end (Lab), the report filling form will be accessible only to the technician with valid credentials.
- On submitting the form, the software will generate a complete report of sample transaction along with quality report generated by lab.

Status of Your Project/Idea:
The project currently has a fully-functional prototype of proposed web-app

Working or Developed Idea/Project as:
Team

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8. Proposed end-outcomes (Your SIH Project is expected to result in the following end-outcomes).

The end-outcome of our project is to develop a software solution to enable Double Blinding of Coal Samples. But over time our vision has evolved to develop a universal solution to enable Double-Blinding of any valuable asset.

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9. Future Plan of Commercialization [What do you envision to be the key next step to making impact with this innovation (e.g., sponsored research support, licensing, venture financing)? What is the time frame?] Commercialization plan should indicate :
1). Market entry strategy.
2). Data analysis (sample size, data collection)

The project is developed in response to problem statement of Ministry of Coal, so the first step is to deliver them a complete and ready to deploy solution. After that the main market strategy on successful deployment of project is to License the software to various industries that require Double-Blinding, tailoring the web-app in accordance to their requirements and to assist them in deployment of web-app.

9.
Intellectual Property Does the applicant or the applicant company own any IP related to this project. If yes, give details.(Please mention Patent Number, Patent Title and Patent Assignee)

No.
