Solid State Physics Laboratory

DRDO, Lucknow Road, Delhi

Summer Internship Report

(06th June, 2019 – 20th July, 2019)

Project Automation System

Under the guidance of

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1. Acknowledgements

I would like to take this opportunity to thank all the people who helped me in undergoing this summer internship successfully.

At the outset, I would like to express my immense gratitude to my mentors, Dr. Rachna (Scientist 'E') for guiding me right from the inception till the successful completion of the internship. I would like to express my gratitude towards them for extending valuable guidance for the project and support for literature, critical reviews of project and the report and above all the, moral support provided to me with all stages of this internship.

My experience at SSPL was certainly a valuable one, which helped me realize the various modeling techniques and technology.

2. About the Organization: Solid State Physics Laboratory, DRDO

The Origin of DRDO can be tracked back to 1948 when the Government of independent India set up the Defense Science Organization (DSO) to advise and assist the defense services on scientific problems and to undertake research in areas related defense. DRDO was set up in 1958, by merging the units of DSO with the then existing Technical Development Establishments (TDEs) of the 3 services. Subsequently, a separate Department of Defense Research and Development (DDR&D) was found in 1980, to improve administrative efficiency. Starting from a cluster of about 10 laboratories in 1958, DRDO has today evolved into a conglomerate of 46 laboratories, 4 Human Resource Institutions, 3 certification agencies and one deemed university. The 46 laboratories are divided into 7 clusters, based on their technology areas viz. Aeronautics (AERO), Armaments & Combat Engineering (ACE), Electronics and Communication Systems (ECS), Life Sciences (LS), Micro Electronics Devices and Computational Systems (MED & COS), Missiles and Strategic Systems (MSS) and Naval Systems and Materials (NS & M).

DRDO mandate is to provide assessment and advice on scientific aspects of weapons, platforms and surveillance sensors; to carry out research and to develop cutting edge technologies leading to production of state-of-the-art sensors, weapon systems, platforms and equipment for our defense services. In the recent past, the mandate has been widened to support national cyber security architecture which includes security solutions, networking systems and cyber defense tools. In this process, it has also established national infrastructure, enhanced defense industrial capability and developed committed to providing each of these benefits to the nation through sustained efforts and co-operation of all stake holders.

1.1 Project Categories in DRDO

DRDO Projects are categorized as follows:

- Mission Mode Projects (MM): These are taken up based on Users Requirements with stringent time lines and normally involve more than one lab with users having a major say in steering time lines and normally involve more than one lab with users having a major say in steering the project. This Kind of project normally depends on technologies that are proven or readily accessible either with DRDO/ India or from abroad at short notice.
- Technology Demonstration (TD) Projects: These are normally initiated by DRDO as feeder technologies for future or imminent MM projects. These are funded and monitored by DRDO with little or limited user inputs. The purpose is to develop, test and demonstrate a particular technology. Modules of this way can be developed by industry and design/analysis packages by academia.
- Science and Technology (S&T) Projects: These are normally of basic research/applied research type taken up by labs with alignment to future technology need.

- Infrastructure and Facilities (IF) Projects: Projects which are typically advanced test and qualification facilities, which are not directed procurement cases are created through IF projects. For the development of State-of-the-art technologies, such facilities have to be created ahead or at the pace of the developments. It is essentially a capital investment which plays a major role in validating the technology / system generated/ developed.
- Product Support (PS): Projects in this category are aimed at up gradation of existing systems in production or maintenance /technical support of the system for a limited period.
- User Trials (UT): The Scope of this newly launched sixth category of projects with cover conduct of user trials including DRDO support during the trials. The Projects which will be taken under this category are those which have been completed in MM/TD category and the highest monitoring committee in its last review has recommended taking of the user trials project. The project proposal will be formulated with identified work share between user, Production Agency and DRDO.

1.1.1 Procedures for Project Formulation & Management (PPFM)

DRDO has brought out structured guidelines on procedures to be adopted for project Formulation and Management. This was first released as procedures for project formulation and Management (PPFM 2006) and covered the broad areas of sanction, execution and closure. The Document has been revised in the year 2014 and 2016 subsequent to the Rama Rao Committee (RRC) implementation and major organisation restructuring, major change in delegation of financial powers and Government's directives to simplify processes and streamline internal functioning. Some of the major changes brought out in the 2016 document includes greater clarity and focus on prioritized selection of projects, enhanced pre-project activity, enhanced pre-project activity, deeper understanding of project costing, simplification of processing through Multiple channels, details guidelines for project closure, etc.

Step for sanctioning of a project

1.

- Feasibility study repot(rough cost estimation)
- Pearl analysis
- Draft project proposal
- In principal approval of cluster council
- Peer review
- Acceptance of necessity(AON) approval of DMC (projects > Rs. 5Cr)

2.

- Detailed project proposal
- Detailed project execution plan
- Preliminary/concept design review
- Cost validation by cost estimation committee
- Procurement plan (concurrent EPC approval).
- Approval in file by LFA

Processing of project proposals for project sanction IPDC Extension/Re-Allocation of funds and cost revision.

1. The lab initially the project proposal will ensure that all steps/stages as laid down in the PPFM documents are completed and the checklist is attached with the proposal, before processing the same for sanction of the designated CFA(Lab Director / CLUSTER DG/Secretary DDR&D / RM/FM/CCS).
2. Project proposal which are less than Rs. 5 Core (Lab directors powers) will be checked by an officer designated by the lab director and routed for financial vetting before approval by director. Sanction letter will be issued by the designated officer.
3. All projects proposal which are within DGs power will be checked by Director(PM) of Cluster DG and routed through IFA (R&D) for financial vetting before approval by cluster DG, Sanction letter will be issued by the Din (PM) of Cluster
4. Project proposals beyond powers will be initiated by the nodal labs and forward to the office of cluster PG for further processing.
5. Project proposals which are beyond the powers of the clusters DGs will be forwarded (along with completed check list and recommendations of the DGs) to DP&C, DRDO HQ for further processing i.e. for obtaining approvals and financial sanction of the CFA. DP&C will arrange issue of sanction letter (complete with project number and unique sanction code of the designated CFA). Project proposal file and other documents will be sent back to cluster DGs office/Lab thereafter.
6. Office of cluster DG will maintain 'Lab Wise Master Control Register' for their records regarding project number. The standardized code for allocation of projects number and format of project sanction letter will be as indicated in PPFM 2016.
7. All projects sanction letters must also have a "Unique Sanction Code", the details of which have already been circulated separately by DBF & A (maintenance of a control register containing details of unique Sanction code for each financial sanction issued by any CFA, will henceforth be mandatory). Project sanction letter will be considered incomplete/invalid, if project number and unique sanction code both are not mentioned in the letter.
8. Copies of all project sanction letters are closure letters, issued by the various competent authorities, must be endorsed to DP&C and DBF & A at DRDO HQ.
9. There will be no separate fund allocation for activities/ tasks costing up to RS 2 CR and the same will be catered by the labs under "Build up".
10. PDC extension for projects programmes within DGS power can be approved by CFA. IF quantum of PDC extension is >50% of the original PDC or >2 extensions, the case file should be put up for approval of next higher CFA/ Secretary DD R&D, whichever is Lower. The corrigendum will be processed for issue by office of approving CFA and should necessarily be forwarded to DB&C and DBF&A for records.

3. INTRODUCTION

Given the fact that there is a vast number of projects in DRDO, it is need-less to say how cumbersome it could be to manage such huge records. In such scenario, maintaining manual records could never be a feasible option as the number of projects and the data associated to them is ever-increasing at a rapid rate.

In the aforementioned scenario, it became a necessity to automate the complete process of keeping records of projects and replace it with the manual record-keeping process. Thus, our department, SSPL initiated this unprecedented work of automating all the projects throughout the various departments/wings of DRDO, gradually, easing the pain of manual record-keeping.

Today, we've a working system offering every minute detail about all the projects, that too in an automated manner. It is a system developed while keeping user-preference and ease-of-use as the central idea.

Manual record-keeping system

The already existing, manual method of keeping records of each and every project have a number of pitfalls, the amount of man-hours required to maintain it being one of the most prominent.

Limitations of Manual record-keeping system

Manual record-keeping system haves a number of issues. Some of them are:

Time Required: The amount of time required to manually gather and formulate all the details about all the projects is considerably high enough, as, a lot of information need to be gathered, recorded and processed, that too manually. Thus, a huge amount of time need to be invested in such an activity.

Efforts Required: Not only time, the manual record-keeping system requires plenty of efforts as well. As, all the data need to be recorded, formulated and maintained manually. Doing all this manually is undoubtedly quite a cumbersome task, since, a huge number of projects is to be recorded.

Loss of Data Integrity: Since, all the work is done manually by humans, the possibility of occurrence of errors and discrepancies is increased to a huge extent. Thus, data integrity is lost and maintaining the accuracy and consistency of data becomes a tough and complex task.

Space Required: Since, all the work is done manually and hard copy documents are prepared in such system, a lot of space is required to keep all of the prepared files and the complete database itself. In such scenario, often the number of files is large enough, thus, requires a lot of space and turns out to be a painful job.

Searching: In instances, when a particular data needs to be searched, searching it in a pile of manually-recorded hard-copies becomes a very complex and stressful task and requires insane amount of man-hours and efforts. In quest of a particular data, a large number of files and often, the complete database need to be searched rigorously, requiring more and more time and efforts, gradually.

Raised Cost: Since, a large space is required for the operations, it raises-up the cost in-addition to the material needed for smooth-flow of the complete system. Thus, higher operating-cost is to be incurred by the office, in such scenario.

Automated record-keeping system

The newly developed, advanced system of keeping an automated soft-copy record of all projects under the belt of a department and the organization as whole, overpowers all of the major challenges faced by the conventional manual-record keeping system. It is meticulously built on the concepts of saving time and efforts.

Advantages of automated record-keeping system

Automated record-keeping system discards the major issues faced while dealing with the manual record-keeping system. And, this is what results into being its own prominent advantages.

Some of these are:

Time-Saving: The automated record-keeping system requires considerably lesser amount of time as compared to the traditional manual record-keeping system. Since, everything is just a click-away, it takes no time to record a new entry or work on an existing one. Eventually, ending up in saving lot of time.

Less Efforts Requiring: Not only less time is required by an automated record-keeping system, it also requires relatively less efforts in contrast to the manual-record keeping system. As all the data is stored in soft-copy format, it takes less efforts to store or retrieve the data.

Data Integrity: Such a system, intensely promotes data integrity and robustness. Data, in its digital form, is easier to be worked-upon and the chances of occurrence of any form of error or discrepancy is relatively less as compared to its manual counterpart. Thus, data integrity is very well maintained.

Very less space required: Since, all the files are in soft-copy. Very less space is required to store data in such type of system. A single computer itself can store data worth hundreds and thousands of files and databases. Thus, the space required for such set-up is minimum.

Searching: Searching for a particular data in and automated record-keeping system is like a cake-walk. All that needs to be done is, to simply go to the search option in the software and search for the desired

data. There is no need to search through a large number of files for every time a particular data is of interest.

Reduced Cost: As, lesser space is required in the automated record-keeping system, the cost involved in the overall set-up of the system is quite less as compared to the manual record-keeping system. The only cost to be incurred is of the equipment and material used to set-up the whole system and there exist no need of separate areas so as to store hundreds and thousands of files and databases. Thus, all this can be done in less space at a lesser cost.

Salient Features

The automated record-keeping system offers a variety of features and services.

Some of them being,

Record of Funding: The complete record of funding of every project can be kept clearly and the chances of inconsistent or inaccurate data is reduced to almost nil.

Meeting: A proper schedule of meetings about any project can be easily maintained so as to ensure no meeting is missed.

Category: Projects can easily be sorted as per their category and a clean well sorted-list can be made as per the various categories of projects in-hand.

Laboratory Schedule*:* It also allows to maintain a well-furnished record of the allotment of laboratory to any given project. Making it easier to identify which lab. Is allotted to which project and to ensure that none of the laboratories remain idle.

Duration: The complete record about the duration of any certain project can be kept in the automated record-keeping system. It clearly depicts the entire duration of the project, highlighting the deadlines well enough.

Strategy: The automated record-keeping system also offers the privilege to record and identify the strategy used in the case of any specific project. Making it easier to always stick to the strategy used or to identify one, in-case the need of the same arises.

DATABASE STRUCTURE USED IN PROJECT

- **Tables Used in Project**

```
mysql> show tables;
+----------------------+
| Tables_in_projects   |
+----------------------+
| contents             |
| duration_list        |
| employee             |
| fund_details         |
| native               |
| pdc_list             |
| project_deliverables |
| project_fund_details |
| project_lab_mapping  |
| project_mst          |
| project_objectives   |
| project_scopes       |
+----------------------+
12 rows in set (0.27 sec)
```

- **Description of each table**

Table->Contents

Field	Type	Null	Key	Default	Extra
id	int(11)	NO	PRI	NULL	
description	varchar(255)	YES		NULL	
item_number	int(11)	NO		NULL	
page_no	varchar(255)	YES		NULL	
page_number	int(11)	YES		NULL	
project_id	int(11)	YES	MUL	NULL	

Table->duration_list

Field	Type	Null	Key	Default	Extra
project_id	int(11)	NO	MUL	NULL	
duration_list	varchar(255)	YES		NULL	

Table->employee

Field	Type	Null	Key	Default	Extra
emp_id	int(11)	NO	PRI	NULL	
enabled	int(11)	NO		NULL	
password	varchar(255)	YES		NULL	
username	varchar(255)	NO	UNI	NULL	

Table->fund_details

Field	Type	Null	Key	Default	Extra
id	int(11)	NO	PRI	NULL	
fe	double	NO		NULL	
ic	double	NO		NULL	
item	varchar(255)	YES		NULL	
minor_head	int(11)	NO		NULL	
type	varchar(255)	YES		NULL	

Table->native

Field	Type	Null	Key	Default	Extra
next_val	bigint(20)	YES		NULL	

Table->pdc_list

Field	Type	Null	Key	Default	Extra
project_id	int(11)	NO	MUL	NULL	
pdc_list	datetime	YES		NULL	

Table->project_deliverables

Field	Type	Null	Key	Default	Extra
project_id	int(11)	NO	MUL	NULL	
deliverables	varchar(255)	YES		NULL	

Table->project_fund_details

Field	Type	Null	Key	Default	Extra
project_id	int(11)	NO	MUL	NULL	
fund details id	int(11)	NO	PRI	NULL	

Table->project_lab_mapping

Field	Type	Null	Key	Default	Extra
project_id	int(11)	NO	MUL	NULL	
other_labs	varchar(255)	YES		NULL	

Table->project_mst

Field	Type	Null	Key	Default	Extra
id	int(11)	NO	PRI	NULL	
project_director	varchar(255)	YES		NULL	
duration	varchar(255)	YES		NULL	
foreign_exchange	double	YES		NULL	
govt_letter_date	datetime	YES		NULL	
govt_letter_no	varchar(255)	YES		NULL	
gsqr	varchar(255)	YES		NULL	
nodal_lab_name	varchar(255)	NO		NULL	
pdc	datetime	YES		NULL	
planning_fyp	varchar(255)	YES		NULL	
planning_status	varchar(255)	NO		NULL	
project_category	varchar(255)	NO		NULL	
project_no	varchar(255)	NO	UNI	NULL	
security_level	varchar(255)	NO		NULL	
date_of_sanction	datetime	YES		NULL	
project_no_status	bit(1)	YES		NULL	
title_of_project	varchar(255)	NO		NULL	
total_cost_cr	double	NO		NULL	

Table->project_objectives

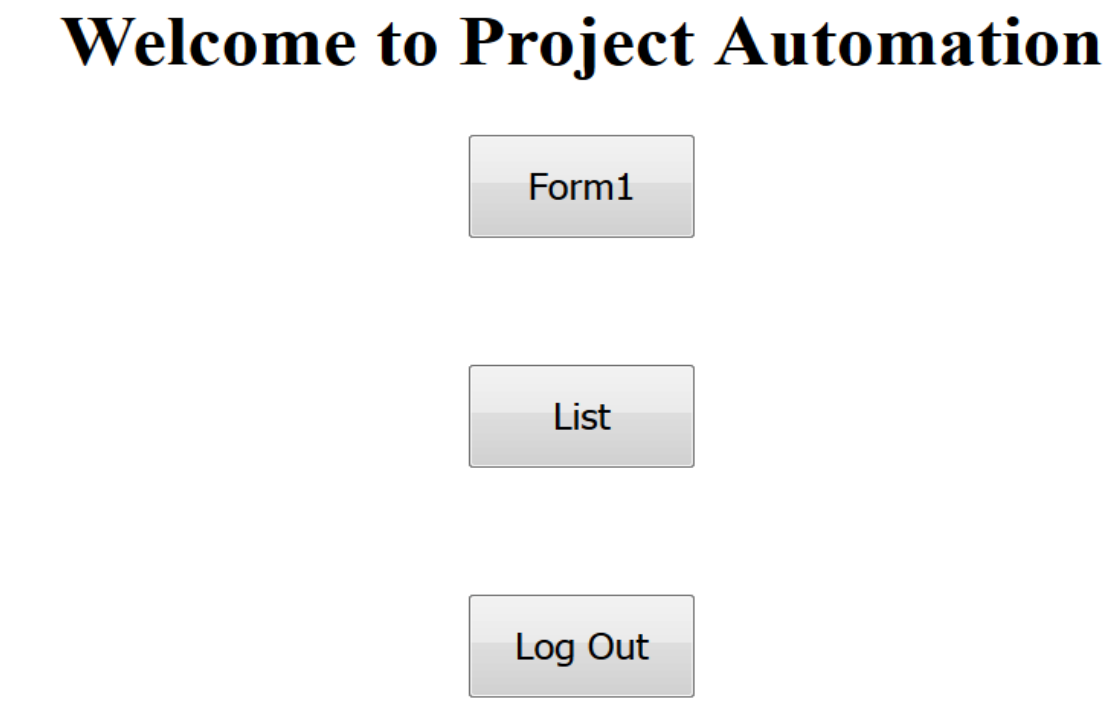
Field	Type	Null	Key	Default	Extra
project_id	int(11)	NO	MUL	NULL	
objectives	varchar(255)	YES		NULL	

Table->project_scopes

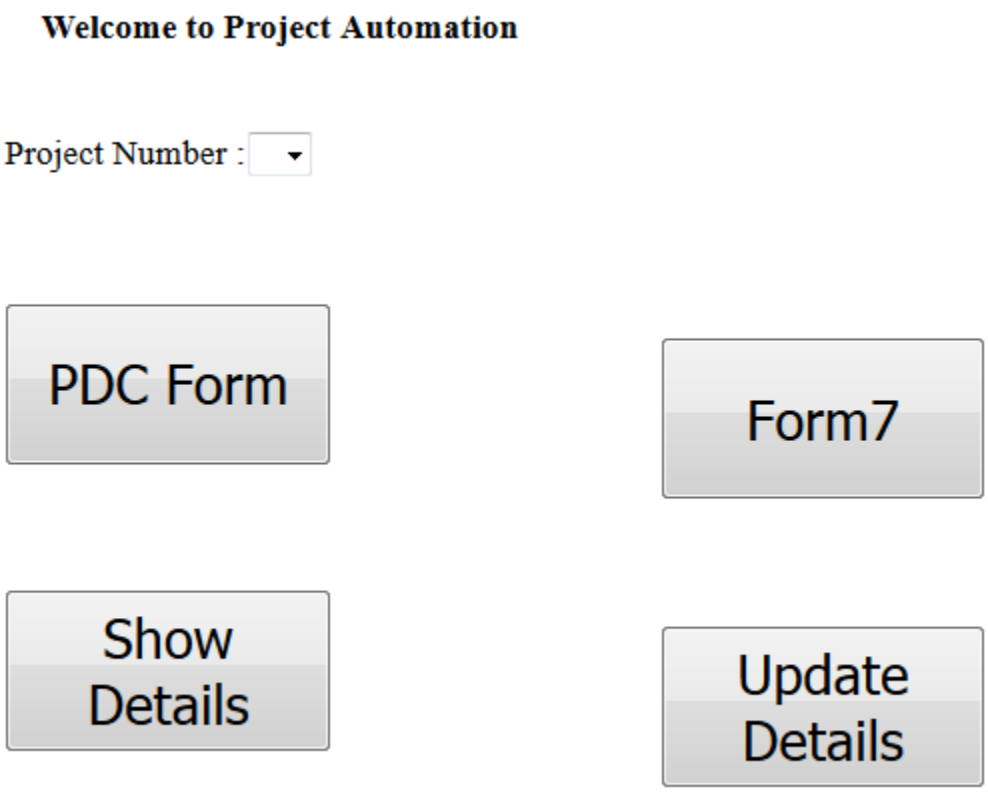
Field	Type	Null	Key	Default	Extra
project_id	int(11)	NO	MUL	NULL	
scopes	varchar(255)	YES		NULL	

OUTPUT SCREENS

SCREEN-1



Screen-2


Welcome to Project Automation
Project Number :
PDC Form
Form7
Show Details
Update Details