Nadimpalli Satyanarayana Raju Institute of Technology (Autonomous) – Summer Internship-I Report

Department of CSE, 2020-2021 Admitted Batch



**Nadimpalli Satyanarayana Raju Institute of Technology**

**(Autonomous)**

**Sontyam 531 173, Andhra Pradesh**

## DIABETES PREDICTION USING MACHINE LEARNING &IOT BASED PROJECTS

### Report

**Summer Internship I**

Submitted by

SREESAILAM VEERA BABU

20NU1A05A6

in partial fulfillment for the award of the degree of

## BACHELOR OF TECHNOLOGY

in

**Department of Computer Science & Engineering**

# JUNE-JULY,2022

**Nadimpalli Satyanarayana Raju Institute of Technology (Autonomous)**

**Sontyam 531 173, Andhra Pradesh**

## DIABETES PREDICTION USING MACHINE LEARNING

## &IOT BASED PROJECTS

### Report Summer Internship I

Carried out at

HMI ENGINEERING SERVICES

RTC COMPLEX, DWARAKA NAGAR, VISAKHAPATNAM-530027

in partial fulfillment for the award of the degree of

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## BONAFIDE CERTIFICATE

Certified that this internship report DIABETSIS PREDICTION USING MACHINE LEARNING is the bonafide work of “SREESAILAM VEERA BABU” who carried out summer internship under our supervision at Mr. DINESH KUMAR HIRAWAT, HMI ENGINEERING SERVICES.

Signature of the Faculty supervisor Signature of the Industry Supervisor Mrs. P.SAHITHI Mr. Dinesh Kumar Hirawat

Mentor

Assistant Professor Dept. of CSE

Signature of the Head of the Department

Dr. R. Rayudu Srinivas

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CERTIFICATE OF SUMMER INTERNSHIP

**Acknowledgement**

I would like to take this opportunity to express my deepest gratitude to my project supervisor, Mrs. P SAHITHI MAM, Asst. Professor, CSE , N S Raju Institute of Technology (A), S o n t y a m , Visakhapatnam, who has persistently and determinedly guided me during the whole course of this project. It would have been very difficult to complete this project without his/her enthusiastic support, insight and advice. I am extremely thankful to DR. R. SRINIVAS RAYADU, PROFESSOR, & Head of CSE Department for providing excellent lab facilities which were helpful in successful completion of my internship program. Our utmost thanks also to all the trainers of the company for their support throughout my Summer Internship and Internship, my internship department level coordinator Ms. P. Sahithi Asst. Prof. Of CSE and our Institute Level Coordinator, Mrs. V. Usha Rani, Asst. Prof. of EEE.

I take immense pleasure in thanking Dr. M.A. Khadar Baba, Principal & Dr. J. Raja Murugadoss, Director, N S Raju Institute of Technology (A), Sontyam, Visakhapatnam, for having permitted me to finish the Summer Internship - I. I am thankful to the MANAGEMENT of N S Raju Institute of Technology (A), Sontyam, Visakhapatnam, for providing the various resources to complete the Summer Internship - I successfully. I am also thankful to one and all who contributed to my work directly or indirectly.

SREESAILAM VEERA BABU

(20NU1A05A6)

# Company Profile



**Our Company**

# HMI Engineering Services

## HMI Engineering services is the Ministry of Micro, Small and Medium Enterprises, is the apex executive body for the formulation and administration of rules, regulations and laws relating to micro, small medium enterprises in India and collaborates with different manufacturing industrial companies and different research and development companies. Free industrial Internship for all technical students, real time implementation in manufacturing processing, real time robotics manufacturing company.

#### Learning Outcomes of Summer Internship

As per Curriculum

1. Demonstrate the theoretical learning outcomes
2. Integrate theory and practice during graduation
3. Comprehend the Industry practices in the relevant and allied field of study
4. Develop Communication Skills in terms of Oral, Written and graphical communications
5. Develop Problem solving skills
6. Develop work habits and teamwork in a multidisciplinary setting for a successful career after graduation.

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#### List of Program Outcomes

As per the Program of Study

PO1: Apply the knowledge of basic sciences and fundamental engineering concepts in solving engineering problems **(Engineering Knowledge)**

PO2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **(Problem Analysis)**

PO3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. **(Design/Development of Solutions)**

PO4: Perform investigations, design and conduct experiments, analyze and interpret the results to provide valid conclusions **(Investigation of Complex Problems)**

PO5: Select/develop and apply appropriate techniques and IT tools for the design & analysis of the systems **(Modern Tool Usage)**

PO6: Give reasoning and assess societal, health, legal and cultural issues with competency in professional engineering practices **(The Engineer and Society)**

PO7: Demonstrate professional skills and contextual reasoning to assess environmental/societal issues for sustainable development **(The Environment and Sustainability)**

PO8: Demonstrate Knowledge of professional and ethical practices **(Ethics)**

PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary situations **(Individual and Team Work)**

PO10: Communicate effectively among engineering community, being able to comprehend and write effectively reports, presentation and give / receive clears instructions **(Communication)**

PO11: Demonstrate and apply engineering & management principles in their own / team projects in multi-disciplinary environment **(Project Finance and Management)**

PO12: Recognize the need for, and have the ability to engage in independent and lifelong learning

#### (Life Long Learning)

PSO1: Able to apply the theoretical knowledge of Computer Science and Engineering and the foundational principles of software development to provide sustainable solutions for the real-world technical challenges in the tech landscape by maintaining professional standards, ethical values and integrity.

PSO2: (Able to adopt to technological changes by initiating self-paced learning to meet the industry demands)

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**Learning Outcomes (Write in your own words not exceeding 200 words) PO#1:**

(Indicate how the theoretical knowledge of the courses taught helped you to do summer internships)

1.At first, we initially started with IOT and we came to know different Sensors like lcd, led, bulb, smoke and some few.

2. **Internet of things**, IoT, is when physical objects are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems.

3.Later we came into know about coding and implementation of deployment of a code in a hardware component.

4. After completion of iot we learned about python fundamentals and we came to know about modules in python which are used for project like NumPy, pandas, matplotlib. Which are important modules for data science.

5.Data science is an interdisciplinary field that focuses on extracting knowledge from data sets which are typically huge in amount. The field encompasses analysis, preparing data for analysis, and presenting findings to inform high-level decisions in an organization. As such, it incorporates skills from computer science, mathematics, statics, information visualization, graphic, and business.

5.Theoretical knowledge what I leaned on datasets in my summer internship which is my project is diabetes prediction.

### PO #2:

(Indicate the ability of Problem Analysis)

1.As come to problem analysis 5.As come to problem analysis stage we analysis the problem by collaborating with team members and choosing decisions and we analyze the problem and followed methods and knowledge required for that problem as follows.

2.The aim of the proposed work is to analyze the diabetes dataset over the classification techniques.

3.Selection of the right attributes in given dataset to get the quality results from the classification can be expected.

4.And to produce as a result which is prediction of chances of having diabetes to a person based on his/her inputs (values for attributes available in our data set) to get result we usen random forest classifier.

5**.Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dat**

### PO #3:

(Indicate the ability of Design and Development of Solutions)

* + For any development of model or application design and development of solutions is necessary.
  + We have several steps in designing and development, for the development of machine learning model we perform the following steps:
  + We need to clean and analyze the given data.
  + Firstly, we need to have to clean the dataset.
  + Secondly, we need to have the appropriate packages to import the CSV file into the program.
  + We need to check the data using head and tail functions.
  + Next, we need to split the dataset.
  + Later, we need to create the appropriate model for required output.
  + Then, we need to pass the training data to the model.
  + After it, Validate the data with test data.
  + Finally, we need to check model using real time and run time inputs.
  + For design we can create a UI integrating multi plat form access to users so that Whenever users need to check they can use any platform to access the Model with ease in any shape of appliance.
  + Creating an Android application for wearable devices and Apple watch which can Call for help whenever the uses have chances of heart disease.
  + Creating a Learning model for ML model so it can be UpToDate of present Data sets.

### PO #4:

(Indicate your experiments being carried out in industry, if any)

1.As we started about learning of iot both theoretical and experimental there we came to know about different working of Arduino.

2.we started our experiments with led Sensor, bulb Sensor, lcd Sensor, smoke Sensor which is as a part of iot.

3.As we connected to Thing speak network and we observed our experimental results at online.

4.As coming iot is a new experience for me as before coming to internship I only know about software side knowledge but hardware side I don’t have much knowledge as I means I only theoretical knowledge only I had but when I came to internship I learn about iot I was very much interested in learning iot.

5.i came to know about importance of hardware and embedment ot decomposition of software for working of hardware.

6.later we came to know about and start of data science with machine learning.

7.we seen various datasets and various classifiers we came to know.

8.As a final project we came with diabetes prediction in this we used random forest classifier.

### PO #5:

(Indicate the new tools, programming language, equipment learned during this program, if any)

1.The programming language we used is python programming.

2.Python is a popular general-purpose programming language. It is used in machine learning, web development, desktop applications, and many other fields. Fortunately for beginners, Python has a simple, easy-to-use syntax. This makes Python a great language to learn for beginners.

3.This dataset is originally from the National Institute of Diabetes and Digestive and Kidney Diseases. The objective is to predict based on diagnostic measurements whether a patient has diabetes**.**

4.As implementation we require to choose a classifier, we chosen random forest classifier.

5. A random forest **is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset**

6.In talking with python the important modules for both data science and machine learning are NumPy library used for working with arrays and functions.

7.And pandas, matplotlib we also learnt.

8.We have learnt machine learning algorithms like Logical Regression which is a statistical analysis method to predict a binary outcome.

9.We have also learnt many more models like classification, decision trees, Support vector machine etc. Which are chosen based on our requirement to implement our given data set.

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**PO #**6**:**

(Indicate how your Summer Internship is helpful for the Society)

Our summer internship is very helpful for society as in a way.

1.It help us to solve real world problems like diabetes prediction, heart dieses prediction, so on

2.It will aware us by make us to know technologies in the society.

3.it make us know the what is the real work of a software engineer and his duties.

Ex: take an example of my project

My project is "diabetes prediction ". Diabetes Prediction of diabetes at an early stage can lead to improved treatment. Data mining techniques are widely used for prediction of disease at an early stage. Diabetes is predicted using significant attributes, and the relationship of the differing attributes is also characterized

Early prediction of diabetes of a person is chances of having or is to help that person to take care of his/her health conditions.it will aware people on their health condition check. And help them to leave with good health condition.

(Indicate how the Summer Internship is helpful for the Environment and how it is sustainable)

## **Our Summer Internship is helpful for environment as it is sustained also.**

* + It has eco-friendly concepts to work on.
  + My project is "diabetes prediction ". Diabetes Prediction of diabetes at an early stage can lead to improved treatment. Data mining techniques are widely used for prediction of disease at an early stage. Diabetes is predicted using significant attributes, and the relationship of the differing attributes is also characterized
  + Early prediction of diabetes of a person is chances of having or is to help that person to take care of his/her health conditions.
  + They are sustained as they are helpful for future generations in a way predication of their health condition and make them to live with good health.

## We are having many projects and predictions which are sustained for future.

(Indicate the ethical practices followed in your Summer Internship)

Almost every decision involves ethics. I have always viewed myself as a very ethical person, however every person has their own set of procedures and rules. I wouldn’t necessarily say I follow the “book” to the fullest extent. No technology or piece of equipment can replace the effectiveness of a skilled person. It always has to be on a case-by-case basis, but there are times it is the most human thing to do. Ethical behaviors are always important in both the workplace and my personal life. I have yet come across any ethical practice during my internship so far, but I am sure I will choose to do the right thing if I have to.

(Indicate your work experience in Summer Internship as an Individual and in a team)

1.As an individual I done my daily tasks in internship which were given by company people as an assignment.

2.As I completed them by my knowledge gained at my internship. But when the project has assigned, I was the team leader of my project.

3.As doing my daily tasks I get an new knowledge because the assignment questions are related my programming subject.

4.what concepts I had learnt based on that my assignment questions were given and they related to me in a way not only to make practice of concepts learned on that but also to make new things with that concept.

5.As coming into my work experience in collaboration with my team members to complete our project were given a new happy and new kind learning experience.

6.As before summer internship I worked and completed my tasks on using my view and my knowledge. But when I worked in team, I came to gain a knowledge by them and my knowledge is to be delivered to them.

7.we collaborated and discussed about our project with each other and find solution to our problem domain and we implemented our project

**PO #**10**:**

(Indicate your improvement in Communication in Oral, Written and Graphical Communication)

In the weekly assessments, I am evaluated for the works I had done during internship which improved my oral communication skills. While coming to written part we write weekly one report based on the given topic it improved my written skills. Also, the design phases of the project helped to understand and improve the graphical communication and graphical skill.

As coming to talk about oral and writtening skill as I very much improved than before because after going to internship as my oral skills are very much improved at the time instructor explaining I listened very carefully and when I got doubts, I clarified by asking my instructor. As he clarified my doubts and he also gave me chance to spoke about the real-life situation’s is has to be applied. As per my knowledge I answered as he says correct and he also explains some real time situations.

**PO #**11**:**

(Indicate your project management in Summer Internship)

Our team worked on “diabetes prediction project” I was experienced to take care of management of our project as a member of team and as well as team leader. I had responsibility to take of care of our project and as well as getting idea and skills gaining to all team members(including me) in doing project. In our project each and every person should have good understanding in all aspects of project and each and every person in team should involve in completion and management of project.

As I involved in project management in a way that planning for group discussions and sharing information related to

project by all team members and asking them to say their ideas for project and coordinating all team

**PO #12:**

(Indicate about the self learnt topics or self learnt skills, if any)

* + - Basics of Machine Learning learnt by us are:
      * Types of Problems in Machine Learning
      * Types of Machine Learning
      * Algorithms of Machine Learning
      * Applications of Machine Learning
    - Model Building:
      * Selecting the right ML algorithms to identify the patterns
      * Building the candidate models
    - Model validation:
      * Validation of the Model
      * Tuning the parameters of Model
    - Python: Python is a popular programming language used on a server to create a web applications and machine learning models.
    - In python we have learnt pandas to analyze data.
    - And also, we have learnt Numpy library used for working with arrays and functions for working in the domain of Linear Algebra.
    - We had used Scikit learn tool to build machine learning models and also used for data cleaning, preprocessing and for testing data.
    - We also have learnt many concepts like Seaborn used for making statistical graphics in python.

(Able to apply the theoretical knowledge of Computer Science and Engineering and the foundational principles of software development to provide sustainable solutions for the real-world technical challenges in the tech landscape by maintaining professional standards, ethical values and integrity.)

* + - Importance of Computers in our Life
      * You can understand and analyze the importance of computer by seeing a revolution in online education, offline and online business, online communication and banking sector. To store, access, manipulate, calculate, analyze data and information we use software application only with the help of these computer machines. All our daily life activities are based on online services and products which can only be possible via computers.
    - computer programmers spend most of their days doing one of four things:
      * Creating new code from scratch.
      * Building off existing code to create new functionality.
      * Testing someone else’s code before releasing a product.
      * Debugging code to achieve a desired function.
    - Predicting and avoiding catastrophes:
      * Computer science is scaling—and scaling very fast for that matter, according to Nand. Applying computer science to prediction can have a huge impact on the world. “We are predicting human behavior; we are predicting diabetes’s etc.” Nand says.
      * With these tools, we can predict everything from an incoming tsunami to the outbreak pattern of a pathogen. In that way, some of the most life-saving work that happens in our world relies on computer scientists. Computer science is even in action when predicting the trajectory of dangerous comets near our planet.
    - It helps ability to identify heart diseased person.
    - Analyzing multiple ML models present in skilit learn / seaborn to find the appropriate model which has higher accuracy.
    - Developing a NEA style user interface to interact with the model.
    - Using this NEA style, the user gives the vital values to the model so that it predicts whether the user is diseased or not.

(Able to adopt to technological changes by initiating self-paced learning to meet the industry demands)

* + - Flexible and engaging learning culture:
      * On-demand lessons help all students, regardless of where and how they want to study. Self-paced digital learning gives students access to explore critical concepts before an exam. It also gives them the flexibility to find out where they made mistakes in the last exam before moving on to the next one.
    - Find the Right Resources for Learning Process:
      * To find the right & worthwhile resources for learning a new technology is as crucial as it can be.
      * You won’t believe but the substandard learning resources will not only make you mediocre or even below-average with the particular technology or skill but can also make you lose your interest in the technology.
      * And as there are an ample amount of learning resources available over the web for each and every technology, you need to be very careful and fastidious to pick out the worthwhile ones among all these.
    - most-preferable methods to learn any technology are provided below:
      * Online Courses & Training Programs
      * Recommended Books
      * YouTube Videos
      * Seminars & Conferences



##### Internal Quality Assurance Cell (IQAC) Rubrics for Summer Internship

20NU1A05A6

**Preamble:** This rubric is specifically designed to assess the performance of the students in Summer Internship

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Criteria | Unsatisfactory (1) | Developing (2) | Satisfactory (3) | Good (4) | Exemplary (5) | Score |
| A. Objectives & Outcomes | **Criterion #1**  Ability to understand the need of industry  engagement through internship program | Less awareness on this aspect and no traces of objectives as well as outcomes. | Aware of the significance of the industry engagement to the industry being engaged alone and little bit familiar with objectives and outcomes. | Aware of the significance of the industry engagement and little bit familiar with objectives and outcomes. | Aware of the significance of the industry engagement and completely aware of the objectives and intended learning outcomes of the internship. | Aware of the significance of the industry engagement and completely aware of the objectives and intended learning outcomes of the internship and able to guide others to sensitize them and making efforts on his to companies / SMEs and groom himself initiating life- long learning |  |
| B. Demonstration of theoretical knowledge | **Criterion #2**  Ability to correlate the theory and practice | Unable to correlate and demonstrate the theory and practice | Able to partially connect the theoretical outcomes with the practical applications. However not able to demonstrate to the full extent and cite references with examples | Able to connect the theoretical outcomes with the practical applications. However not able to demonstrate to the full extent and cite references with examples | Able to connect the theoretical outcomes with the practical applications. And able to demonstrate to the full extent and cite references with examples in the appropriate program of study | Able to connect the theoretical outcomes with the practical applications. And able to demonstrate to the full extent and cite references with examples not only in their respective program of study but also in other inter- disciplinary domain suggesting changes for curriculum enrichment |  |
| C. Problem Analysis & Critical Thinking | **Criterion #3**  Ability to identify the source of problems and suggest solutions | Unable to identify the source of problems and suggest solutions | Able to identify problems’ source with little bit depth and not able to provide solutions | Able to identify the source of problems as well as the source / cause and not able to provide solutions | Able to identify the source of problems as well as the source / cause and able to provide solutions | Able to identify the source of problems as well as the source / cause and not able to provide solutions by citing appropriate journal papers / articles with research based proven facts |  |



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| D. Design and Development of System, Component, Process or  any others in relevant form | **Criterion #4**  Ability to demonstrate the learning outcomes in the form pf product development | Unable to initiate product development on his own | Able to visualize / conceptualize / develop draft version product / system / design / process by taking the support of mentors / peer group and not aware the tools / hardware / software required for the development of the above said items | Able to develop draft version product / system / design / process by taking the minimal support of mentors / peer group and surface awareness / developing stage of identification of the tools / hardware / software required for the development of the above said items | Able to develop product / system / design / process on his own with appropriate use of tools / hardware / software required for the development of the above said items | Able to develop product / system / design / process on his own with appropriate use of tools / hardware / software required for the development of the above said items and develop SOP for the same developed products inking down the scope and limitations of the developed ones and guide others to do so. |  |
| E. Individual and  Teamwork | **Criterion #5**  **Individual and Teamwork in a Multi-disciplinary Setting** | Unable to realize the importance of individual and team work in a multi- disciplinary setting in a real time environment | Able to realize the importance of individual and teamwork in a multi- disciplinary setting and team play is missing | Able to realize the importance of individual and teamwork in a multi- disciplinary setting and shows involvement to certain extent either as an individual or as a team member in contributing  his/her own responsibility to the team | Able to realize the importance of individual and teamwork in a multi-disciplinary setting and extent full support to the team for completing the assigned task either as an individual SME or as a part of team understanding his/her responsibility in a team | Able to realize the importance of individual and teamwork in a multi- disciplinary setting and extent full support to the team for completing the assigned task either as an individual SME or as a part of team understanding his/her responsibility in a team and motivate others and support in case of  uncertainty from his / her part for completing the assigned team task. |  |
| F. Communication  Skills | **Criterion #6**  Able to realize the importance of  communication | Unable to  communicate properly in any of the form (Written, Verbal and Graphical) | Able to communicate properly verbally with the peer group with the use of appropriate technical language that everyone understands but not with other skills of communication | Able to communicate properly with verbal and written with the peer group with the use of appropriate technical language that everyone understands but not with other skill of communication | Able to communicate properly in all the forms with their peer group with appropriate use of technical language that everyone understands demonstrating professional ethics occasionally | Able to communicate properly in all the forms with their peer group with appropriate use of technical language that everyone understands and support others in doing so |  |
| Signature of the Reviewer with Date / Review No. | | | | **Total Score (Average of the ‘A’, through ‘F’** | |  | |

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### Your Feedback on Experiential Learning

As I learned about io, python fundamentals, important modules in python for data science, as I experienced in doing iot and implementation of various classifiers on various datasets. As I really liked experimental learning in before summer internship also but when I worked on team to do the project as I really excited and enjoyed and mostly experienced in working as team. As I get to know how team coordination and managing problems in team and carrying responsibilities is very help to all of our team and as member me to also. My personal experience in working is very new and happy experience to me.As I felt very grateful for getting this opportunity because by this only as I learned real time industrial experience. As I am eagerly waiting for my next internship. To learn and to implement what I learned.

### S.VEERA BABU

##### Signature of the Student