



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AI&ML)**

**Innovative Approaches to Blood Flow Monitoring using Sensor Data**

**ABSTRACT**

**1. Problem Statement:**

Frequent measurement and study of changes in blood flow could be used to improve the ability of health care providers to diagnose and treat patients with vascular conditions, such as those associated with diabetes and high blood pressure. Blood flow can be used to determine the tissue health. If we notice that blood flow is increased then there are chances of infection or inflammation and the flow is decreased then there might be chances of heart attack or low blood pressure. If there is less blood flow to the organs then diseases are inevitable.

**2. Background work:**

- ❖ Generally, many people face obesity, diabetes, heart conditions, and arterial issues due to improper rate of blood flow in body.
- ❖ Poor circulation of blood can even lead to death of a person, so blood flow detection and analysis is essential in everyone's life.
- ❖ By analyzing the rate of blood flow can solve the issue and can treat the underlying causes

**3. Materials and Methodology:**

**3.1 Dataset :**

- ❖ Particular Person data is considered as dataset.
- ❖ The dataset considered will include some important attributes like person's age, name, velocity of RBC (red blood cells) and density of blood etc.

**3.1.1 Data Collection and Preparation:**

- ❖ The data is collected from a particular person through blood flow detection devices.
- ❖ Blood flow detection devices will provide the data of velocity and density of blood.
- ❖ Inclusion of important attributes will increase the accuracy of disease detection through rate of blood flow.

- ❖ The data collected is structured data.

### **3.2 Methods :**

- ❖ The implementation of the project is done using supervised learning concept.
- ❖ In supervised learning concept classification models are used to analyze and monitor the users blood flow.
- ❖ Classification Models:
  - ID3(Decision tree)
  - Naïve Bayesian
  - Random Forest Method
  - K-Nearest Neighbour

#### **3.2.1 Training:**

- ❖ The data used is already predefined in nature.
- ❖ Doctors and Scientist have defined values of particular attributes, like normal blood pressure level is 120/80.
- ❖ Test data is also collected from the user through the blood flow detection devices.
- ❖ Machine learning model predicts the health condition using the test data

#### **3.2.2 Evaluation Measures:**

- ❖ Confusion matrix is used as evaluation measure.
- ❖ Above mentioned is used for evaluating the performance of the model through predicted values and expected values.
- ❖ Error rate, kappa value, sensitivity of data is determined to increase the performance of model.

#### **3.2.3 Deployment and analysis of real-life scenario:**

- ❖ The measurement of blood flow can provide sufficient and accurate data which can be processed and can get to know the issue before hand rather than we going to a doctor and spending lot of time just to analyze the problem.
- ❖ Machine learning model can easily detect and monitor the blood flow without any hassles.
- ❖ Helps people in analyzing and improving their health conditions.

## **4. Experimental Design :**

### **4.1 Software and Hardware Requirement:**

- ❖ Hardware Includes:
  - Laser Doppler blood flow meter
  - Electromagnetic blood flow meters
  - NMR blood flow meter.
  - Ultrasonic blood flow meters.

❖ Software includes:

- Machine learning algorithms are used to analyze the health condition using rate of blood flow.
- Python, java, R language, etc. are the software tools used to employ machine learning algorithms.
- Google colab is used to execute the machine learning algorithms.