# Fetal AI:Using Machine Learning To Predict And Monitor Fetal Health.

## Milestone 1: Project Initialization and Planning Phase

The "Project Initialization and Planning Phase" marks the project's outset, defining goals, scope, and stakeholders. This crucial phase establishes project parameters, identifies key team members, allocates resources, and outlines a realistic timeline. It also involves risk assessment and mitigation planning. Successful initiation sets the foundation for a well-organized and efficiently executed machine learning project, ensuring clarity, alignment, and proactive measures for potential challenges.

### Activity 1: Define Problem Statement

Problem Statement: Despite advances in prenatal care, many expectant mothers face uncertainty and anxiety about their baby's health during pregnancy, leading to inadequate monitoring, delayed detection of fetal growth restrictions insufficient monitoring,limited access to personalized guidance and support and potentially preventable complications. Our goal is to develop a system using Machine Learning to predict accurate results and we improve fetal health outcomes by developing innovative solutions that provide accurate, personalized, and timely insights for expectant mothers, empowering them to take control of their pregnancy journey and ensure the best possible start for their baby.

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**Fetal AI Problem Statement Report:** Click Here

### Activity 2: Project Proposal (Proposed Solution)

The proposed project, Fetal Health predicting and monitoring using AI and ML,"AI-powered ultrasound analysis and fetal heart rate monitoring for early detection of potential issues and with building a tele medicine platform for remote prenatal care an designing a low-cost, portable device/wearable device for fetal monitoring in resource-poor settings.Advanced fetal monitoring and personalized risk assessment enable early detection and prevention of complications. Connection with other expectant mothers and support groups for emotional support.This leads to better health outcomes,personalized fetal care, reduced healthcare costs, and enhanced quality of life.

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**Fetal AI Project Proposal Report:** Click Here

### Activity 3: Initial Project Planning

Initial Project Planning involves outlining key objectives, defining future scope, and identifying timely insights of Fetal Health of Pregnant women.Detect potential complications and abnormalities,Predict fetal growth and development,Identify high-risk pregnancies,setting timelines, allocating resources, and determining the overall project strategy. During this phase, the team establishes a clear understanding of the datasets, formulates goals for analysis, and plans the workflow for data processing. Effective initial planning lays the foundation for a systematic and well-executed project, ensuring successful outcomes.

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**Fetal AI Project Planning Report:** Click Here

## Milestone 2: Data Collection and Preprocessing Phase

The Data Collection and Preprocessing Phase involves executing a plan to gather relevant Fetal Health application data from Kaggle, ensuring data quality through verification and addressing missing values. Preprocessing tasks include cleaning, encoding, and organizing the datasets for subsequent exploratory analysis and machine learning model development.

### Activity 1: Data Collection Plan, Raw Data Sources Identified, Data Quality Report

The datasets for "Fetal AI:Using Machine Learning To Predict And Monitor Fetal Health." is sourced from Kaggle. It includes patient Fetal health details by analyzing various data points, Medical Images, Lab Results,Predictive modeling, Patient Information,Pattern recognition,Fetal Monitoring. Data quality is ensured through thorough verification, addressing missing values, and maintaining adherence to ethical guidelines, establishing a reliable foundation for predictive modeling.

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**Fetal AI Data Collection Report:** Click Here

### Activity 2: Data Quality Report

The datasets for "Fetal AI:Using Machine Learning To Predict And Monitor Fetal Health." is sourced from Kaggle. It includes patient Fetal health details by analyzing various data points. Data quality is ensured through thorough verification, addressing missing values, and maintaining adherence to ethical guidelines, establishing a reliable foundation for predictive modeling.

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**Fetal AI Data Quality Report:** Click Here

### Activity 3: Data Exploration and Preprocessing

Data Exploration involves analyzing the fetal health datasets to understand patterns, distributions, and outliers. Preprocessing includes handling missing values, scaling, and encoding categorical variables. These crucial steps enhance data quality, ensuring the reliability and effectiveness of subsequent analyses in the fetal health project.

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**Fetal AI Data Exploration and Preprocessing Report:** Click Here

## Milestone 3: Model Development Phase

The Model Development Phase entails crafting a predictive model for fetal health process. It encompasses strategic feature selection, evaluating and selecting models (Random Forest, Decision Tree, KNN, Logistic Regression), initiating training with code, and rigorously validating and assessing model performance for informed decision-making in the lending process.

### Activity 1: Feature Selection Report

The Feature Selection Report outlines the rationale behind choosing specific features (e.g., Baseline Value,Accelerations,Fetal Movement) for the Fetal health AI model. It evaluates relevance, importance, and impact on predictive accuracy, ensuring the inclusion of key factors influencing the model's ability to predict and monitor well being of fetal health.

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**Fetal AI Feature Selection Report:Click Here**

### Activity 2: Model Selection Report

The Model Selection Report details the rationale behind choosing Random Forest, Decision Tree, KNN, and Logistic Regression models for fetal health prediction. It considers each model's strengths in handling complex relationships, interpretability, adaptability, and overall predictive performance, ensuring an informed choice aligned with project objectives.

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**Fetal AI Model Selection Report: Click Here**

### Activity 3: Initial Model Training Code, Model Validation and Evaluation Report

The Initial Model Training Code employs selected algorithms on the fetal health datasets, setting the foundation for predictive modeling. The subsequent Model Validation and EvaluationReport rigorously assesses model performance, employing metrics like accuracy and precision to ensure reliability and effectiveness in predicting fetal health outcomes.

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**Fetal AI Model Development Phase Template: Click Here**

## Milestone 4: Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyper parameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

### Activity 1: Hyper parameter Tuning Documentation

The Random Forest model was selected for its superior performance, exhibiting high accuracy during hyper parameter tuning. Its ability to handle complex relationships, minimize overfitting, and optimize predictive accuracy aligns with project objectives, justifying its selection as the final model.

### Activity 2: Performance Metrics Comparison Report

The Performance Metrics Comparison Report contrasts the baseline and optimized metrics for various models, specifically highlighting the enhanced performance of the Random Forest model. This assessment provides a clear understanding of the refined predictive capabilities achieved through hyper parameter tuning.

### Activity 3: Final Model Selection Justification

The Final Model Selection Justification articulates the rationale for choosing Random Forest as the ultimate model. Its exceptional accuracy, ability to handle complexity, and successful hyper

parameter tuning align with project objectives, ensuring optimal fetal health predictions.

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**Fetal AI Model Optimization and Tuning Phase Report: Click Here**

## Milestone 5: Project Files Submission and Documentation

For project file submission in GitHub, Kindly click the link and refer to the flow. Click Here

For the documentation, Kindly refer to the link.

## Milestone 6: Project Demonstration

In the upcoming module called Project Demonstration, individuals will be required to record a video by sharing their screens. They will need to explain their project and demonstrate its execution during the presentation.