REAL-TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEM

TEAM LEADER   – R.JANANI

TEAM MEMBER 1 – M.AARTHI

TEAM MEMBER 2 – R.GAJALAKSHMI

TEAM MEMBER 3 – K.BHUVANESWARI

LITERATURE SURVEY

LITERATURE SURVEY:

1.Title :   **River Water Quality Check**

Author :   **MOHAMMAD SALAH UDDIN CHOWDURY**

PUBLISHED IN : "The 16th International Conference on Mobile Systems and Pervasive Computing (MobiSPC)" On 2019.

DESCRIPTION : The current approach for monitoring water quality is manual, has a tedious process, and takes a lot of time. This research suggests a sensor-based system for monitoring water quality. Multiple sensors make up the system, which measures the physical and chemical characteristics of the water. A microprocessor for system processing, a communication system for inter- and intra-node communication, and a number of sensors are the core elements of a wireless sensor network (WSN). Remote monitoring and Internet of Things (IoT) technology can be used to access real-time data. With the aid of Spark streaming analysis through Spark MLlib, Deep learning neural network models, Belief Rule Based (BRB) system, and data acquired at the separate site, may be presented in a visual way .

2.Title :   **Real Time River Water Quality Check**

Author :   **JYOTIRMAYA IJARADAR**

PUBLISHED IN : "International Research Journal" Of Engineering and Technology On March 2018.

DESCRIPTION : In this era of increased environmental awareness, the need for effective and efficient water quality monitoring, evaluation, and control in residential areas has increased.

PROJECT PLANNING PHASE

PROBLEM STATEMENT

- The primary purpose of quality monitoring and control system is to provide early warning of dirty river water.

- To monitor the water parameters such as turbidity ,PH , dissolved solvent and to analyse the quality of river water.

IDEA / SOLUTION DESCRIPTION

- Monitoring water parameters with sensors and control measures by ultrasonic frequencies.

- The PH level of the water can be monitored

- Altering the authorities if the water quality is not good so that they can intimate the people not to drink that water.

NOVELTY / UNIQUENESS

- Arduino and sensor based water parameters monitoring which identifies biological and chemical change in water.

SOCIAL IMPACT / CUSTOMER SATISFACTION

- It provides the user with an idea about the quality of water which might help them to base the usage of water according to its quality.

BUSINESS MODEL (REVENUE MODEL)

- The monitoring system could be sold in the market for the purpose of testing water quality.

SCALABILITY OF THE SOLUTION

- The model could be Scaled according to size of the water body about to be tested.

DESIGN

CUSTOMER JOURNEY

PHASES	MOTIVATION	INFORMATION GATHERING	ANALYZES VARIOUS PRODUCTS	CHOOSES THE MOST EFFICIENT PRODUCT	PAYMENT
ACTIONS	wants to maintain the quality of river water	wants to choose an efficient device for maintaining water quality	other available meters are colorimeters, MINARS and test strips	MINARS and GEMS are more efficient compared to test strips	Quality of river water is good
TOUCHPOINTS	The people feel satisfied	After setup, the people need not worry much about the quality of water	The user amuse by the various types of meters available	After getting this the people won't get any water borne disease.	After metres are introduced, the people feel healthy.
CUSTOMER FEELING	😊	😵	😊	😊	😊
CUSTOMER THOUGHTS	Customer thinks it is neccessary for their life	Customer thinks they can lead a healthy life.	Customer thinks alter solution for their problem	The meter choosing will be easy and comfortable for them	They think the meter will be user friendly
OPPORTUNITIES	The customer gets the better quality water	The customer knows about the process of the meter	The customer will be aware of all the meter and devices available	The customer comes to know which device is best.	The customer will be healthy and satisfied.

DATA FLOW DIAGRAM
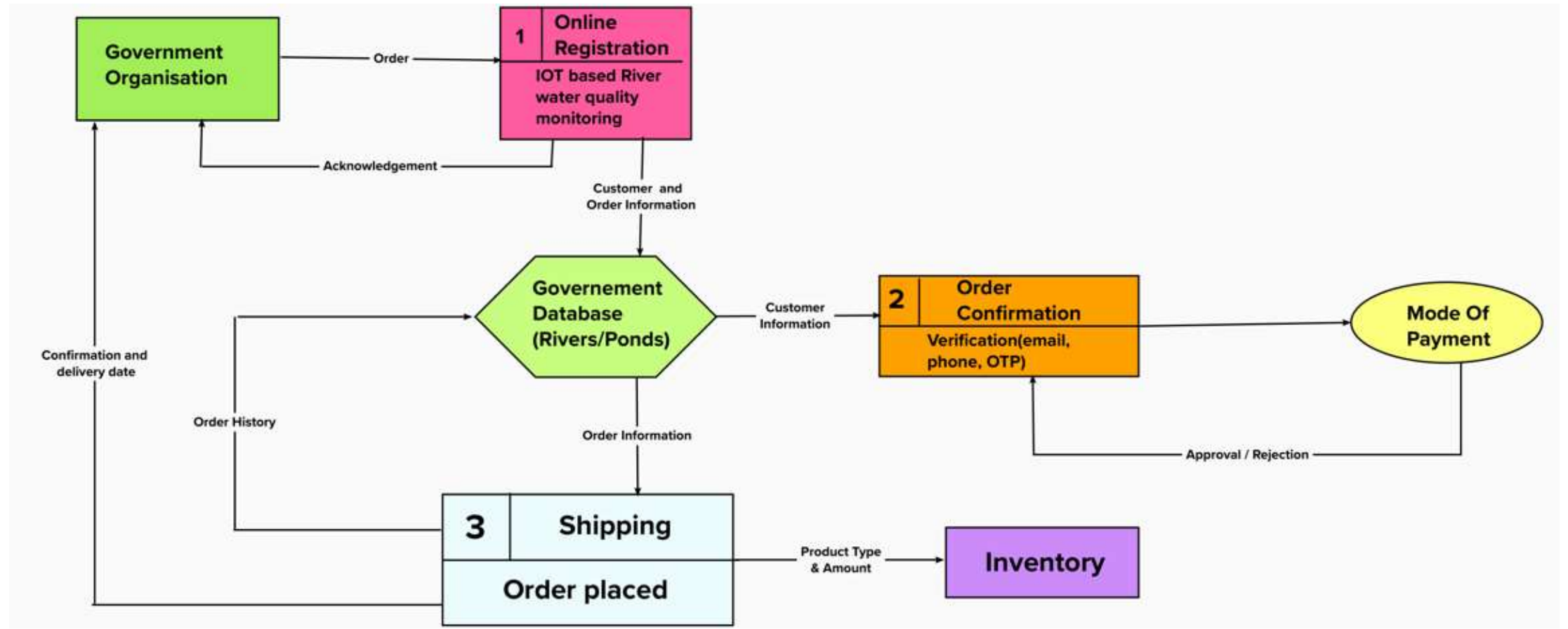
FUNTIONAL REQUIREMENTS

Functional Requirements:

Following are the functional requirements of the proposed solution.

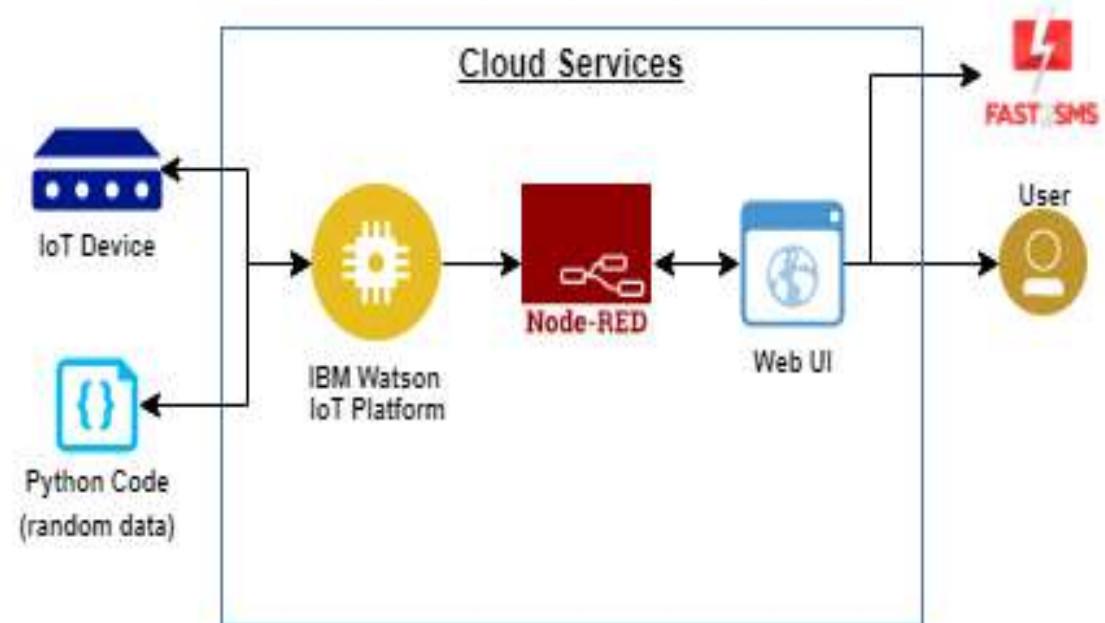| FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Requirements	River Water Protection pH,Turbitidy ,Humidity and Temperature
FR-2	User Registration	Manual Registration Registration through webpage Registration through Form Registration through Gmail
FR-3	User Confirmation	Confirmation Via Email Confirmation Via OTP Confirmation Via Phone
FR-4	Payment Options	Cash on Delivery Net Banking/UPI Credit/Debit/ATM Card
FR-5	Product Delivery and Installation	Door Step delivery Free Installation
FR-6	Product Feedback	Through GoogleForms Through Phone calls Through Webpage

NON-FUNCTIONAL REQUIREMENTS

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

| FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Have a clear and self-explanatory manual. Easier to use Even an illiterate farmer have to use the product without any difficulties
NFR-2	Security	Application has to be secured with 2 step authorisation Passwords and passkeys will be assigned as per the users need.
NFR-3	Reliability	Hardware requires a regular checking and service Software may be updated periodically Immediate alert is provided in case of any system failure
NFR-4	Performance	The application must have a good user interface It should have a minimal energy requirement It has to save water and energy
NFR-5	Availability	All the features will be available when the user requires. It depends on the need of the farmer and the customization the user has done.
NFR-6	Scalability	The product has to cover all the space of land irrespective of the size or area of a farm field.

ARCHITECTURE

PROBLEM SOLUTION FIT

Problem-Solution fit canvas 2.0

IOT Based Safety Gadget for Child Safety Monitoring and Notification

1. CUSTOMER SEGMENT(S) — CS
Who is your customer?

According to our problem statement maintaining the ecosystem health and livelihood of the population.

6. CUSTOMER CONSTRAINTS — CC
What constraints prevent your customers from taking action or limit their choices of solutions?

- Analysis is little bit high
- compact in size.

5. AVAILABLE SOLUTIONS — AS
Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have?

- Improving the balance between exposure and toxicity assessment of real-world pollution mixture.

2. JOBS-TO-BE-DONE / PROBLEMS — J&P
Which jobs-to-be-done (or problems) do you address for your customers?

- To identify the presents of algal bloom in the tank or water bodies.
- The quality, quantity and temperature of the water can be maintained.

9. PROBLEM ROOT CAUSE — RC
What is the real reason that this problem exists? What is the back story behind the need to do this job?

- Lack of system administration and upkeep is the problem.
- it uses a lot of electricity.

7. BEHAVIOUR — BE
What does your customer do to address the problem and get the job done?

- These are portable and are easily maintainable.
- It uses less data and power. Additionally, it might serve as a reference for the best safety steps to take.

3. TRIGGERS — TR
What triggers customers to act? i.e. seeing their neighbour installing

- They are able to recognise the issue with the water without anyone's assistance.
- It uses little energy and is small in size. Customers will find it easy to use.

4. EMOTIONS: BEFORE / AFTER — EM
How do customers feel when they face a problem or a job and afterwards?

BEFORE: Anxity, time consumption and unaware of things

AFTER: aware of things, less time consumption and pleasure.

10. YOUR SOLUTION — SL
If you are working on an existing business, write down your current solution first. Fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill into canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviours.

- The system finds a way for supervising and monitoring the real time river water so that quality & flow can be maintained.
- The device will be in compact size and user friendly to use.

8. CHANNELS of BEHAVIOUR — CH
8.1 ONLINE
What kind of actions do customers take online?

- The cloud storage can be used to regulate water flow.

8.2 OFFLINE
What kind of actions do customers take offline?

- The proposed system includes a number of sensors to test and guarantee the water's quality based on factors including pH, temperature, conductivity, turbidity, and ardunio.
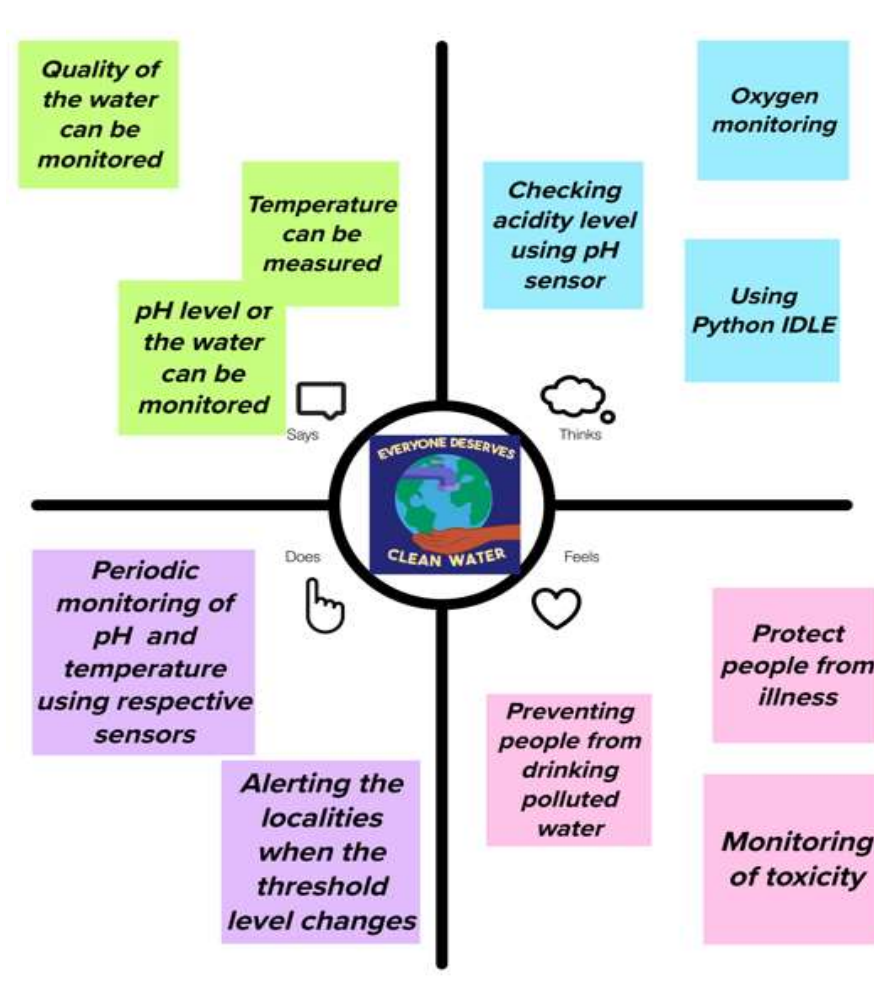
PROPOSED SOLUTION
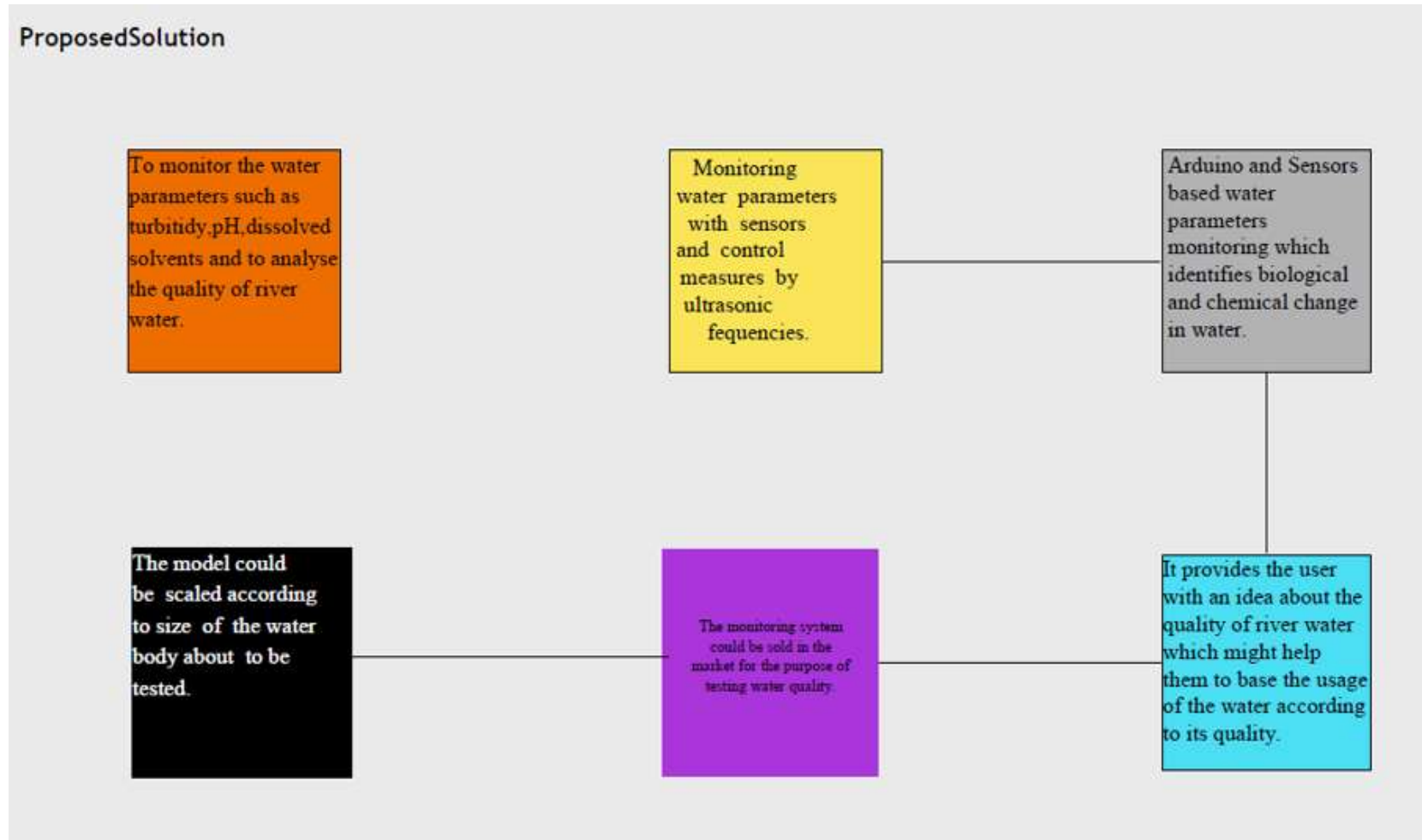
IDEATION

TEAM MEMBERS DETAILS

S.NO	NAMES	POSITION	COLLEGES
1	JANANI R	TEAMLEADER	K.RAMAKRISHNAN COLLEGE OF ENGINEERING
2	AARTHI M	TEAM MEMBER 1	K.RAMAKRISHNAN COLLEGE OF ENGINEERING
3	GAJA LAKSHMI R	TEAM MEMBER 2	K.RAMAKRISHNAN COLLEGE OF ENGINEERING
4	BHUVANESWARI K	TEAM MEMBER 3	K.RAMAKRISHNAN COLLEGE OF ENGINEERING

EMPATHY MAP
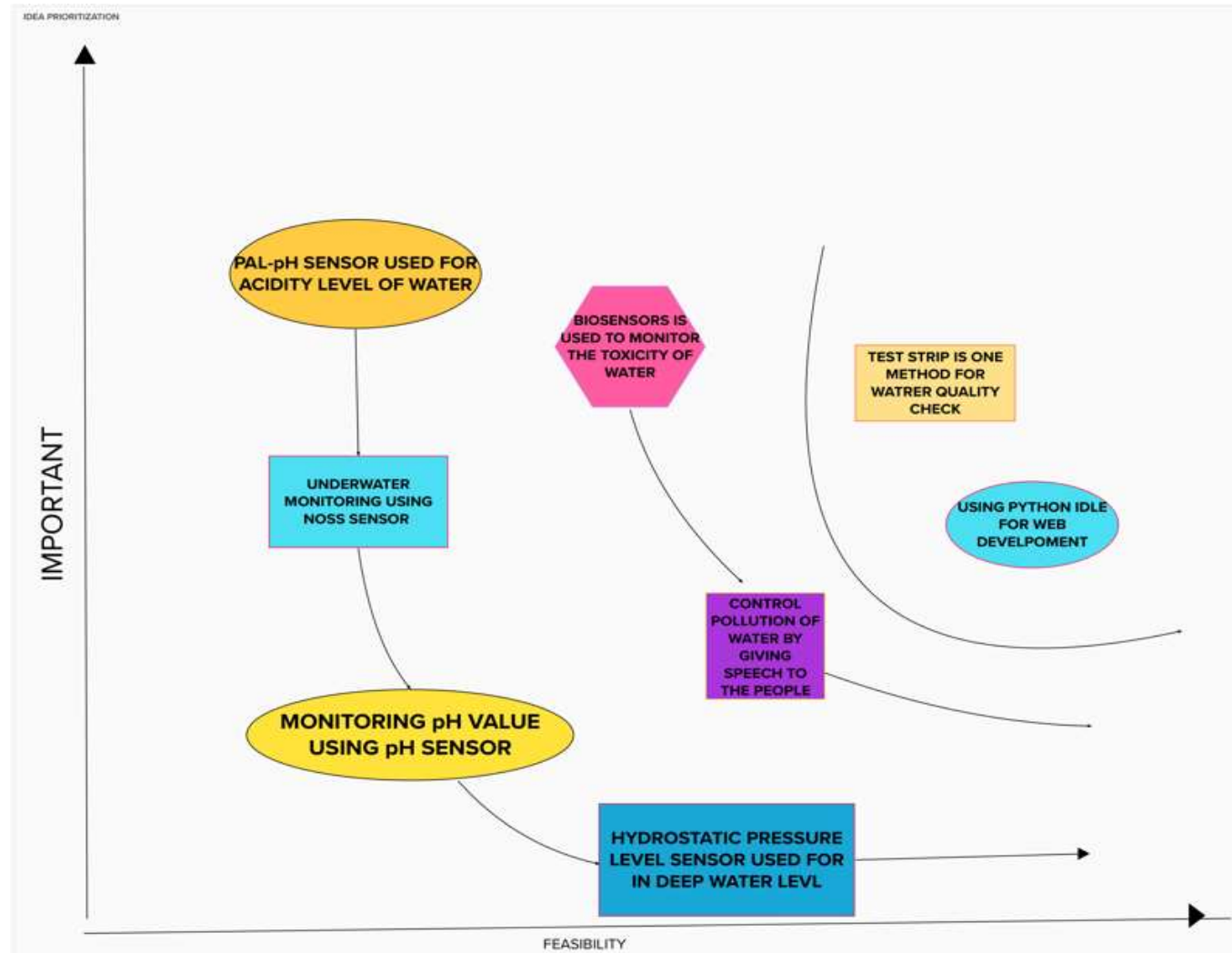
BIG IDEAS
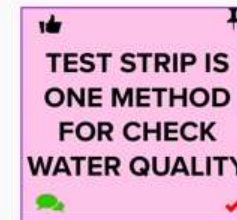
IDEA PREPARATION

NEED STATEMENT

TO CHECK THE QUALITY OF RIVER WATER

NEED A WAY TO

FIND THE PURIFICATION OF WATER

SO THAT

IT MUST BE CLEAN

To check the quality of the river water need a way to find the quality and announce the localities whether the water can be used or not

PROJECT PLANNING AND SCHEDULING

SPRINT PLANNING AND ESTIMATION

S.NO	ACTIVITY TITLE	ACTIVITY DESCRIPTION	DURATION
1	Understanding the project requirement	Assign the team members and create repository in the Github, Assign the task to each members and teach how to use and open and class the Github and IBM career education .	1 WEEK
2	Starting of project	Advice students to attend classes of IBM portal create and develop an rough diagram based on project description and gather of information on IOT and IBM	1 WEEK

3	Attend class	Team members and team lead must watch and learn from classes provided by IBM and NALAYATHIRAN and must gain access of MIT license for their project.	4 WEEK
4	Budget and scope of project	Budget and analyze the use of IOT in the project and discuss with team for budget prediction to predict the favorability for the customer to buy	1 WEEK

SPRINT DELIVERY SCHEDULE

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application using google login	2	High	Janani R, Aarthi M
Sprint-2		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Aarthi M, Janani R
Sprint-2	Login Dashboard	USN-3	As a user, I can log into the application by entering email & password	1	High	Gajalakshmi R, Bhuvaneswari K
Sprint-3			As a developer, I have to integrate python script with the IBM IOT platorm and send values to Node Red	2	High	Bhuvaneswari K, Gajalakshmi R
Sprint-4			As a developer, I have to make my website to fetch data from the Node Red platform	2	High	Aarthi M, Janani R

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

CODING AND SOLUTIONING

FEATURE 1

name Firstname

Middlename:

Lastname:

project title
1. cloud computing
2. internet of things
3. machine learning
4. data science
5. artificial intelligence

Gender :

○ Male
○ Female
○ Other

Phone :
| +91 | |

Address

FEATURE 2

Real time water quality monitoring system

Modal Login Form

Login

TESTING

TEST CASES

```python
#importing Random function to generate the value
import random as rand


for i in range(5):
    print("Test case:",i+1)
    print("Welcome to Real-Time River Water Quality Monitoring and Control System")
    temperature = int(rand.randint(-40,125))
    pH = int(rand.randint(0,14))
    DO = int(rand.randint(0,100))
    TSS = int(rand.randint(0,3700))
    Manganese = int(rand.randint(0,1000))
    Copper = int(rand.randint(0,2000))
    ammonia_Nitrate = int(rand.randint(0,100))
    Hardness = int(rand.randint(0,1000))
    Zinc =  int(rand.randint(0,100))
    Conductivity =  f"{float(rand.uniform(0.001,2000)):.2f}"
    Chloride = int(rand.randint(0,200))
    Sulphate = int(rand.randint(0,1000))
    #These variables store value of ramdom data to be shared to the cloud

    #printing the values
    print(
        "Temperature:", temperature,
        "\npH:", pH,
        "\nDO:", DO,
        "\nTSS:", TSS,
        "\nManganese:", Manganese,
```

```python
#printing the values
print(
    "Temperature:", temperature,
    "\npH:", pH,
    "\nDO:", DO,
    "\nTSS:", TSS,
    "\nManganese:", Manganese,
    "\nCopper:", Copper,
    "\nAmmonia & Nitrate:",ammonia_Nitrate,
    "\nHardness:",Hardness,
    "\nZinc:", Zinc,
    "\nConductivity:", Conductivity,
    "\nChloride:", Chloride,
    "\nSulphate:", Sulphate, "\n"
)
```

RESULTS

PERFORMANCE METRICS