POLITEKNIK MALAYSIA

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

JABATAN KEJURUTERAAN MEKANIKAL FINAL REPORT PROJECT 1

PROGRAM COORDINATOR

EN. MOHD SHARIZAN BIN MOHD SHARIF

GROUP MEMBERS

1. MUHAMMAD DANISH IRFAN BIN MARHADI
(08DKM20F2016)

2. SASI TARAN A/L RAMESH
(08DKM20F2013)

3. ALFRED PAUL A/L AROKIAM
(08DKM20F2021)

POLITEKNIK MALAYSIA

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

"SOIL PH MONITORING SYSTEM'

MUHAMMAD DANISH IRFAN BIN MARHADI

(08DKM20F2016)

SASI TARAN A/L RAMESH

(08DKM20F20130

ALFRED PAUL A/L AROKIAM

(08DKM20F2021)

MECHANICAL ENGINEERING DEPARTMENT

DATE : 21/5/2023

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

"SOIL PH MONITORING SYSTEM"

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(08DKM20F2016)

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ALFRED PAUL A/L AROKIAM

(08DKM20F2021)

This report will be send to Mechanical Engineering Department as following the part of terms to received certification of Diploma in Mechanical of Engineering.

Mechanical Engineering Department

Date : 21/05/2023

DECLARATION OF ORIGINALITY AND COPYRIGHT

TOPIC : SOIL PH MONITORING SYSTEM

DATE : 21/5/2023

I'm,

1. **MUHAMMAD DANISH IRFAN BIN MARHADI (08DKM20F2016)**
2. **SASI TARAN A/L RAMESH (08DKM20F2013)**
3. **ALFRED PAUL A/L AROKIAM (08DKM20F2021)**

1. Are final year students **Diploma in Mechanical Engineering, Mechanical Department, Politeknik Sultan Salahuddin Abdul Aziz Shah**, with address at **Persiaran Usahawan, 40150 Shah Alam, Selangor**. (Referred as "Politeknik")

2. We admit that "the project" and intellectual property contained in it was our design without imitate from other intellectual.

3. I agreed to release ownership of "the project Soil PH Monitoring System" to "Politeknik Sultan Salahuddin Abdul Aziz Shah" to fulfilled requirement for **Diploma in Mechanical Engineering** to me.

Done and is truly acknowledge by :

1. MUHAMMAD DANISH IRFAN BIN MARHADI (08DKM20F2016)
   Identification number : (020710-10-0451)

2. SASI TARAN A/L RAMESH (08DKM20F2013)
   Identification number : (020509-14-1075)

3. ALFRED PAUL A/L AROKIAM (08DKM20F2021)
   Identification number : (021203-10-1681)

At Polytechnic Sultan Salahuddin Abdul Aziz Shah,

In front of,
EN. MOHD SHARIZAN BIN MOHD SHARIF
(800210-14-5925)

As project supervisor on the date of : 22.08.2022

ACKNOWLEDGEMENT

We would like to convey our heartfelt gratitude to everyone who made it possible for us to compile this report. Mr. Mohd Sharizan bin Mohd Sharif, our final year project supervisor, whose contribution in stimulating suggestions and encouragement, helped us to coordinate our project from the very start towards the end completing our project "Soil PH Monitoring System" successfully, including in writing this report. We would also like to thank the Mechanical Innovation Challenge and Exhibition [MICE] and PSA Innovation Technology & Commercialization [PITEC] panels especially in our project presentation that has improved our presentation skills thanks to their comment and advice.

ABSTRACT

Soil pH is a measure of the acidity or alkalinity of a soil. Soil pH is a key characteristic that can be used to make informative analysis both qualitative and quantitatively regarding soil characteristics. Nowadays, the manual process of soil pH monitoring system is often proved inaccurate and not efficient most of the time. This makes finding out the pH value of the soil is late, and the maintenance could not be done sooner which often leads to accidents in some fields such as the pipeline is ruptured. After monitoring and researching about this issue, a new and advanced soil pH monitoring system that provides fast and accurate readings of soil pH is designed to solve some of the existing problems. The objective that is targeted for this project is to monitor soil pH remotely and to prevent pipe ruptures due to acidity in soil. A test run will be conducted to make sure the project functions properly as planned. The project will operate when the pH sensor is inserted into the pipe and the pipe will be placed in the soil. Then, the pH sensor will detect the pH value of soil and sends the data to computer or laptop. The laptop and phone will be connected to the same Wi-Fi network to get the pH value. The pH value can also be monitored in the phone through BLYNK app and get warning notification if the monitoring system detects acidity in soil. Based on the research conducted, acidic soil can corrode metal pipes over time, causing them to weaken and eventually rupture. The length of time that a pipe takes to rupture due to acidity in soil in oil and gas operations depends on several factors, including the type and thickness of the pipe, the level of acidity in the soil, and the specific conditions of the operation. With this new soil pH monitoring system pipelines' lifespans can be increased, and ruptures can be avoided through routine maintenance, inspections, and corrosion prevention methods conducted earlier when the soil pH level is identified remotely earlier.

KEY WORDS: SOIL PH LEVEL, MONITORING SYSTEM

ABSTRAK

pH tanah ialah ukuran keasidan atau kealkalian sesuatu tanah. pH tanah adalah ciri utama yang boleh digunakan untuk membuat analisis bermaklumat secara kualitatif dan kuantitatif mengenai ciri-ciri tanah. Pada masa kini, proses manual sistem pemantauan pH tanah sering terbukti tidak tepat dan tidak cekap pada kebanyakan masa. Ini menyebabkan mengetahui nilai pH tanah lewat dan penyelenggaraan tidak dapat dilakukan lebih awal yang sering mengakibatkan kemalangan di beberapa medan seperti saluran paip pecah. Selepas memantau dan menyelidik tentang isu ini, sistem pemantauan pH tanah baharu dan termaju yang menyediakan bacaan pH tanah yang cepat dan tepat direka untuk menyelesaikan beberapa masalah sedia ada. Objektif yang disasarkan untuk projek ini adalah untuk memantau pH tanah dari jauh dan untuk mengelakkan paip pecah akibat keasidan dalam tanah. Larian ujian akan dijalankan untuk memastikan projek berfungsi dengan baik seperti yang dirancang. Projek ini akan beroperasi apabila sensor pH dimasukkan ke dalam paip dan paip akan diletakkan di dalam tanah. Kemudian, sensor pH akan mengesan nilai pH tanah dan menghantar data ke komputer atau komputer riba. Komputer riba dan telefon akan disambungkan ke rangkaian WiFi yang sama untuk mendapatkan nilai pH. Nilai pH juga boleh dipantau dalam telefon melalui aplikasi BLYNK dan dapatkan pemberitahuan amaran jika sistem pemantauan mengesan keasidan dalam tanah. Berdasarkan kajian yang dijalankan, tanah berasid boleh menghakis paip logam dari masa ke masa, menyebabkan ia menjadi lemah dan akhirnya pecah. Tempoh masa yang diambil oleh paip untuk pecah disebabkan keasidan dalam tanah dalam operasi minyak dan gas bergantung pada beberapa faktor, termasuk jenis dan ketebalan paip, tahap keasidan dalam tanah dan keadaan khusus operasi. Dengan sistem pemantauan pH tanah baharu ini jangka hayat saluran paip boleh ditingkatkan dan pecah boleh dielakkan melalui penyelenggaraan rutin, pemeriksaan dan kaedah pencegahan kakisan yang dijalankan lebih awal apabila tahap pH tanah dikenal pasti lebih awal.

KATA KUNCI: TAHAP PH TANAH, SISTEM PEMANTAUAN

CONTENT

TOPIC 1 ; INTRODUCTION

1.1 INTRODUCTION

In recent times, there are many pipelines ruptures occurring in the Oil and Gas industries and other similar industries that uses pipelines under soil. A research has been conducted to find out the cause of those ruptures. It has been found that most of pipe ruptures happen due to the acidity of soil that makes the pipelines corrode and lead to leaking and in worst case ruptures. Therefore, a new Soil PH Monitoring System is found and designed to prevent the matter in hand.

Changes in pH level of soil can occur due to many several factors and one of them is weather conditions. Weather conditions could not be handled by anyone that makes it hard to maintain a safe level of soil pH. This contributes to pipelines ruptures to happen almost all the time. Pipe ruptures can contribute hundreds and thousands of loss to the industry.

With this new and advanced Soil PH Monitoring System soil pH level can be monitored remotely anywhere. This monitoring system uses internet connection to monitor the pH level of soil. Just connect the phone to the monitoring system and with a good wifi connection soil pH level can be monitored remotely.

Figure 1.1.1 Pipe ruptures due to acidity in soil.

1.2 BACKGROUND RESEARCH

The soil pH sensor used in the pipeline industry often transfers the data of the soil pH value to the computer through cloud/server or wi-fi. These data can be viewed and analyse using MS Excel. On 4th October 2015, NPS 30 PGU 22 Sector Pipeline experienced pipe burst at KP 197 in Ulu Tiram. The pipe ruptured due to external environment induced corrosion cause a thinning of the pipe; the remaining thickness could not sustain the internal pressure. The pipe was cut out and replacement activity have been completed on 9th October 2015. Even with such technology cannot prevent pipe from rupture due to corrosion.

Due to this incident, the soil pH monitoring system is developed to prevent similar incident from happening in the future. The soil pH monitoring system enables the users to access the data regarding soil pH value through mobile phone. The system comes with Real Time monitoring capability and will send notification warning if the pH value is acidic. The monitoring system purpose is to help people who are working in the pipeline industry to have access to the data anywhere and anytime as long as there is internet connection. This can help users to plan forward a maintenance in order to maintain the integrity and the lifespan of the pipe.

1.3 PROBLEM STATEMENT

- Pipe ruptured due to the acidity of the soil.
- Maintenance could not be done sooner.
- pH value could not be identified earlier.

1.4 OBJECTIVES

- To monitor soil pH value level remotely.
- To prevent pipe ruptures due to acidity of the soil.
- Test run the project to make sure the project functions properly as planned.

1.5 PROJECT SCOPES

- Needs internet connection to receive or transfer data regarding soil pH value.
- Soil needs to be in a damp or humid condition to detect its pH value.

1.6 IMPORTANCE OF RESEARCH

- To maintain the lifespan of the pipe.
- To avoid pipe rupture incident that can result in major loss.
- To find the solution to the existing problem.
- To reduce the human power used to check the soi pH value.

1.7 SUMMARY OF CHAPTER

The uses of this monitoring system will provide benefits to the people who are working in pipeline industry or the industry that's related. The impact can be seen whereby using this monitoring system, the user's productivity of work greatly increased.With the existence of this monitoring system, it will

make it easier for user to maintain the lifespan of pipe because the data can be access anywhere and anytime. Indirectly this will boost profit for the industry that's related.

TOPIC 2 : LITERATURE REVIEW

2.1 INTRODUCTION

This study aims to figure out how to improve the idea of soil pH monitoring system. The feature and process that needed to be add is being research through the other type of monitoring system that has been found throughout the internet. Monitoring system has actually been implemented already though not much industry rely on it. The idea to make a soil pH monitoring system that any industries that using pipelines could rely on is because that it is known that monitoring system that exist now is considered manual process and delays the result this brings delay in the maintenance work and the pipeline is ruptured. Hence, with the new and advanced Soil PH Monitoring System the method before is made easy and pipeline can be saved with taking maintenance a lot earlier than before.

2.2 PREVIOUS RESEARCH

2.2.1 Glass electrode based soil pH system

First, research that we found is glass electrode based soil pH system discovered by Cremer in 1906 , and is still found in many laboratories. The glass electrode produces fast, accurate and reliable readings, however, suffers from a number of drawbacks, such as complexity of construction, fragile materials involved and the need of frequent calibration. Methods to operate this system is pH-sensitive knob must be loaded with a support arrangement, the ISFET semiconductor innovation brings about a genuine strong state pH sensor. The entire microchip is implanted in plastic in such a route, to the point that just the gate surface is left open to be in contact with the sample. By supplanting the delicate glass globule with the implanted microchip, a powerful and without glass pH measuring gadget can be outlined. The last anode consolidates in one plastic

lodging the pH-sensitive ISFET device, reference terminal and a temperature sensor. Results for this pH system can be known when the pH value changes, the current through the transistor will change accordingly. To maintain the drain–source current at a constant value a control voltage has to be applied through the reference electrode. The change in the control voltage is a measure of the pH value of the sample. This presented soil pH system reviews the soil pH sensing techniques based on ISFET and Conductimetric technology, and since both of the technologies have some drawbacks, a new way is proposed. Hence this paper proposes the implementation of an efficient and improved in-situ soil pH sensing approach based on nanotechnology, in which nano-particles of ZnO will be used to increase the sensing efficiency of the electrodes.

2.2.2 Sturdier electrical instrument

Similar project that we found is in 1934 a former classmate of Beckman's from the University of Illinois, who had the job of measuring the acidity of lemon juice for the California Fruit Growers' Association, asked Beckman to devise a sturdier electrical instrument for the task. Close control of acidity is critical in the manufacture of many industrial products. Yet despite the introduction of the pH scale by Soren Sorensen in 1909, industrial chemists had continued to use traditional color tests for acidity well into the 20th century. Beckman, in response to his colleague's request, invented the acidimeter (forerunner to the legendary first commercially successful electronic pH meter). Arnold Beckman proposed that the current obtained through Haber and Klemensiewicz's electrode be amplified, allowing it to be measured using a cheap miliamperometer. He devised a simple, high-gain amplifier using two vacuum tubes for this purpose. This advance represents the development of the first pH meter, known at the time as an "acid-o-meter". The model was known as the Model G acidimeter and later renamed the Model G pH meter. This device was revolutionary because it was the first to combine the whole apparatus (amplifier, electrochemical cell, electrode, calibration dials, batteries and measuring gauge) into one unit.

2.2.3 Soil pH can be determined from soil color using on digital image processing techniques

Soil pH can be determined from soil color using on digital image processing techniques. The digital photographs of the soil samples were used for the analysis of soil pH. Soil color is visual perceptual property corresponding in

humans to the categories i.e. red, green, and blue and others. Soil colors are the parts of visual perceptual property where digital values of red, green and blue (RGB) provide a clue for spectral signature capture of different pH in soil denote the wave lengths of electromagnetic radiation. Bayer filter technique separate the color bands for given information about the intensity of light in red, green, and blue (RGB) wavelength regions. Digital photographs or images were displayed with color composites as well as incorporated wavelength bands corresponding to red green and blue colors. Soil colors are the parts of visual perceptual property where digital values of red, green and blue (RGB) provide a clue for spectral signature capture of different pH in soil. The pH properties of the soil have been used to describe the degree of acidity and basicity which ultimately affects the pipe condition. We also describe with the parameters of related application which have some advantages and limitations.

2.3 SUMMARY OF CHAPTER

The conclusion for the topic is that, the Soil PH Monitoring system that can be found on the internet, some uses glass electrode, electrical instrument and some uses digital image processing techniques. On the downside of it, those previous research has certain downfall according to its working techniques. Meanwhile, the new and advanced Soil PH Monitoring System provides fast reading and can be monitored remotely from anywhere compared to the project exost in the market now.

TOPIC 3 : METHODOLOGY

3.1 INTRODUCTION

The detection of pH value, which is often employed to measure acidity and alkalinity in a particular solution, may be used as an indicator for evaluating environmental, biochemical, and biological processes. pH sensing techniques use a variety of approaches, including potentiometric, capacitive, chemoreceptive, luminescence, and optical methods. The potentiometric pH sensor is the most widely used pH sensor because of its small size, simple device construction, and cheap unit cost of production. The electromotive force (EMF) differential between a pH detecting electrode and a reference electrode is measured by the potentiometric pH sensor. Because of its potential stability and environmental friendliness, Ag/AgCl is the most often used reference electrode. Metal oxides (e.g., IrOx, WO3, RuO2, TaO2, TiO2, and SnO2) and conductive polymers are commonly used in pH sensor electrodes. As the use of pH sensors grows from laboratory experiments to agriculture, water quality, healthcare, and clinical applications, developments in pH sensors have been miniaturised and flexible, allowing for direct detection of pH in small volumes or on curved surfaces. Furthermore, many applications need a decrease in the unit cost of pH sensor production.

Printing methods have lately received a lot of interest for their use in the production of electronics and electrochemical devices such as displays, sensors, energy devices, and electrical gadgets. For printed electronics and electrochemical devices, screen printing, inkjet printing, and photolithography have all been developed. A mask (screen) is used to transfer pastes onto a substrate, avoiding regions made impervious to the paste by a blocking stencil. This technique is scalable and low-cost, and it is appropriate for micro-sized materials and electronics.

Methodology is a study of research or more formally called a contextual framework for research before making a product. It is a system of thought that informs the choices researchers make, based on their beliefs and values.

3.2 METHOD OF DATA COLLECTION

We gathered data through survey among our Polytechnic Institute, Mechanical Engineering Department, from semester 1 to semester 5 students to store and analyse important information and look into the satisfaction level of conducting the work of collecting pH value remotely or manually.

3.3 DESIGN OF PRODUCT

The soil pH monitoring system is designed for the pipeline industry aims to address the specific needs and challenges associated with maintaining the integrity of pipelines. Monitoring soil pH levels around pipelines is crucial to prevent corrosion and ensure the long-term durability and safety of the infrastructure.

This system ultilizes Arduino software and integrates with the Blynk mobile application to transfer pH data to a mobile phone. This design allows users to remotely access real-time and historical data, receive notifications, and make informed decision for safety of the pipeline.

3.4 DRAWING OF PRODUCT

FIGURE 3.4.1 SKETCH AND FINAL DRAWING OF THE MACHINE

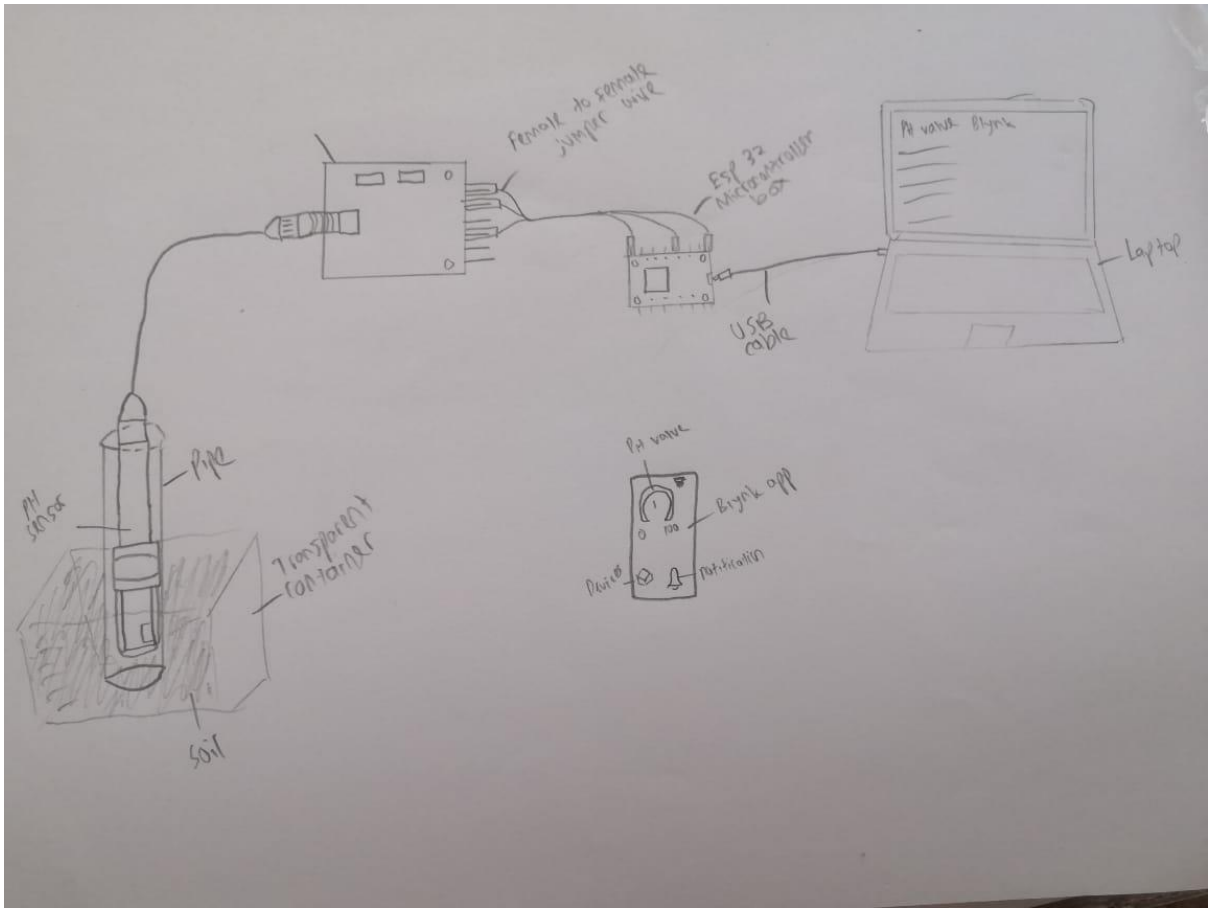
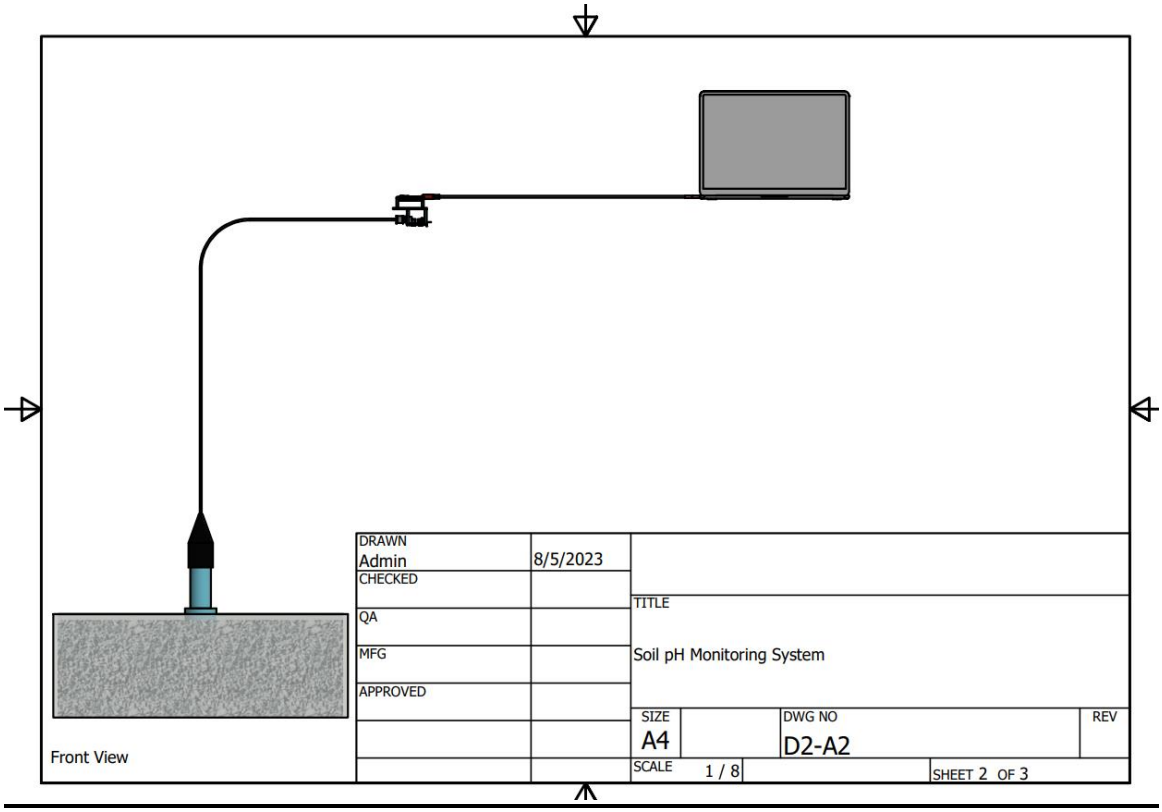
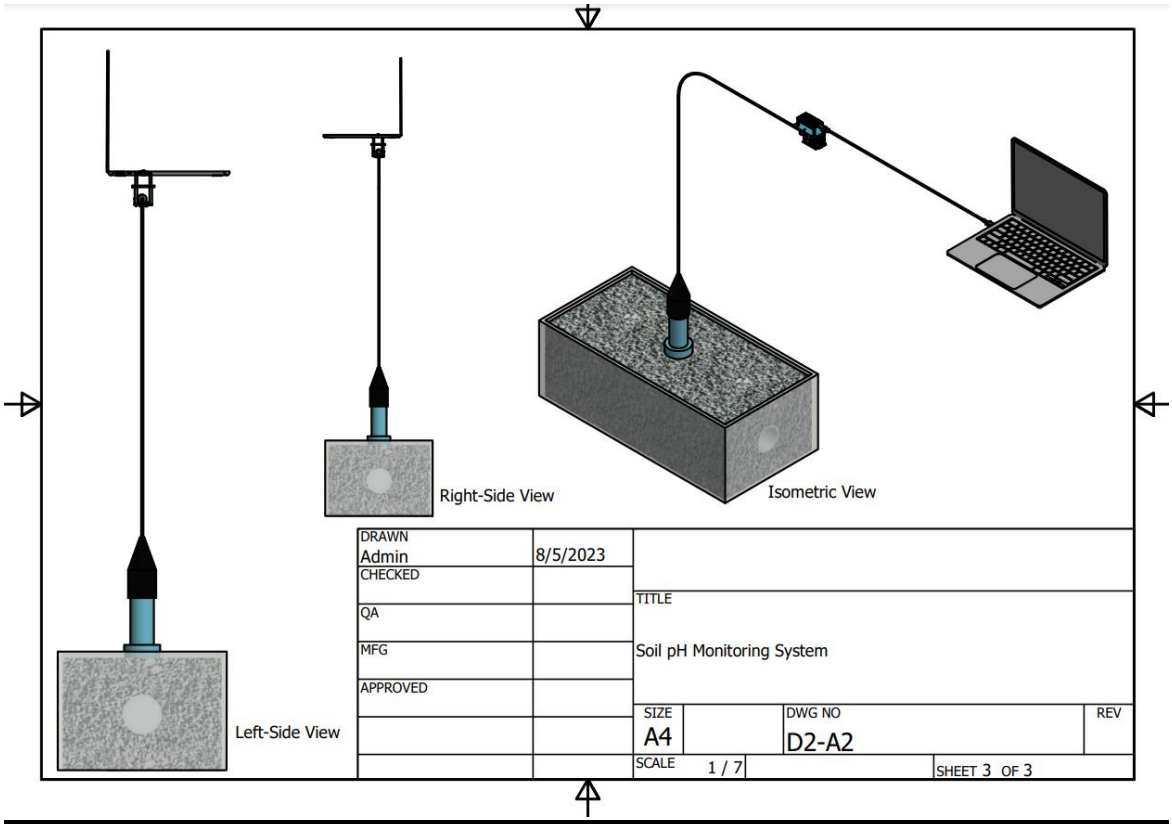


FIGURE 3.4.2 THE 3D MODEL OF THE PROJECT FROM THE SKETCH




Right-Side View
Isometric View
Left-Side View
DRAWN
Admin
8/5/2023
CHECKED
QA
MFG
APPROVED
TITLE
Soil pH Monitoring System
SIZE
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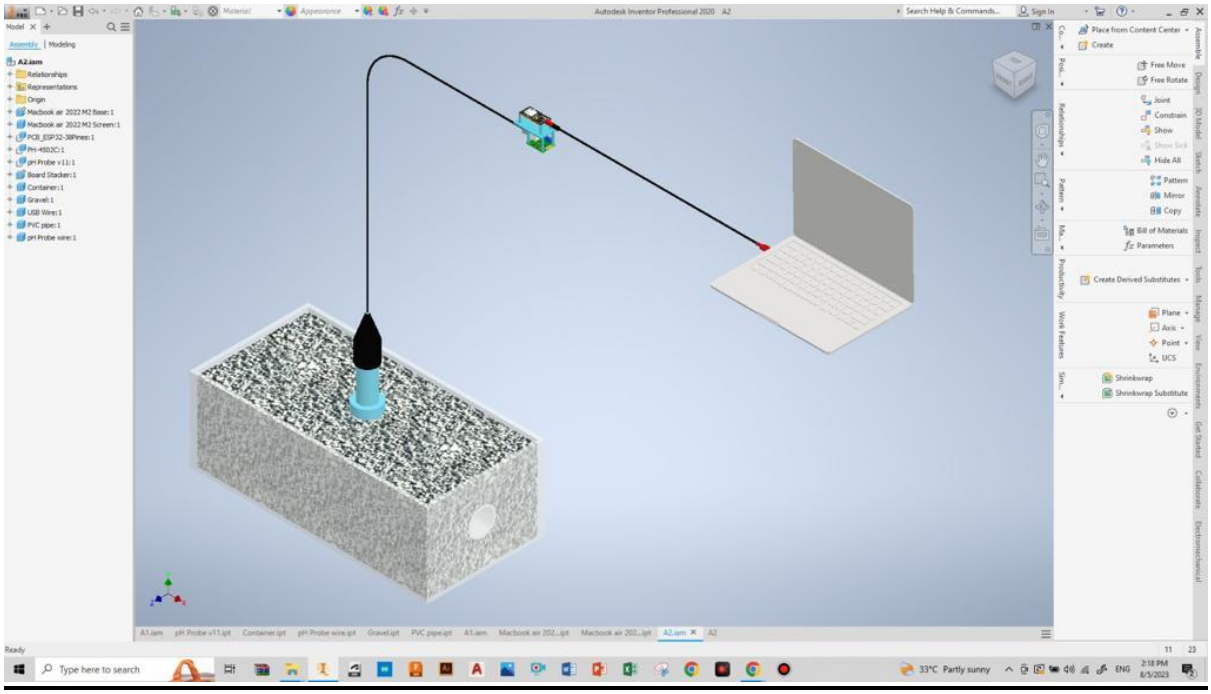
SHEET 3 OF 3



3.5 BACKGROUND RESEARCH

A) Arduino Software

Java was used to create the cross-platform Arduino integrated development environment (IDE), which is available for Microsoft Windows, macOS, and Linux. It came from the IDE for the programming languages Wiring and Processing. It has a code editor with tools for text copying and pasting, text replacement, automated indenting, brace matching, and syntax highlighting. It also offers straightforward one-click compiling and uploading tools for Arduino programmes. A hierarchy of operating menus, a message area, a text terminal, a toolbar with buttons for standard operations, and more are also included. The GNU General Public Licence, version 2 governs the publication of the IDE's source code.

The Arduino IDE has specific code organisation guidelines to support the languages C and C++. A software library from the Wiring project, which offers several standard input and output operations, is provided by the Arduino IDE. For the sketch to start and the main programme loop, user-written code only needs two fundamental functions, which are combined with a programme stub main to create an executable cyclic executive programme using the GNU toolchain, which is also distributed with the IDE. The executable code is transformed by the Arduino IDE's use of the programme avrdude into a text file with hexadecimal encoding, which is then loaded into the Arduino board by a loader programme in the firmware of the board.

Only Windows 7 or newer OS are supported by the Arduino IDE windows compiler as of version 1.8.12. When trying to validate or upload a programme on Windows Vista or earlier, one receives a "Unrecognised Win32 application" problem. Users may either use version 1.8.11 or transfer the "Arduino-builder" executable from version 11 to their current install folder as it is independent of IDE to run IDE on older computers.

B) AUTODESK INVENTOR

Autodesk Inventor is a professional-grade computer-aided design (CAD) software developed by Autodesk. It is widely used by engineers, designers, and manufacturers to create 3D digital prototypes of mechanical components and assemblies.

Inventor supports the integration of 2D and 3D data in a single environment, resulting in a virtual representation of the final product that allows users to evaluate the shape, fit, and function of the object before it is created. In addition to parametric, direct edit, and freeform modelling tools, Autodesk Inventor features multi-CAD translation capabilities and standard DWG drawings. Shape Manager, Autodesk's proprietary geometric modelling kernel, is used in Inventor. The programme is available for purchase as a subscription or as pre-paid Flex Tokens (daily use, consumption-based). Autodesk Inventor Professional is also included in the Autodesk Product Design & Manufacturing Collection licence. Autodesk Inventor is a direct competitor to SolidWorks, Solid Edge, and Creo.

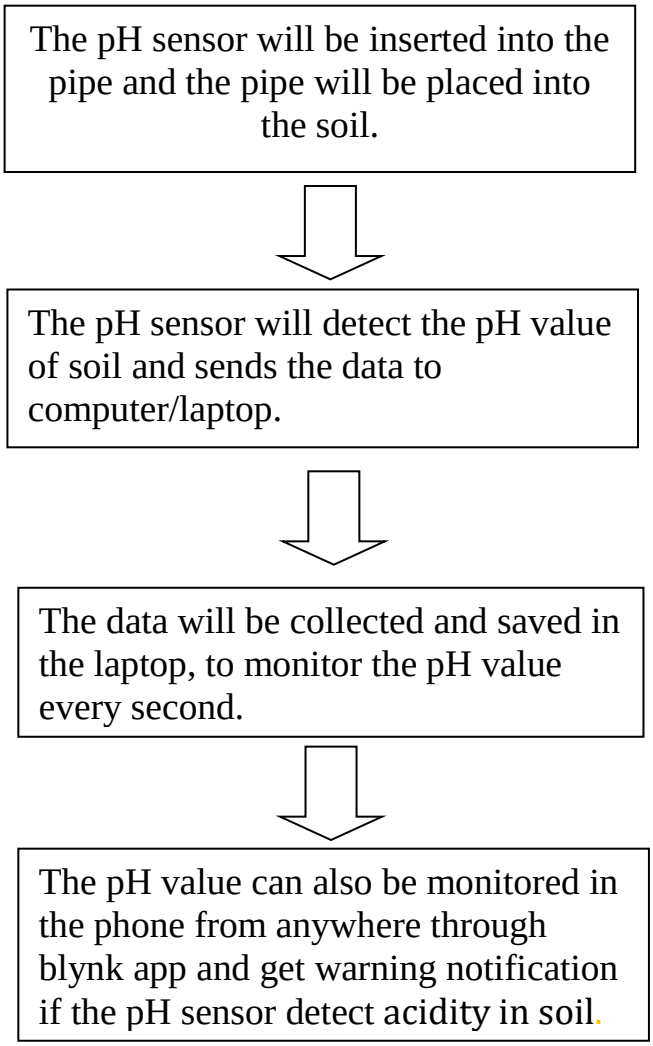
C) **Blynk**

Blynk is a platform that allows users to easily build and control Internet of Things (IoT) projects. It provides a simple way to connect hardware devices, such as Arduino or Raspberry Pi, to the Blynk app on a smartphone or tablet.

With Blynk, users can create a graphical interface on their mobile devices to interact with their connected hardware. The platform offers a drag-and-drop interface builder, which allows users to design custom control interfaces by adding buttons, sliders, gauges, graphs, and other widgets. These widgets can then be linked to specific actions or functions in the hardware device.

Blynk operates through a cloud-based infrastructure, enabling remote control and monitoring of IoT projects from anywhere with an internet connection. The platform supports various communication protocols, including Wi-Fi, Ethernet, Bluetooth, and cellular networks, making it versatile for a wide range of IoT applications.

3.6 WORKING PROCESS



3.7 TESTING METHOD

1) Test run using each group members mobile phone before adding acid to the soil.
2) Add acid to make sure there is changes in the pH value to monitor from mobile phone.
3) Move far away from the monitoring system to make sure data can be receive everywhere if there is internet connection.

3.8 SUMMARY OF CHAPTER

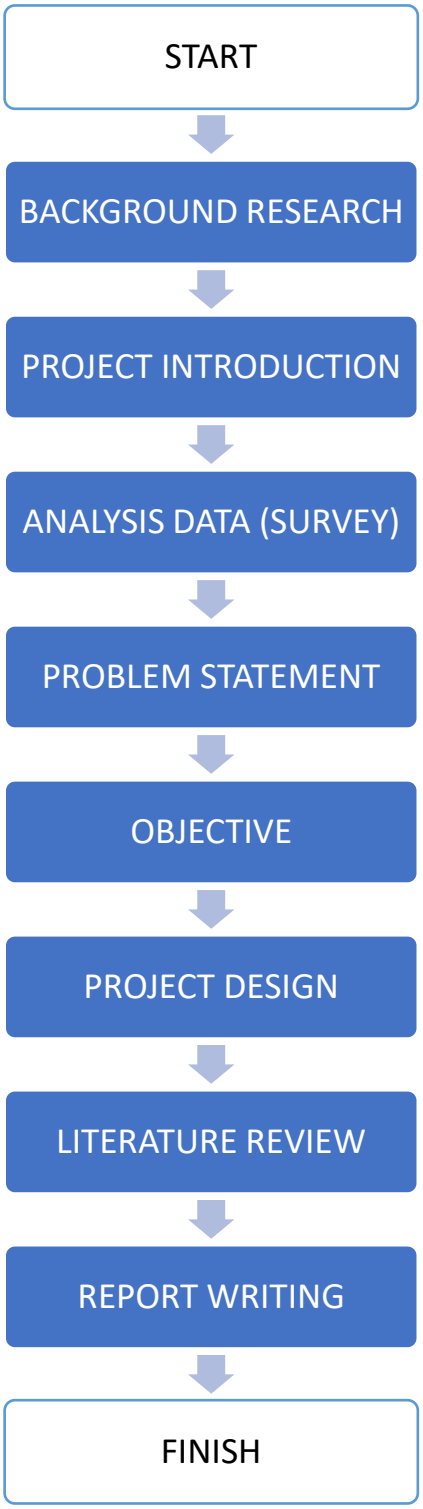
The conclusion of this chapter is that monitoring system is based off of a design of the soil pH monitoring system used in the pipeline industry while utilizing Arduino software and the Blynk app is a solution that allows users to measure and monitor the pH levels of soil in real-time. We gathered data through survey among our Polytechnic Institute, Mechanical Engineering Department, from semester 1 to semester 5 students to store and analyse important information and look into the satisfaction level of conducting the work of collecting pH value remotely or manually. Furthermore, we also used three different software to create the Soil pH Monitoring System which is the Arduino Software, Autodesk Inventor, Blynk. Last but not least, we had few ways to test run of monitoring system which is by recording the readings using our own mobile phone before testing the range of the connection.

TOPIC 4 : RESULT

4.1 INRODUCTION

This project started with an idea and then a background research regarding this soil pH monitoring system before writing the project introduction and starting to collect data to serves as evidence for the problem statement that was written afterwards. The objective was written after the data from the survey was collected enough and the problem statement was finished written, the objective is serves as the problem solving target. Lastly, the literature review was collected from the similar monitoring system and data found across the web as a review and a comparison.

Figure 4.1.1 : Flow Chart



4.2 PROCEDURE

Figure 4.2.1 the first sketches of soil pH monitoring system model

- the first sketch that was drawn in the simplest way and simplified it into the second sketch so that it can be transferred to fusion easily.

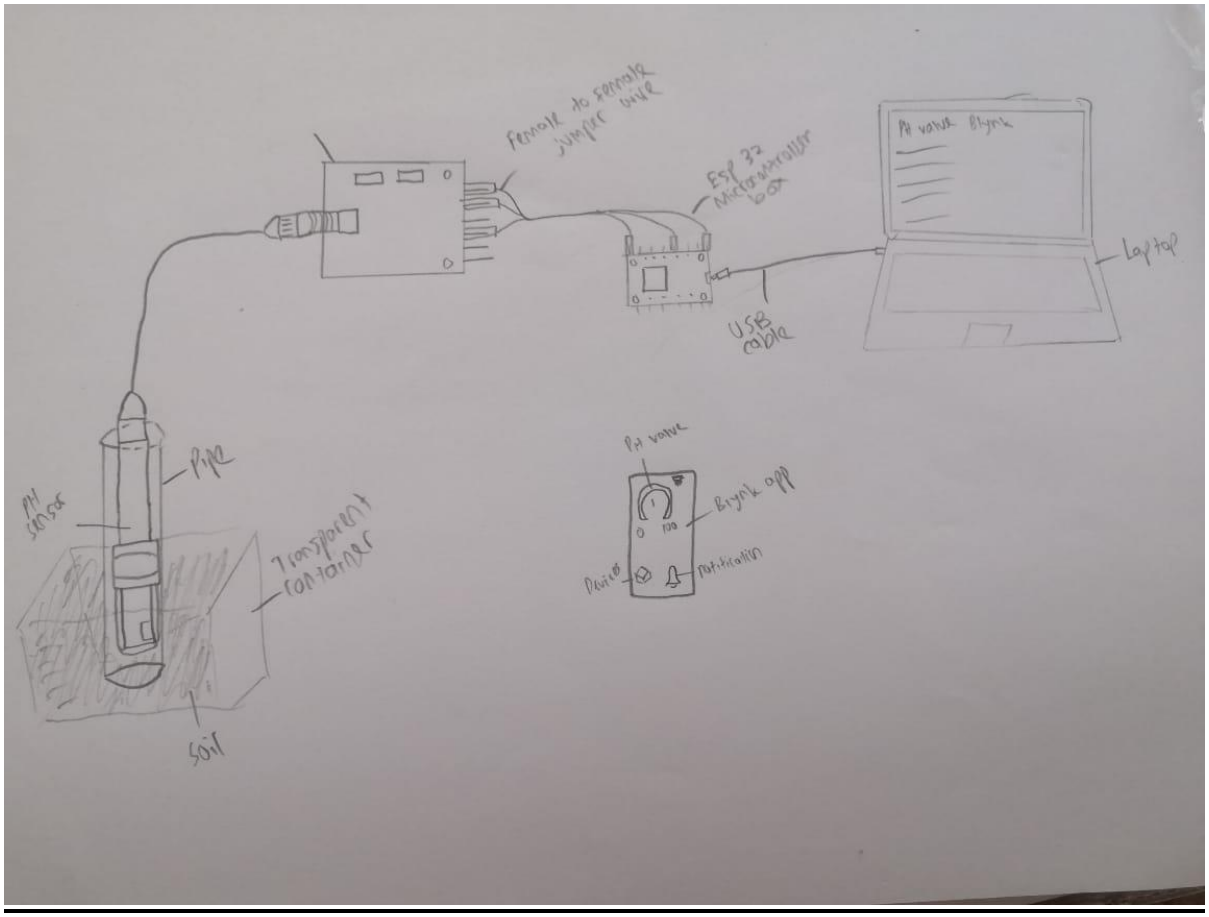
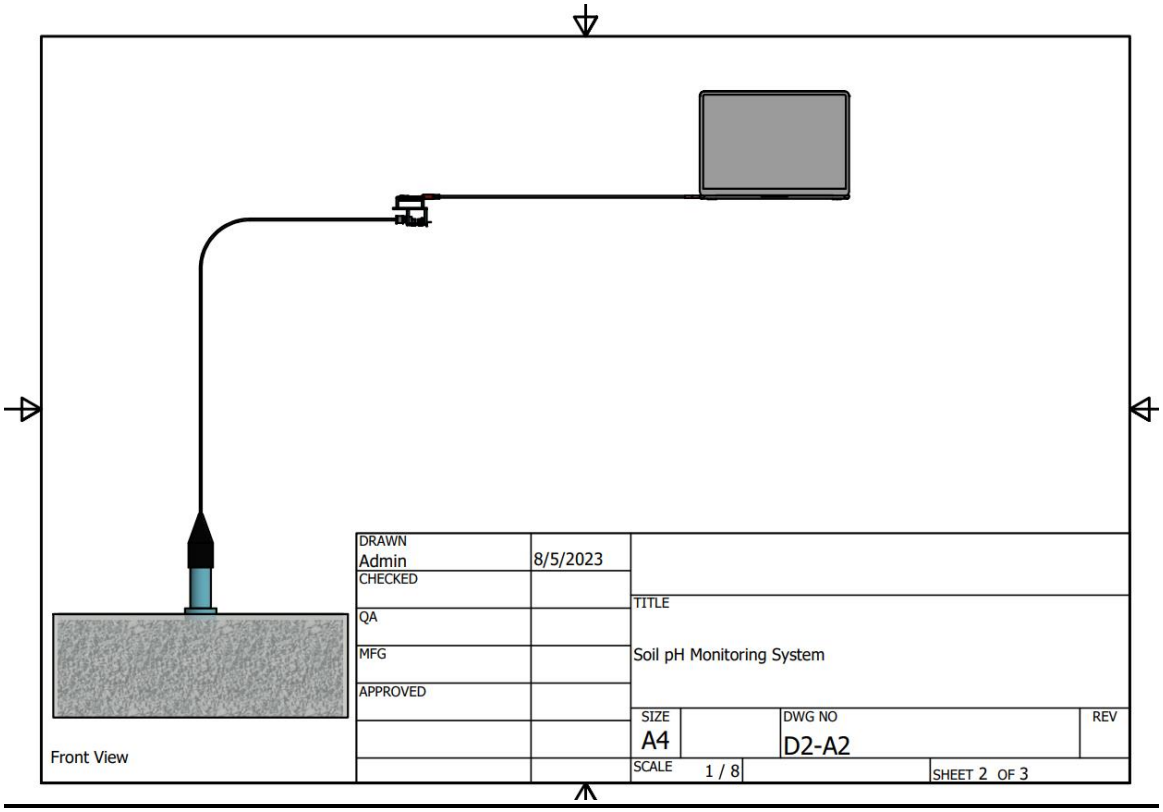


Figure 4.2.2 sketch in Autodesk Inventor and the 3D model of soil pH monitoring system



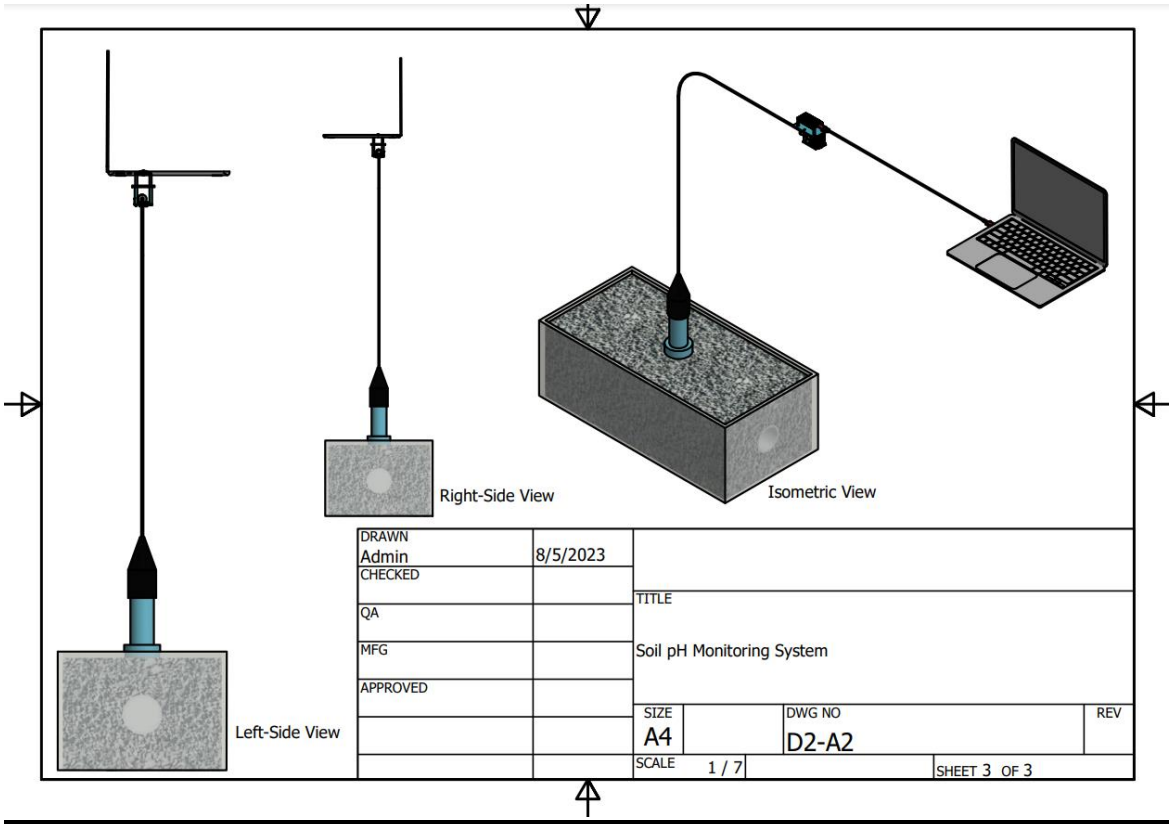
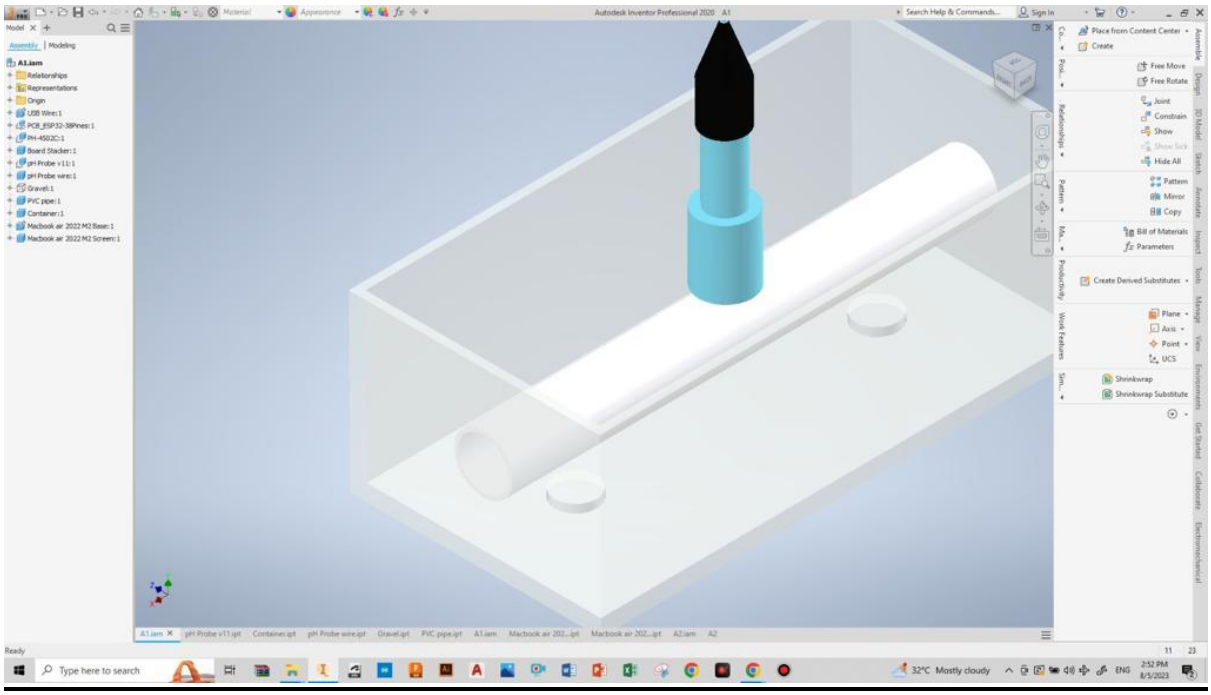


Figure 4.2.3 pH sensor 3D design

- Model of the pH sensor is created before the detail is added.



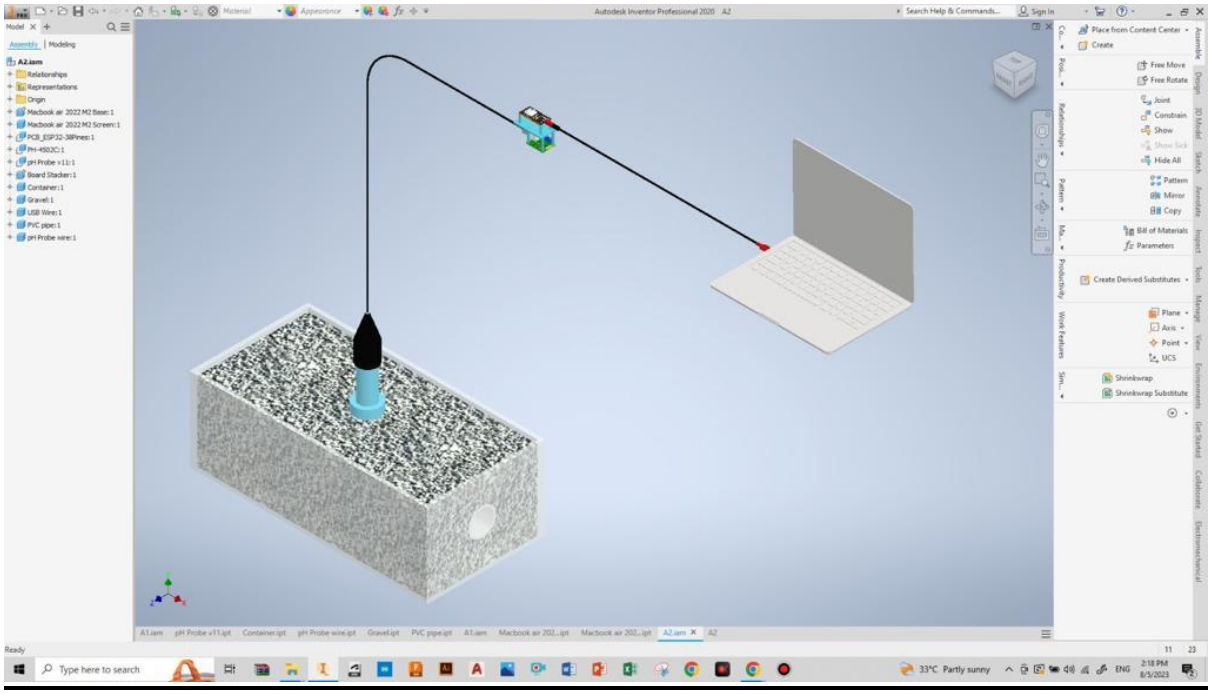
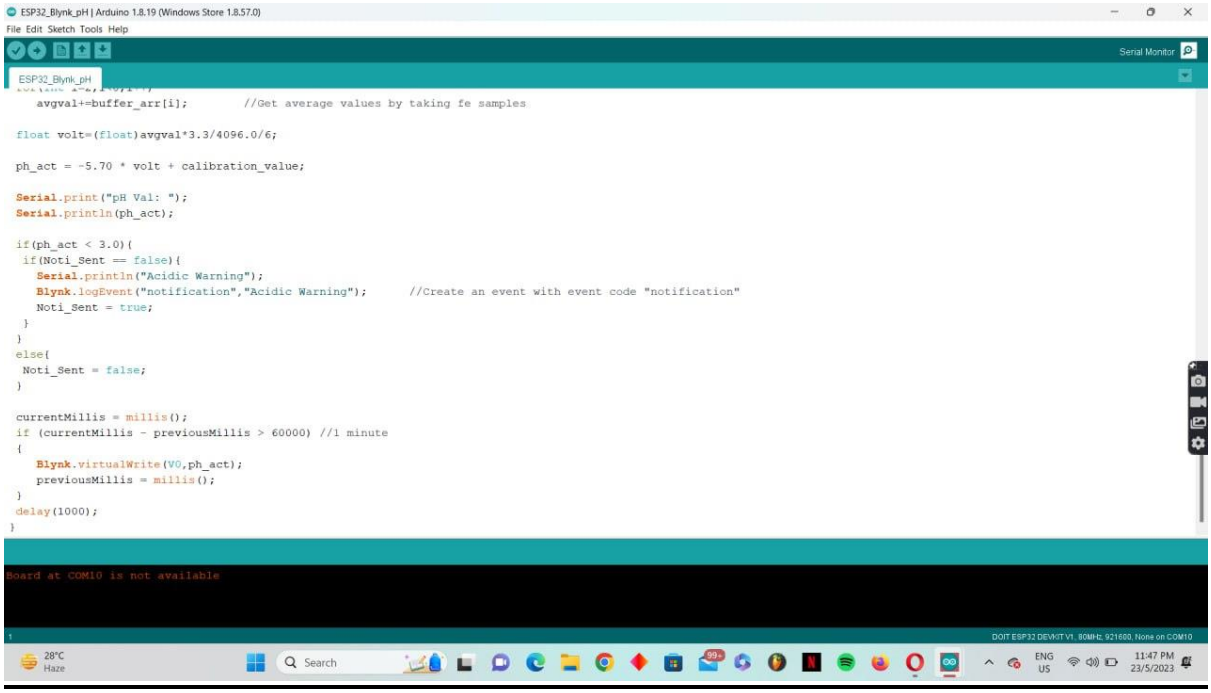
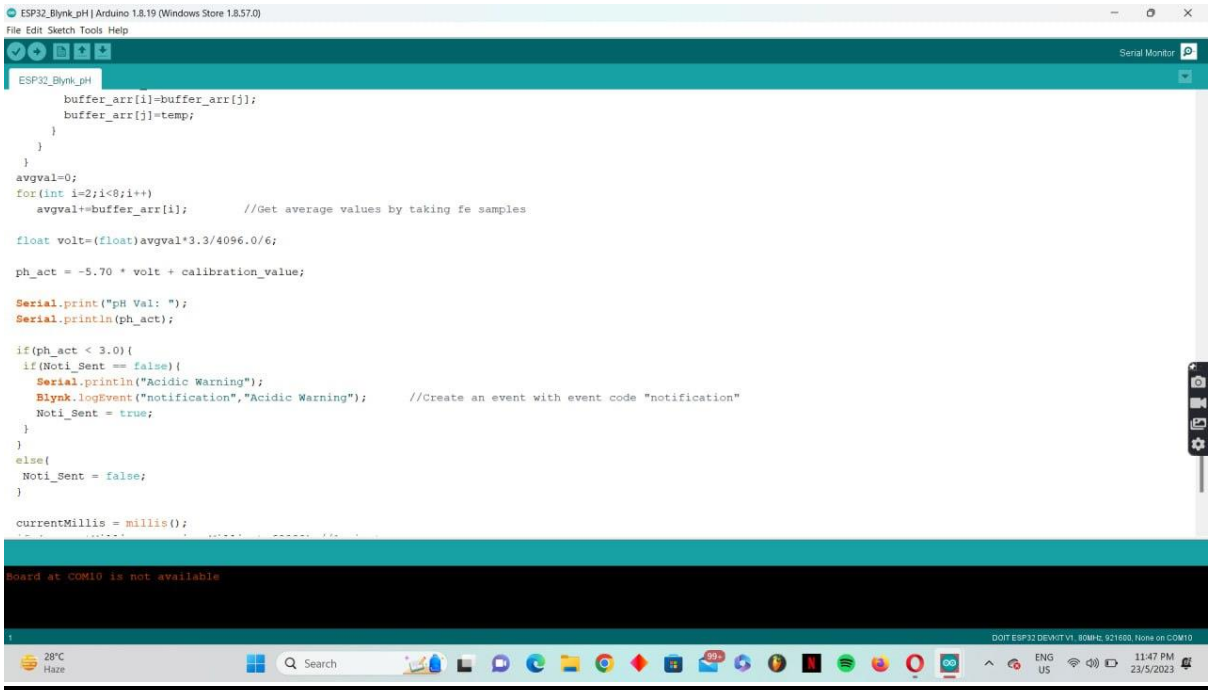


Figure 4.2.4 Programming for monitoring system





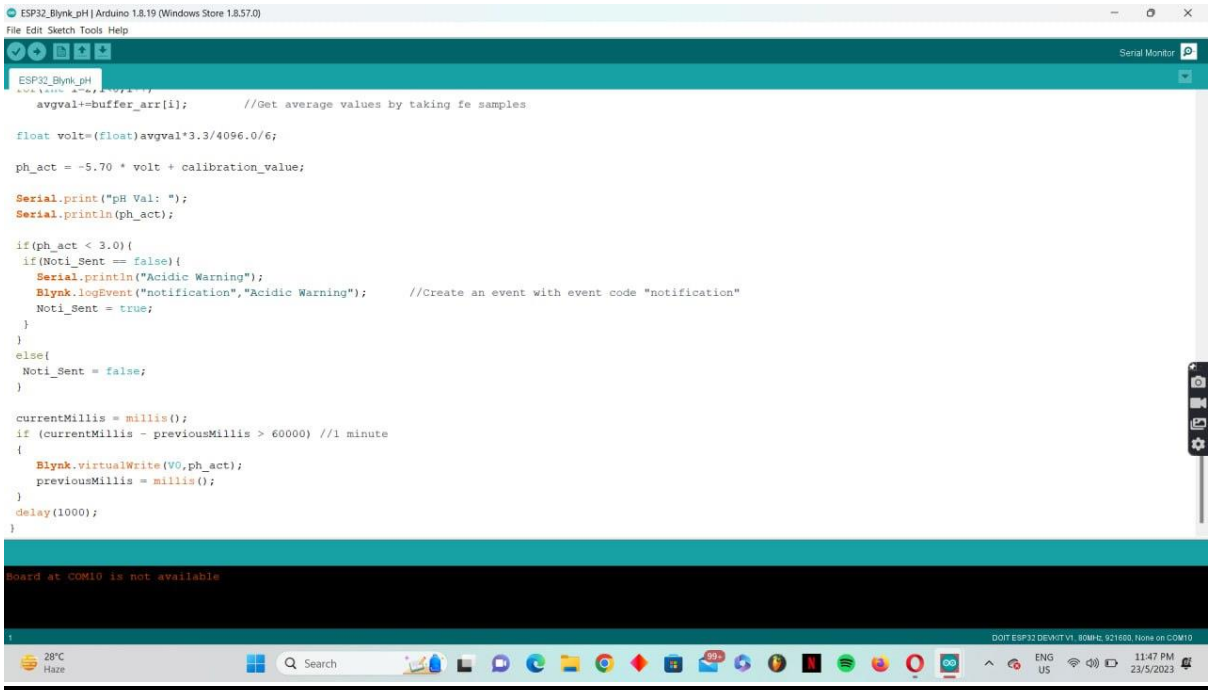


Figure 4.2.4 Live results of soil pH level recorded every second

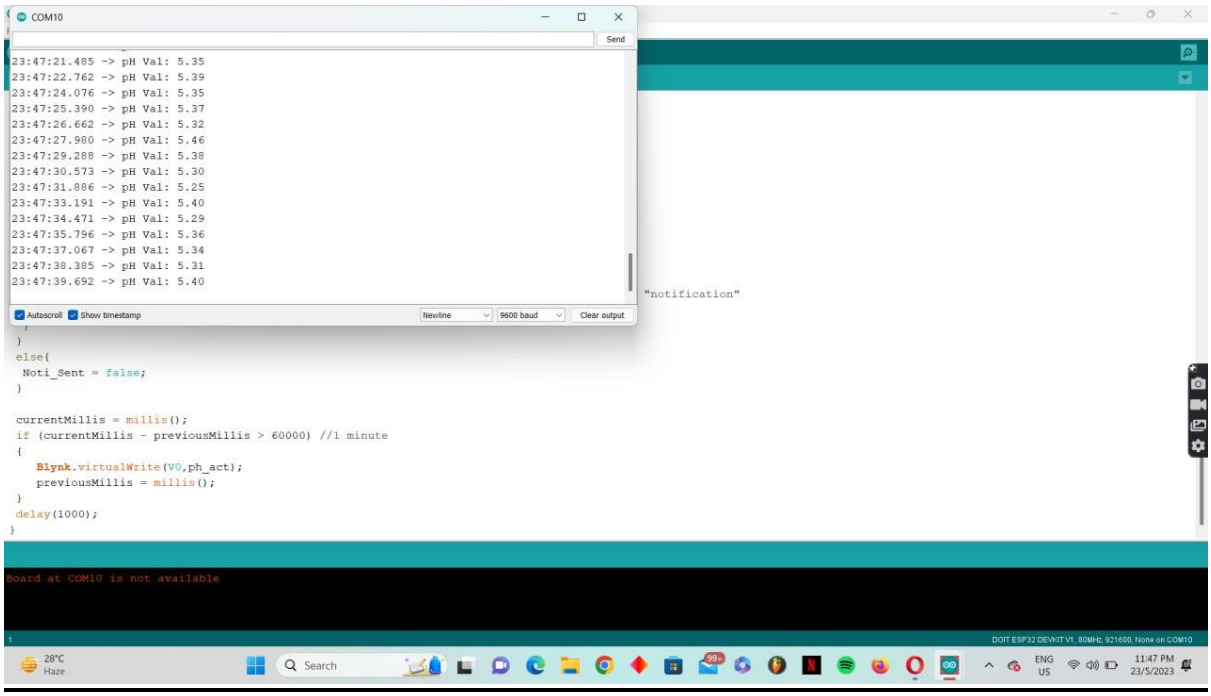


Figure 4.3 Products and components need to build the prototype

Figure 4.3.1 Esp 32

Figure 4.3.2 PH Sensor

Figure 4.3.3 PVC Pipe

Figure 4.3.4 Female to Female Jumper Wire

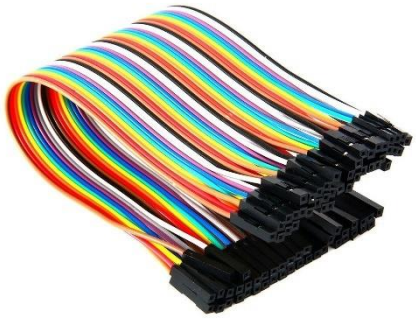
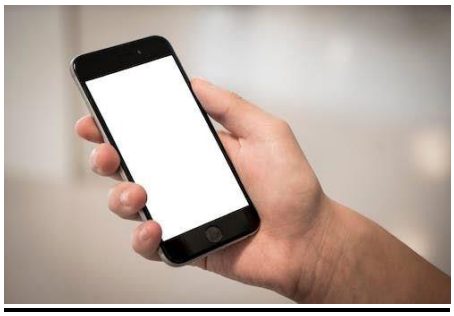


Figure 4.3.5 Laptop

Figure 4.3.6 Mobile Phone

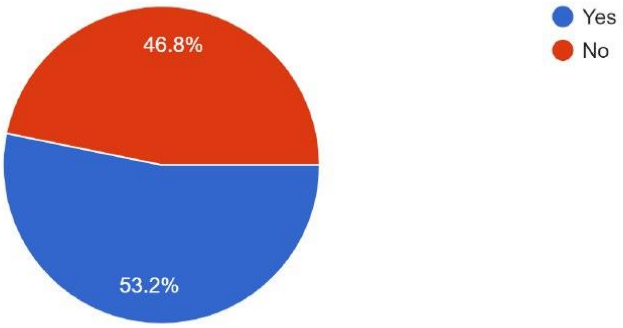


4.3 SURVEY RESULT

This monitoring system is functional to use in any type of industry that is related to the soil pH level in their work field. It is functional to provide information or data regarding soil pH value anywhere and anytime as long as there is internet connection to reduce manual labour.

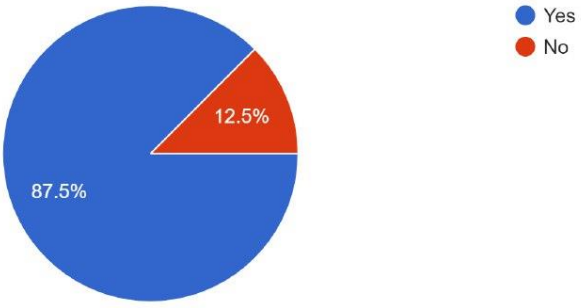
2. Have you heard of Soil pH Monitoring System.

47 responses



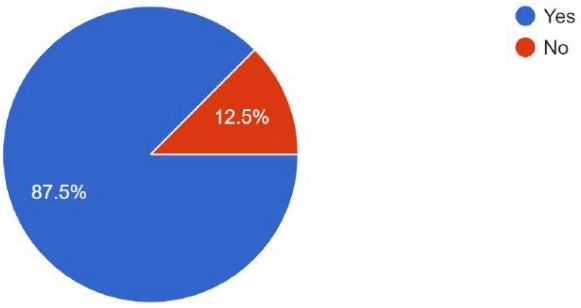
3. Do you think by using technology will get better results than using manpower when carrying out a work.

48 responses



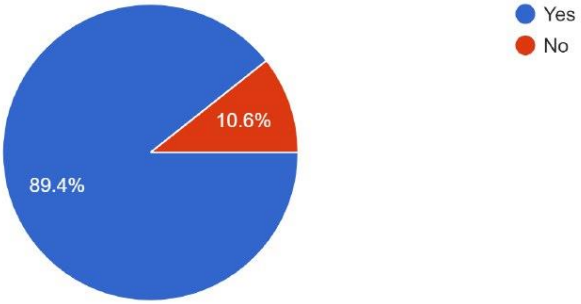
4. Do you think that using technology in an industry will increase the work rate ?

48 responses



5. Do you think using internet for soil pH monitoring system is effective in terms of delivering data

47 responses

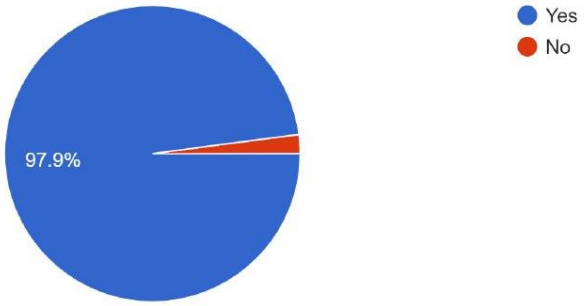


6. How important it is to maintain the health and pH level of soil.

48 responses

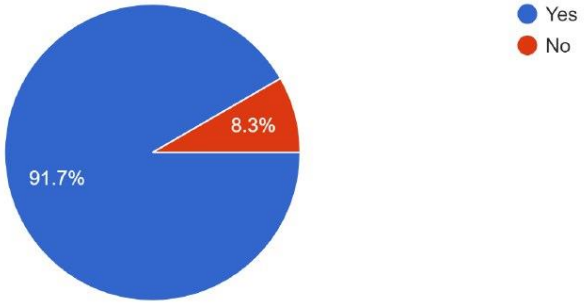
7. Do you think receiving data by monitoring pH level remotely is easier than manually monitoring it ?

48 responses



8. Is it easy to receive data through cloud/server ?

48 responses



9. Do you think Soil pH monitoring system will save your time to monitor the pH of soil.

47 responses

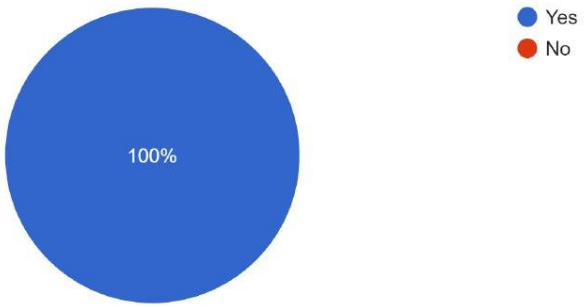


Figure 4.3.3: Result about the "Soil pH Monitoring System survey"

From the figure above it has been recorded that the responses replied that the that using this technology will help users get better result of the pH value, it also known from the survey that using this technology can increase work rate at the industry.

From the survey it is also recorded that maintaining the health and pH level of the soil is important in an industry, the survey also shows that it is easier to monitor soil pH level remotely rather than manually.

Finally, the results shows that the respondents is indeed interested in having a soil pH monitoring system in an industry. This is because it can saves them a lot of time and manual labour in an industry.

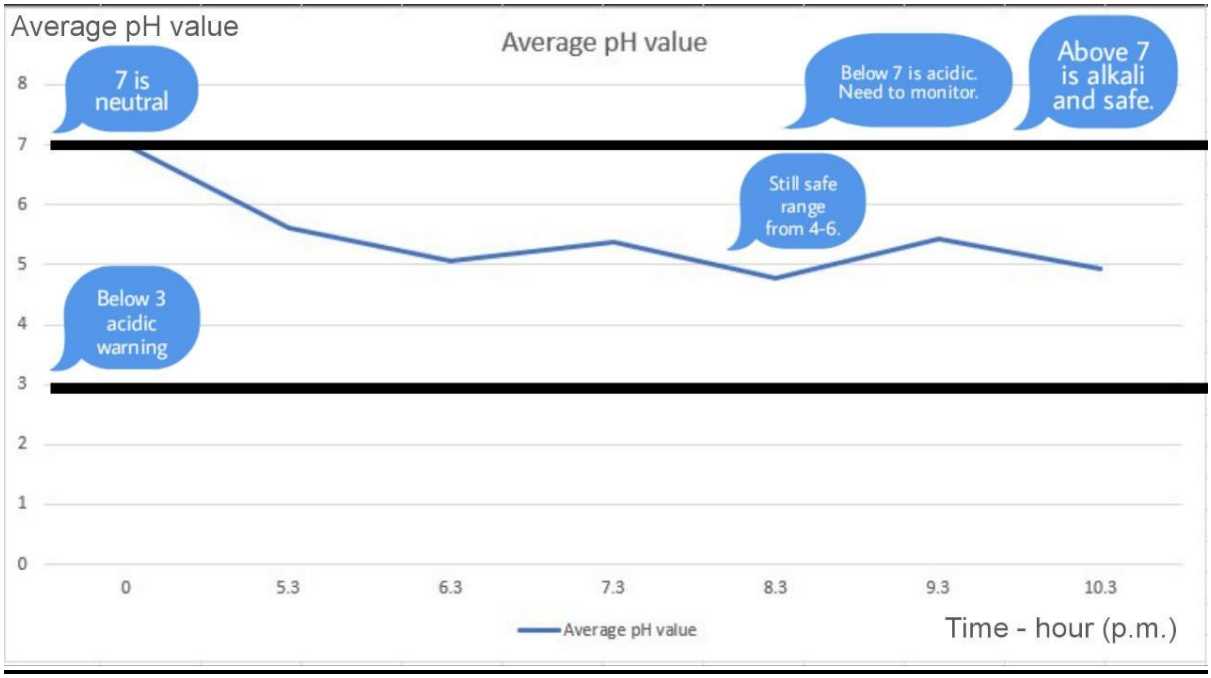
4.4 DATA ANALYSIS

After project functioning a data and analysis session was conducted to find out the accuracy of results collected.

The data and analysis was conducted readings were recorded for 5 hours, to prove that soil pH monitoring system is indeed a good thing as it will help the users especially that are working in an industry to work efficiently while saving cost.

TIME [HOUR]	AVERAGE PH VALUE
0	7 (Neutral)
5.30 PM	5.6
6.30 PM	5.07
7.30 PM	5.38
8.30 PM	4.77
9.30PM	5.42
10.30 PM	4.93

Figure 4.4.1 Graph chart based on the data collected



- Based on the graph above, a pH value of 3 in soil is extremely acidic, and acidic soils can be corrosive to pipelines made of certain materials such as iron or steel.
- High hydrogen ion concentrations in acidic soils can react with the metal in the pipeline, producing corrosion and long-term degradation. By weakening the pipeline due to corrosion, spills and potential environmental risks may result.
- For the integrity and durability of pipelines, it is crucial to keep the pH value within a safe range. Avoid a pH level of 3, which is considered to be well outside the safe range for pipes. Depending on the specific materials used, different pH ranges are allowed for pipelines, although generally speaking, a pH between 4 and 6 is thought to be safe for most pipelines.

4.4 SUMMARY OF CHAPTER

The procedures were done accordingly from the first step which is the sketching of soil pH monitoring system model to the final step which is to program process of the monitoring system. Then to gather the data and analysis, survey form was given to the students of polytechnic and public to know what their thoughts about the project are, was it a good idea to build a monitoring system as an alternative to receive data regarding soil pH level. Many knowledges can be learned by looking at the survey results such as the use of monitoring system is very efficient and effective in an industry to reduce manpower and cut cost.

TOPIC 5: DISCUSSION AND CONCLUSION

5.1 DISCUSION

The process of chatting with group members in order to achieve a conclusion or share ideas for the project simulator is known as discussion. Throughout the conversation, the strengths, weaknesses, and improvements that needed to be made were identified and agreed. The enhancement is necessary to ensure that the project can compensate for its weaknesses and that it is easy to use and does not cause any trouble to the user.

During this procedure, the project encountered various obstacles, including the discovery of flaws and mistakes in the code when the programming was done. So, to solves that the coding is re written and then some arrangement and changes was made into the programming to prevent the bugs from happening.

5.2 CONCLUSION

This monitoring system work any type of industry that is related to the soil pH level in their work field. This monitoring system also purposes to give the users who are working in an industry a more efficient work time and reduce manpower. This monitoring system is a web-based monitoring system that is suitable to be use by any people who may or may not work at an industry. This is monitoring system is placed in the Blynk app one the system is already installed. The monitoring system can be run on a laptop, computer or smartphones. At the final point the monitoring system it got to achieve objective that was targeted which one of them is to monitor pH value remotely by only using smartphones.

Finally in conclusion, this project has managed to achieve all the targeted objectives and it is able to function properly.

5.3 RECCOMENDATION

This project is officially completed, however there is still room for improvement. Improvements should be made so that the monitoring system may be powered by a rechargeable battery. This will aid in the reduction of hazardous waste in the industrial area.

5.4 SUMMARY OF CHAPTER

One of the main stated problem-solving issues was that the project had some challenges in which certain defects and faults in the code were discovered when the monitoring system was executed. So, to address this, the software was rewritten, and certain adjustments were made to the UI components to avoid issues from occurring. Last but not least, this project has met all of its objectives, is functional, and can be handed to students for usage. In conclusion, this project is considered accomplished; however, improvements can still be made, such as powering the monitoring system using a rechargeable battery.

REFRENCE

1. https://www.researchgate.net/publication/276145904_Soil_pH_Sensing_Techniques_and_Technologies_-_A_Review
2. https://ieeexplore.ieee.org/document/8978243
3. https://www.sciencedirect.com/science/article/abs/pii/S1572665721001120
4. https://www.jetir.org/papers/JETIR180Z020.pdf
5. https://www.sciencehistory.org/historical-profile/arnold-o-beckman

APPENDECISES

OPM VENTURE SDN. BHD. (Co. Reg. No. 976972-A)
12A-1 & 12A-2, Jalan PJU3/38, Sunway Damansara, 47810 Petaling Jaya, Selangor D. E. Malaysia.
Tel: +603-7733 6764 Fax: +603-7733 6765 Email: info@opmventure.com

No Rujukan : L-OPM-0523-001

Tarikh : 22.03.2023

Tuan/Puan,
SURAT PENGESAHAN APLIKASI INOVASI- SOIL PH MONITORING SYSTEM

Perkara di atas dengan hormatnya dirujuk.

2. Sukacita dimaklumkan kami telah mengaplikasikan produk inovasi SOIL PH MONITORING SYSTEM daripada pihak tuan. Kami mendapati produk ini mampu mengurangkan masalah retakan paip dan masalah paip yang pecah akibat keasidan tanah

3. Untuk itu bagi meningkatkan nilai komersial produk ini, pihak kami mencadangkan penambahbaikan yang boleh dibuat seperti berikut:

i- Disyorkan untuk melaksanakan system tanpa sambungan WiFi

ii- Menghasil prototaip tanpa wayar untuk menghasilkan projek yang lebih mudah alih dan cekap

4. Semoga cadangan ini dapat memajukan lagi pembangunan produk tuan. Sekian, terima kasih.

Yang benar,

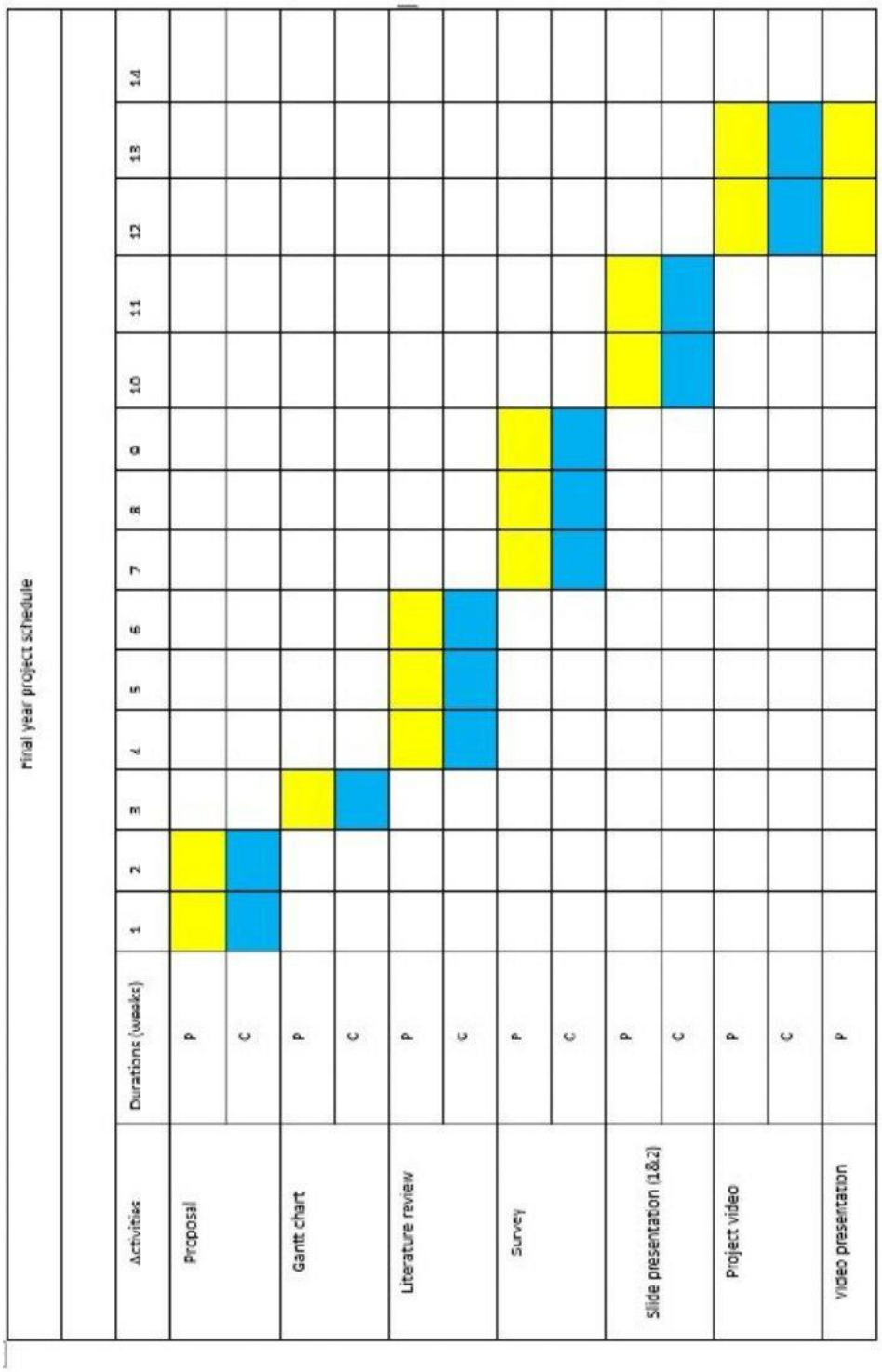
(Marhadi Mushaffa)

Pengarah Urusan

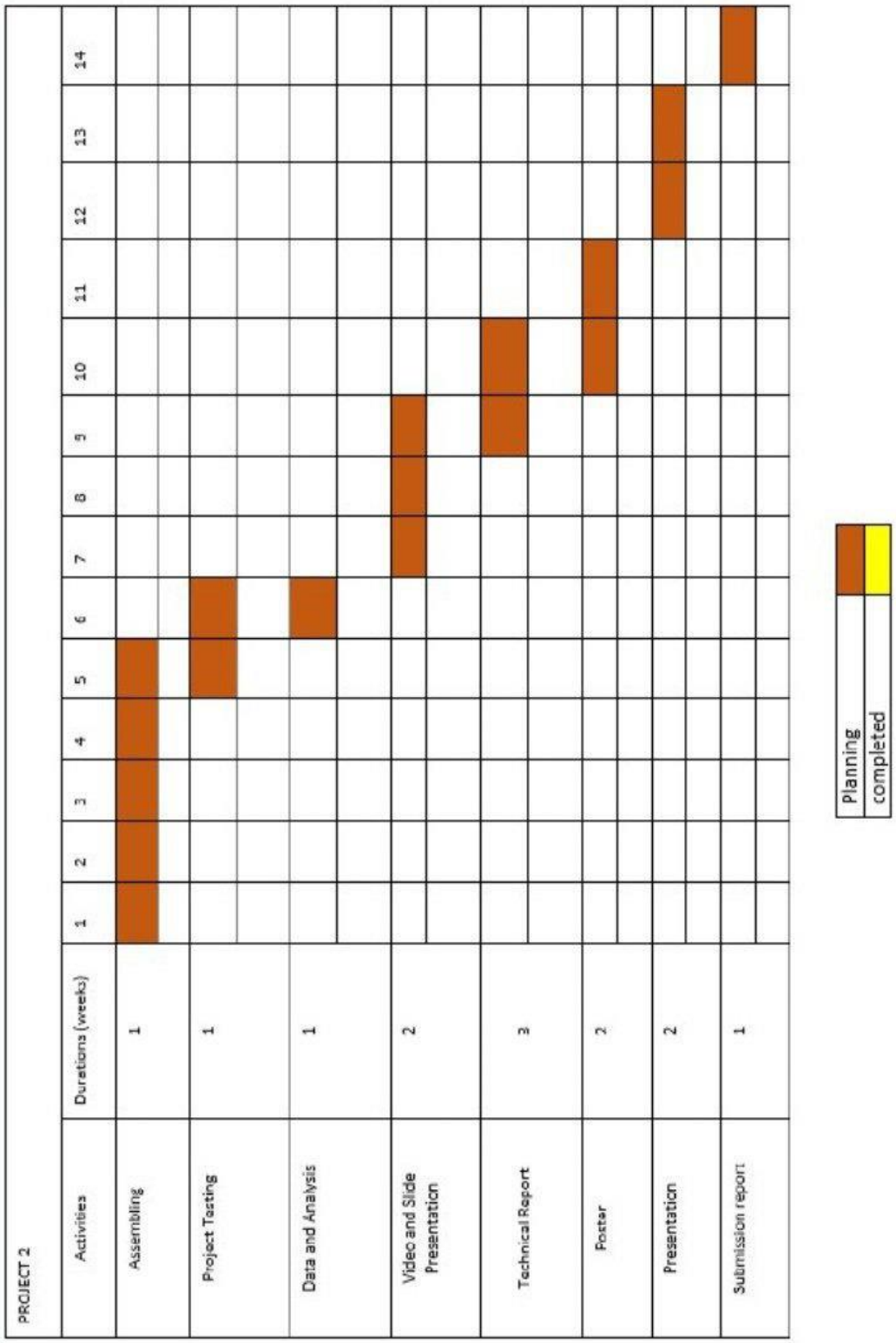
OPM VENTURE SDN BHD

OPM VENTURE SDN. BHD. (976972-A)

GANTT CHART 1 PROJECT 1



GANTT CHART 2 PROJECT 2



POSTER

KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

POLITEKNIK MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SOIL PH MONITORING SYSTEM

SASI TARAN
A/L RAMESH
(08DKM20F2013)
0172024272
sasicy0918@gmail.com

ALFRED PAUL
A/L AROKIAM
(08DKM20F2021)
0173414260
alfredpaul836@gmail.com

MUHAMMAD DANISH
IRFAN BIN MARHADI
(08DKM20F2016)
0199675410
mdanishirfan@yahoo.com

ABSTRACT

In Engineering field, corrosion has been considered as one of primary reasons leading to failures of various industry facilities such as pipelines. Underground pipe ruptures from corrosion due to acidic in soil. Hence,The soil pH sensor used in an industrial-grade soil pH sensor comes with suitable communication protocol and Real Time Monitoring capability. The real time pH monitoring system sends the data to cloud/server and can be visualised in Mobile phones or back end system. The system also provides instantaneous notification in the case of abnormalities in measured pH which helps us to detect the acidic of the soil and prevent the occurring of pipe rupture.

IMPACT OF INNOVATION

ADVANTAGE

- Can monitor the pH sensor through mobile phone from anywhere.
- Record pH value every second in the system and also get notified of acidic warning if the pH is too low.
- Maintenance can be done sooner.

MARKET POTENTIAL

- This project targets for any industry that uses underground pipes especially for Oil & Gas Engineering.

DURABILITY

- Does not expire.
- Low data usage.
- Easily can connect the prototype.

PROBLEM STATEMENT

- Pipe ruptured due to the acidity of soil.
- Maintenance could not be done sooner.
- PH value could not be identified earlier.

OBJECTIVE

- To monitor soil pH level remotely.
- To prevent pipe ruptures due to acidity in soil.
- Test run the project to make sure the project functions properly as planned

OPERATIONAL FLOW CHART

PROTOTYPE

ESP 32

PH SENSOR

JUMPER WIRE

PVC PIPE

LAPTOP

SMARTPHONE

Blynk
PROGRAMMING ON BLYNK IOT