

DIGITAL HOLOGRAPHIC BASED FOOD SUPPLY MANAGEMENT POST FLOOD ASSESSMENT SYSTEM BY USING AERIAL PROJECTION

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in
Electronics and Communication Engineering

By

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SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

CATEGORY-1 UNIVERSITY BY UGC

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of CHEDE PAVAN KUMAR(40130031) and VEERABALLI ARAVIND(40130016) who carried out the project entitled **"DIGITAL HOLOGRAPHIC BASED FOOD SUPPLY MANAGEMENT POST FLOOD ASSESSMENT SYSTEM BY USING AERIAL PROJECTION"** under our supervision from November 2023 to April 2024.

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DATE: 17/04/2024

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ABSTRACT

Natural disasters, such as floods, can cause devastating impacts on communities and disrupt food supply systems, leading to severe food shortages and distribution challenges. In response to this critical issue, we propose a novel approach utilizing a Digital Holographic System (DHS) integrated with an Aerial Projection technology for efficient post-flood assessment and management of food supply systems.

A fleet of unmanned aerial vehicles (UAVs) equipped with Aerial Projection systems can deliver essential instructions, maps, and guidance directly to the ground, facilitating coordination among relief workers and ensuring seamless food supply chain management. We outline the key components and functionalities of the Digital Holographic System-Based Food Supply System Management Post- Flood assessment System.

Virtual Reality is seen as the high-end of human-computer interactions and it has the potential to target a wide range of applications to improve the standardization and automation of disaster operation management, a new method of emergency management based on the activity network technology is presented. Firstly, the emergency plan is built upon emergency response activities by using the activity network technology. While a virtual trajectory may be represented using straight lines connecting waypoints of interest, this simple model does not accurately represent typical user behavior. We implemented the model within a framework that can be used for redirect food distribution within different virtual and physical environments. It is useful for the evaluation of redirected of parameters under varying conditions.

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CHAPTER -1

INTRODUCTION

Urban floods have become a constant threat in human life and property. Days of heavy rain have caused severe destruction over 13 states like Kerala, Gujarat, Karnataka, Maharashtra, Madhya Pradesh, Tamil Nadu, Goa, Odisha, Andhra Pradesh, Pune, Punjab, Assam and Bihar in late July and early August, 2019. Tamil Nadu was hit with unprecedented rains and flood on December 2015. Chennai saw flooding due to heavy rainfall. Citizens grouped together to rescue others as water level rose in to the homes to alarming levels. The storm brought life to a standstill and almost everyone experienced some kind of losses. More number of people were homeless and vulnerable at the mercy of weather .The lack of warning of the flood in Chennai made it difficult for those people with disabilities .While some in need of rescue ,others lost essential implements that are washed away or ran out when the water started raising leaving them more vulnerable than ever before. Government supplied facilities such as food, water, blankets, medicine. When people needed food they received medicine in return, which is inappropriate for their requirement and never been fulfilled. A private helicopter carrying flood relief material to the victims and the helping hands used Gesture methods by waving hands from the helicopter and providing supplements, that is an existing system. To overcome this difficulty, we introduce this new methodology of using a Virtual Reality that is projected from helicopter at a far distance.



FIG:1.1 : FLOODS EFFECTED TRANSPORTATION

The 3D virtual image of an object is preserved on a recording media called a holographic plate. A holographic plate holds information about light that is used to reconstruct an object, whereas the grooves in a recording medium (such as a CD) contain information about sound that can be used to reconstruct a song. Micro interferences of light and dark are used to encode information about light. Since these have high spatial frequencies, they typically are not visible to the human eye. By illuminating the hologram with the reference wave and reconstructing the object wave, a 3D image showcasing the effects of perspective and depth of focus is produced. Holography is the name of the photographic process that records light scattered from an object and displays it as a 3D image. Because it records information in a manner more similar to what our eyes use to see the world around us, the representations of the object created by this technology are the most lifelike 3D reconstructions. Because the observer may examine the entire three dimensional volume of one image, it is an appealing imaging approach.



FIG:1.2 : FLOODS IMPACT ON PEOPLE

The concept of abrasive holograms was popularized by William Beaty in the 90s .Abrasive holography allows holographic effects to be achieved with simple means .In its basic form, arcs or circles are scratched onto the surface of reflective transparent plastic plates such as plexi-glass using calipers .The back of the glass is covered with black non-reflective material .When viewed under a bright light source, a certain point on the scratched arc will reflect the light as a bright highlight. The highlight position is determined by the position of the viewer and the light source. With a fixed light source, the reflected spot will move along the arc as the observer moves the head.

To create a hologram, holography uses the wave nature of light. In a normal photograph, lenses are used to focus an image on film or an electronic chip, recording where there is light or not. With the holographic technique, the shape a light wave takes after it bounces off an object is recorded. It uses interfering waves of light to capture images that can be 3D. When waves of light meet they interfere with each other, analogous to what happens with waves of water. The pattern created by the interference of waves contains the information used to make the holograms .

In its basic form, three elements are necessary to create a hologram: an object or person, a laser beam, and a recording medium. A clear environment is also recommended to enable the light beams to intersect .

Throughout the years, several types of holograms have been created. These include transmission holograms, that allow light to be shined through them and the image to be viewed from the side, and rainbow holograms. These are common in credit cards and driver's licenses (used for security reasons).

Using a transmission hologram made with silver halide emulsion as an example, there needs to be the right light source to recreate the original object beam. This beam is recreated due to the diffraction grating and reflective surfaces inside the hologram that were caused by the interference of the two light sources. The recreated beam is identical to the original object beam before it was combined with the reference wave. Furthermore, it also travels in the same direction as the original beam. This means that since the object was on the other side of the holographic plate, the beam travels towards the viewer. The eyes focus the light, and the brain interprets it as a 3D image located behind the recording medium.

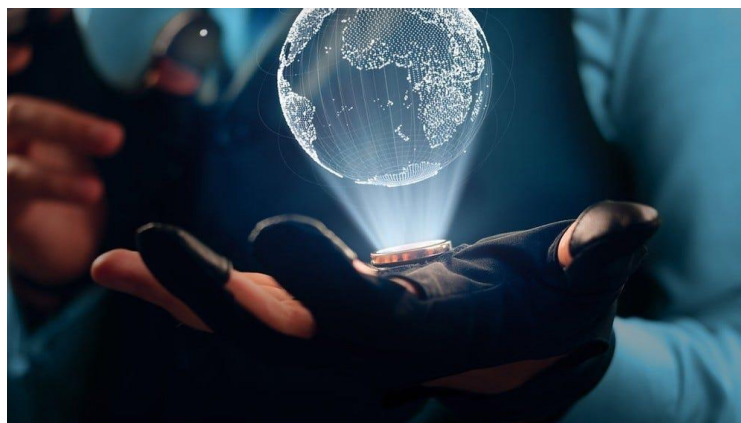


Fig:1.3 : HOLOGRAM LIGHT

Aerial Projection marks a significant advancement in disaster response technology, particularly in addressing the challenges of managing food supply chains in the aftermath of floods. This innovative system combines digital holography and aerial projection techniques to provide real-time assessment and assistance to flood-affected areas.

Central to this system is the utilization of holographic light projection, which offers a unique method of visualizing and interacting with three-dimensional images. Unlike traditional two-dimensional projections, holographic light projections recreate spatial depth and perspective, allowing for more immersive and detailed representations of objects and environments. By harnessing holographic technology, the system can generate highly accurate 3D reconstructions of flood-affected landscapes, infrastructure damage, and food supply inventories, providing responders with invaluable situational awareness and actionable insights.

Furthermore, the system leverages laser beam light for aerial projection, enabling precise and efficient delivery of holographic imagery to remote or inaccessible areas. Laser beams serve as the means of transmitting holographic data over long distances, allowing drones or aircraft to project holographic images onto targeted locations with pinpoint accuracy. This mechanism enables responders to visualize critical information, such as food distribution points, infrastructure damage assessments, and population displacement patterns, directly onto the flood-affected terrain, facilitating informed decision-making and resource allocation in real-time.

In essence, the Digital Holographic-Based Food Supply Management Post Flood Assessment System represents a convergence of cutting-edge technologies to address the complex challenges of post-flood food supply management. By combining the capabilities of digital holography and aerial projection, the system offers a holistic approach to assessing and managing food supply chains in disaster-affected areas, ultimately enhancing response efforts, minimizing food shortages, and improving the resilience of vulnerable communities in the face of natural disasters.

CHAPTER-2

LITERATURE SURVEY

2.1 Title: Drawing Abrasive Hologram Animations With Autogenerated Scratch Patterns

Creating abrasive hologram animations with autogenerated scratch patterns involves a unique and innovative approach to holography. Traditional holograms typically depict objects or scenes with smooth, realistic textures. However, in this context, "abrasive" refers to a deliberate deviation from this convention. Instead of rendering realistic surfaces, the hologram incorporates scratch patterns that are generated algorithmically. These patterns give the hologram a gritty, textured appearance, simulating the effect of abrasion or wear on the depicted objects. This departure from the norm adds a dynamic and visually intriguing element to the holographic animations, evoking a sense of raw energy and ruggedness. The scratch patterns are not pre-designed or manually drawn; they are generated automatically through computer algorithms.

2.2 Title: Hologram Selection In Realistic Indoor Optical Wireless Systems With Angle Diversity Receivers.

In this paper, the author introduced a new adaptive optical wireless system that employs a finite vocabulary of stored holograms. We propose a fast delay, angle, and power adaptive holograms(FDAPA-holograms) approach based on a divide and conquer (D & C) methodology and evaluate it with angle diversity receivers in a mobile optical wireless system. The research introduces the concept of angle diversity receivers, which play a pivotal role in improving the robustness and reliability of communication links in dynamic indoor settings. By carefully selecting the appropriate holograms, the study aims to mitigate the impact of various environmental factors, such as interference and mobility, on the quality of optical wireless communication. The insights derived from this research have significant implications for the practical implementation of optical wireless systems in real-world indoor scenarios, potentially leading to advancements in high-speed, reliable data transmission within confined spaces.

2.3 Title: Comparison of Binary Hologram Generation Methods: Sampling on the Object Image Scene and Error Diffusion Method on the Hologram Plane.

Holography is a technique to record and reconstruct a three dimensional scene on a 2D plane, which is called a hologram. As a special kind of 2D image, the digital image processing of holograms such as gray level image binarization can be quite different from conventional images. The generation of binary holograms from gray level holograms can be implemented not only with conventional dithering or error diffusion methods but also sampling methods on the object image proposed recently. The research delves into the intricacies of each method, assessing their respective merits and demerits. By conducting this comparative analysis, the study aims to provide valuable insights into the performance, efficiency, and computational requirements of these hologram generation techniques. This research is crucial in advancing the development of binary holography, with potential implications for applications ranging from secure information storage to high-resolution 3D displays.

2.4 Title: A Forensic Marking Algorithm based on DWT- SVD using Hologram.

In this paper, a new forensic watermarking algorithm which generates digital hologram from forensic mark and embeds it into DWT-SVD domain was suggested. Forensic watermarking is used to trace the illegal distribution. For the purpose of the high capacity, off-axis hologram is generated from forensic mark and the hologram is embedded into subband of the DWT domain, so that we could reduce the signal interference. Also, we improved the algorithm safety and detection performance by using SVD for the signal embedded hologram.

This innovative algorithm aims to embed robust and imperceptible forensic markers within digital content, ensuring their authenticity and integrity. By leveraging the combined power of DWT and SVD, the method achieves a high level of security and resilience against tampering or forgery attempts. The holographic element introduces an additional layer of protection, enhancing the overall robustness of the forensic marking process. This research has significant implications for digital forensics, offering a sophisticated and reliable method for verifying the authenticity of digital content in a wide range of applications, including legal proceedings, data integrity verification, and content authentication.

2.5 Title: An Automatic Inspection System for Hologram with Multiple Patterns.

They propose an automatic inspection system for hologram with multiple patterns. The system hardware consists of illuminations, camera, and vision processor. Multiple illuminations using LED are arranged in different directions to acquire each image of patterns. The system software consists of pre- processing, pattern generation, and pattern matching. The acquired images of input hologram are compared with their reference patterns by developed matching algorithm. To compensate for the positioning error of input hologram, reference patterns of hologram for different position should be generated in on-line.

This system is designed to automate the inspection process, enabling rapid and precise evaluation of holograms featuring multiple patterns. The research addresses a critical need for efficient quality control measures in industries where holography is employed for security and authentication purposes. By leveraging advanced technologies, the system can detect defects, inconsistencies, or irregularities in the holographic patterns, ensuring that only high-quality holograms reach the market. This automated inspection process not only enhances production efficiency but also guarantees the reliability and authenticity of holographic security features. The implications of this research extend to various industries, including currency production, product packaging, and document authentication, where the integrity of holographic patterns is paramount.

2.6 Title: Altered Reality: Augmenting and Diminishing Reality in Real Time.

Augmented Reality and Diminished Reality techniques to modify real objects present in applications. The proposed approach removes an object and replaces it with its purposely-modified replica. The solution uses dynamic texture techniques and In paint to enhance the visual response of the modification performed. The results are promising considering both realism of the modified real object and performance of the application.

It delves into the dynamic manipulation of the visual environment in real time, introducing the capability to both augment and diminish aspects of reality. This innovative approach offers a versatile and interactive AR experience, allowing users

to modify their perception of the physical world in a dynamic and responsive manner. The research investigates the technical intricacies involved in achieving this altered reality, including real-time image processing and overlay techniques. This groundbreaking work holds immense potential for a wide range of applications, from gaming and entertainment to industrial design and education, revolutionizing the way we interact with and perceive our surroundings through augmented reality technologies.

CHAPTER-3

METHODOLOGY

3.1 EXISTING METHOD

- The food and water was supplied by some helicopters, boats and etc and also by the members of NCC and soldiers and some social working people. This is how food and water supplied to flooded village.
- These have some limitations like ambient optical noise, slower dynamic response, and relatively large data collections/processing of vision-based method.
- The above processes are Less accurate
- However, it seems like you're referring to a hypothetical system that combines digital holography, food supply management, post-flood assessment, and aerial projection technologies. Such a system, if it were to exist, could potentially revolutionize disaster response efforts.



FIG:3.1.1: FOOD SUPPLY THROUGH HELICOPTER

- In this hypothetical system, digital holography might be employed for three-dimensional visualization of flood-affected areas, allowing for precise assessment of damage and identification of critical supply needs. This technology could provide detailed reconstructions of the affected environment, aiding in the efficient allocation of resources.

- Aerial projection, on the other hand, could be utilized to deliver supplies to hard-to-reach or isolated areas, bypassing inaccessible roads and facilitating a more rapid response. This method would significantly enhance the speed and accuracy of relief efforts in the aftermath of a flood.



FIG:3.1.2: FOOD SUPPLY THROUGH BOATS

- Moreover, an integrated food supply management component could use real-time data from the holographic assessments to optimize logistics and distribution. By employing sophisticated algorithms, it could dynamically allocate resources based on changing needs and priorities.
- This would help ensure that essential supplies, including food, reach those in need promptly and efficiently, minimizing waste and maximizing impact. Overall, the combination of these technologies could represent a cutting-edge approach to disaster relief and humanitarian aid in flood-affected regions.

3.2 PROPOSED METHOD:

- In hologram ,which detects wavelength distribution of a light source using a multiplex Fresnel hologram.
- In order to measure the wavelength distribution of the light source, a spectrometer is usually used, but in this case it is difficult to measure the wavelength distribution while using the light source.
- To separate the block in light source food, cloth etc.
- We using Transmission and receiver section.
- This innovative system integrates digital holography with aerial projection techniques to provide a comprehensive and real-time assessment of the affected areas. Using drones equipped with high-resolution cameras and holographic projectors, the system captures detailed 3D holographic representations of the disaster-stricken regions, enabling precise identification of critical infrastructure damage and population distribution.

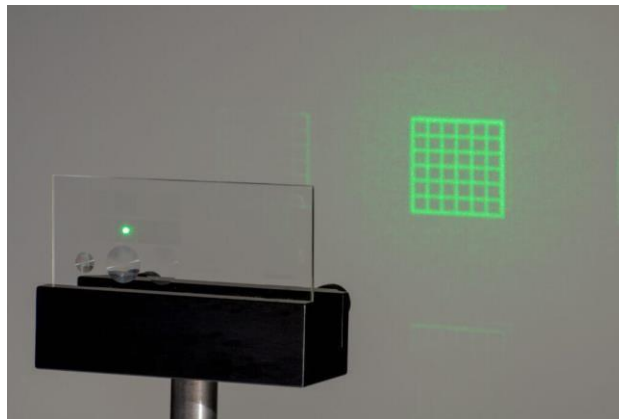


FIG:3.2.1: LASER BEAM OF LIGHT ON WALL

- This information is crucial for effectively planning and coordinating food supply logistics, ensuring that aid reaches the most vulnerable areas promptly. Additionally, the system incorporates advanced data analytics and artificial intelligence algorithms to optimize resource allocation and monitor relief efforts dynamically, ensuring that resources are deployed efficiently based on real-time needs assessments.



FIG:3.2.2: LASER BEAM OF LIGHT ON SKY

3.3 IEEE STANDARDS

- 1) **IEEE 1918.1-2013** - IEEE Standard for Virtual Reality and Augmented Reality: This standard provides guidelines for the design and development of virtual reality and augmented reality systems, ensuring interoperability and quality across platforms.
- 2) **IEEE 802.15.4** - IEEE Standard for Low-Rate Wireless Networks: This standard specifies the physical layer and medium access control for low-rate wireless personal area networks (WPANs), which could be relevant for communication protocols like Zigbee mentioned in the paper.
- 3) **IEEE 802.11** - IEEE Standard for Wireless Local Area Networks (WLAN): This standard defines the specifications for implementing WLANs, which may be applicable for wireless communication within the proposed flood relief system.
- 4) **IEEE 802.3** - IEEE Standard for Ethernet: This standard outlines the specifications for Ethernet networks, which could be relevant for networking components of the proposed system.
- 5) **IEEE 802.1Q** - IEEE Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks: This standard specifies protocols and

mechanisms for VLANs (Virtual Local Area Networks), which might be used for network segmentation and management within the system.

- 6) **IEEE 802.3af** - IEEE Standard for Ethernet: This standard defines Power over Ethernet (PoE) implementations, which could be relevant if the system involves powering devices over the Ethernet network.
- 7) **IEEE 1451** - IEEE Standard for a Smart Transducer Interface for Sensors and Actuators: This standard provides a framework for connecting sensors and actuators to networks, which could be applicable for integrating sensors and actuators within the flood relief system for data collection and distribution of relief materials.

3.4 CONSTRAINTS

- 1) **Limited Coverage Range:** The effectiveness of the system may be constrained by the range of the holographic projection, potentially limiting its reach in large-scale flood scenarios.
- 2) **Dependence on Environmental Conditions:** Environmental factors such as weather conditions and visibility could affect the clarity and reliability of holographic projections, impacting the system's functionality.
- 3) **Technological Dependencies:** The system relies on multiple technologies, including virtual reality, holography, Zigbee communication, and machine learning algorithms, which must all function seamlessly for the system to operate effectively.
- 4) **Resource Availability:** Deployment of the system may be constrained by the availability of resources such as power supply, internet connectivity, and suitable hardware components, especially in remote or disaster-affected areas.
- 5) **Cost Implications:** The implementation and maintenance costs associated with the system, including the procurement of specialized equipment and software, could pose financial constraints, limiting its scalability and accessibility in resource-constrained environments.

- 6) **Regulatory and Ethical Considerations:** Compliance with regulatory frameworks, privacy concerns related to data collection and processing, and ethical considerations regarding the equitable distribution of relief materials are important constraints to be addressed in the development and deployment of the system.

3.5 TRADE-OFFS

- 1) **Accuracy vs. Cost:** While the proposed system offers a novel solution for identifying and addressing the needs of flood victims, there may be trade-offs between the system's accuracy and its cost-effectiveness. Achieving higher levels of accuracy in identifying victims' requirements may require more sophisticated hardware and software components, leading to increased costs of implementation and maintenance.
- 2) **Coverage vs. Complexity:** The system's effectiveness in providing relief to a wide range of flood victims may be influenced by the balance between coverage and complexity. A more complex system with multiple functionalities and features may offer better coverage of diverse needs but could also increase the complexity of deployment, operation, and troubleshooting, potentially hindering its practical utility in real-world scenarios.
- 3) **Speed of Deployment vs. Technological Sophistication:** Balancing the speed of deployment with the level of technological sophistication is another trade-off to consider. While leveraging advanced technologies like virtual reality and holography can enhance the system's capabilities and performance, it may also require additional time for development, testing, and deployment, delaying its availability during critical flood relief operations.
- 4) **Robustness vs. Resource Constraints:** Ensuring the robustness of the system to operate effectively under challenging environmental conditions and resource constraints is essential. However, there may be trade-offs between enhancing the system's robustness and optimizing its resource

utilization, particularly in terms of power consumption, computational requirements, and connectivity, especially in remote or disaster-affected areas with limited infrastructure.

- 5) **Scalability vs. Customization:** Scalability and customization are key considerations in designing the system to accommodate varying needs and scales of flood relief operations. Achieving scalability to handle large volumes of data and requests while maintaining the flexibility to customize the system according to specific disaster scenarios and local contexts may require careful design choices and trade-offs in terms of architecture, modularity, and adaptability.
- 6) **Privacy vs. Data Collection:** Balancing privacy concerns with the necessity of collecting and utilizing data for effective disaster management is crucial. Implementing robust privacy measures to protect sensitive information while ensuring sufficient data collection for accurately assessing and responding to victims' needs involves trade-offs between privacy, data security, and operational requirements, necessitating clear policies and protocols for data handling and access control.

3.6 BLOCK DIAGRAM OF PROPOSED SYSTEM:

TRANSMISSION SECTION:

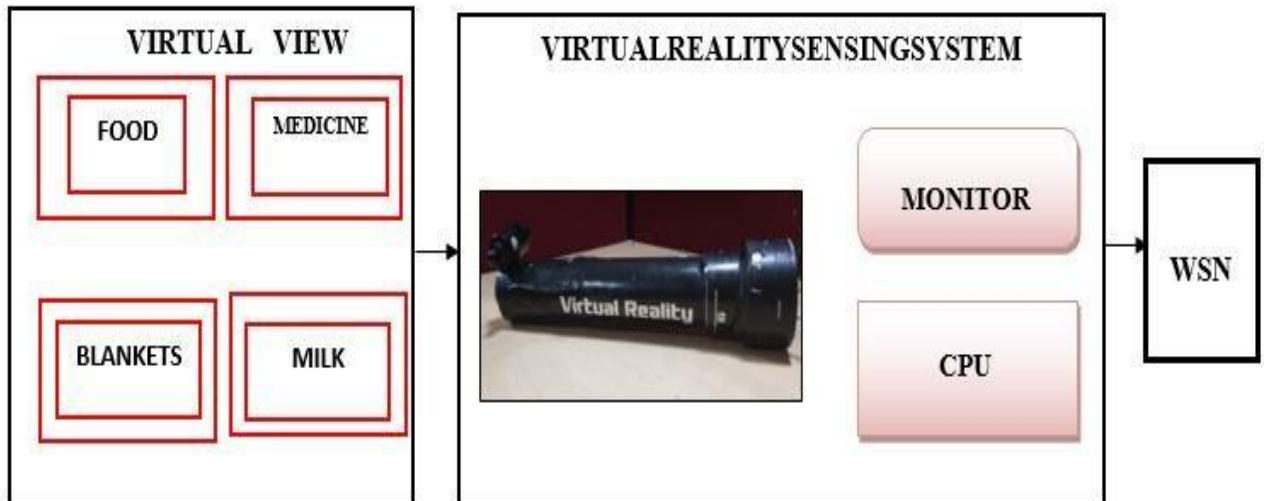


Fig:3.6.1: TRASMISSION SECTION BLOCK DIAGRAM

RECEIVER SECTION:

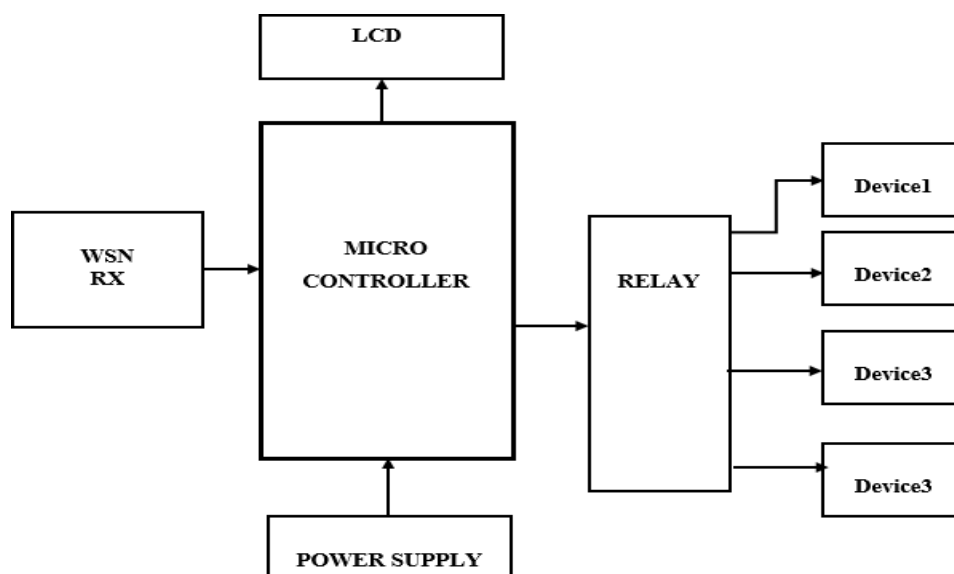


Fig:3.6.2: RECEVIER SECTION BLOCK DIAGRAM

The concepts behind virtual reality are based upon theories about a long held human desire to escape the boundaries of the 'real world' by embracing cyberspace. Once there we can interact with this virtual environment in a more

naturalistic manner which will generate new forms of human-machine interaction (HMI).

The aim is to move beyond standard forms of interaction such as the keyboard and mouse which most people work with on a daily basis. This is seen as an unnatural way of working which forces people to adapt to the demands of the technology rather than the other way around. But a virtual environment does the opposite. It allows someone to fully immerse themselves in a highly visual world which they explore by means of their senses. This natural form of interaction within this world often results in new forms of communication and understanding.

3.7 HARDWARE DESCRIPTUION

The major components used in the proposed have been discussed briefly:

3.7.1 VIRTUAL REALITY (VR LIGHT PROJECTION)

Virtual reality comes, naturally, from the definitions for both 'virtual' and 'reality'. The definition of 'virtual' is near and reality is what we experience. Virtual Reality combines with the zigbee transceiver unit for data transmission and 3.4 an usb camera for image recognition and software for image processing. Virtual Reality can easily interface with PC or Laptop by the USB driver provided. By running the application, you can adjust the distance by viewing the camera image available in the PC or Laptop in which the optimize interaction can done.



Fig:3.7.1.a: VIRTUAL REALITY



Fig: 3.7.1.b : VIRTUAL INTERFACE

FEATURES

- Input voltage: 230VAC
- USB camera voltage: 5VDC
- Zigbee :5VDC
- Output: UART
- Image processing: Fast and reliable

APPLICATIONS

- Scientific visualization
- Tele communications
- Construction applications
- Engineering applications
- Robotic

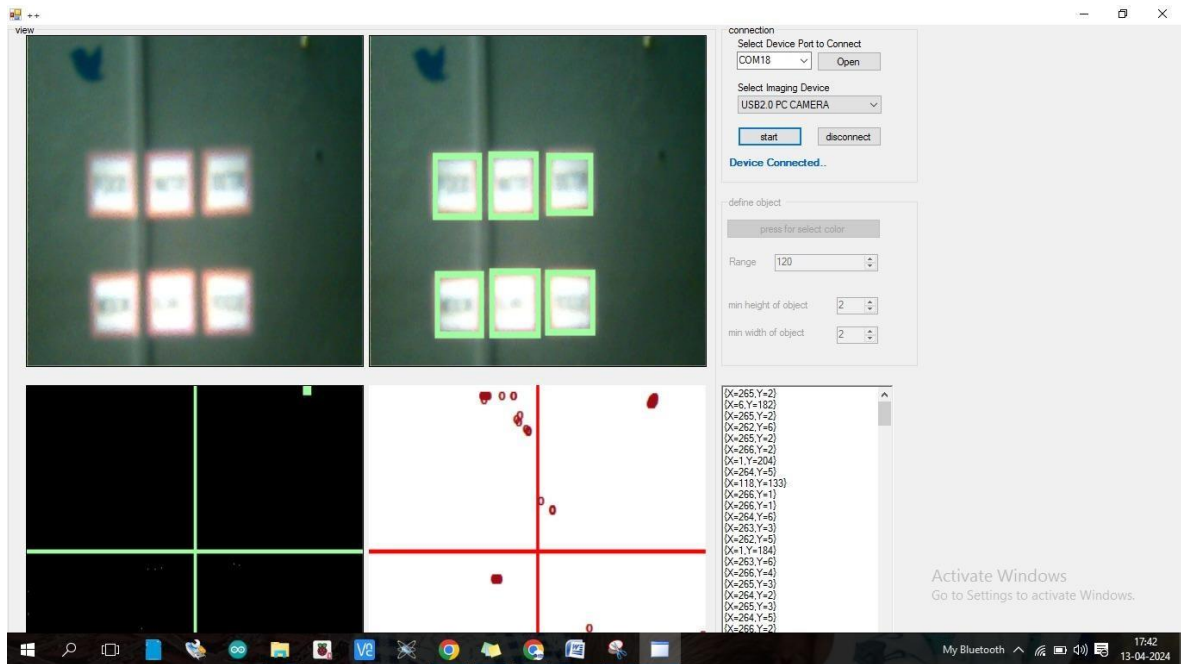


Fig:3.7.1.c : DEVICE CONTROL

3.7.2 ARDUINO UNO

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board.

Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can be communicate with software running on your computer. The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free.

The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment.

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students

anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources.

This guide covers the Arduino Uno board a good choice for students and educators. With the Arduino board, you can write programs and create interface circuits to read switches and other sensors, and to control motors and lights with very little effort.

The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions.

An important feature of the Arduino is that you can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable connection to the PC, and the program will still run from the top each time you push the reset button. Remove the battery and put the Arduino board in a closet for six months. When you reconnect the battery, the last program you stored will run. This means that you connect the board to the host PC to develop and debug your program, but once that is done, you no longer need the PC to run the program.

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



Fig:3.7.2: ARDUINO UNO

3.7.3 LCD DISPLAY

Liquid Crystal Display (LCD) technology is a ubiquitous and fundamental component in modern electronic devices. At its core, an LCD consists of a layer of liquid crystal molecules sandwiched between two transparent electrodes. These liquid crystal molecules have the unique property of being able to change their orientation in response to an applied electric field. This property forms the basis of how an LCD operates. When voltage is applied, the liquid crystal molecules align to allow or block the passage of light, creating the pixels that form the display. This arrangement provides precise control over the intensity and color of light emitted by each pixel, resulting in high-resolution and vibrant visuals.

One of the key advantages of LCD displays is their versatility in terms of size and application. They are commonly found in a wide range of devices, from smartphones and tablets to computer monitors and televisions. The technology enables the creation of displays with varying sizes, resolutions, and aspect ratios, making it suitable for an array of consumer electronics and professional equipment. Additionally, LCDs have become increasingly energy-efficient over time, contributing to extended battery life in portable devices and reduced power consumption in larger displays.

PIN CONFIGURATION:

- Analog 2nd pin is connected to RS(Register Select) of LCD Display
- Analog 3rd pin is connected to E of LCD Display
- Analog 4th pin is connected to D4 of LCD Display
- Analog 5th pin is connected to D5 of LCD Display
- Analog 6th pin is connected to D6 of LCD Display
- Analog 7th pin is connected to D7 of LCD Display

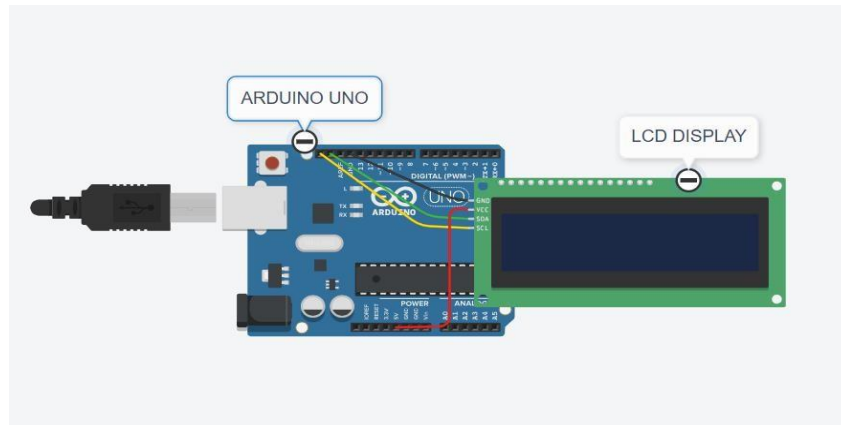


Fig:3.7.3.a: LCD DISPLAY INTERFACE



Fig:3.7.3.b: LCD DISPLAY

3.7.4 DC MOTOR

A Direct Current (DC) motor is an electro-mechanical device that converts electrical energy into mechanical energy through the interaction of magnetic fields. It operates based on the principle of Ampère's law, where a current-carrying conductor placed in a magnetic field experiences a force proportional to the strength of the field and the current. In a basic DC motor, a commutator and brushes are used to periodically reverse the direction of current flow in the armature windings, resulting in continuous rotation. The armature, typically a loop or coil of wire, is situated within a magnetic field generated by stationary field magnets, which can be permanent magnets or electromagnets. This interaction causes the armature to experience a torque, leading to rotational motion.

There are different types of DC motors, including brushed and brushless varieties. Brushed DC motors employ a commutator and brushes to achieve the necessary current reversal for continuous rotation. In contrast, brushless DC motors utilize electronic controllers to switch the current flow in the windings, eliminating the

need for physical commutation. This design results in improved efficiency, reduced maintenance, and higher overall performance. With advancements in technology, brushless DC motors have become increasingly popular in applications where higher efficiency, longer lifespan, and quieter operation are essential. Overall, DC motors play a pivotal role in a wide array of electromechanical systems, contributing to the functionality of numerous everyday devices and industrial processes.

- PIN CONFIGURATION:**
1. FOOD MOTOR is connected to digital pin 8
 2. MEDICINE MOTOR is connected to digital pin 9
 3. BLANKET MOTOR is connected to digital pin 10
 4. WATER MOTOR is connected to digital pin 11



Fig:3.7.4.a: DC MOTOR

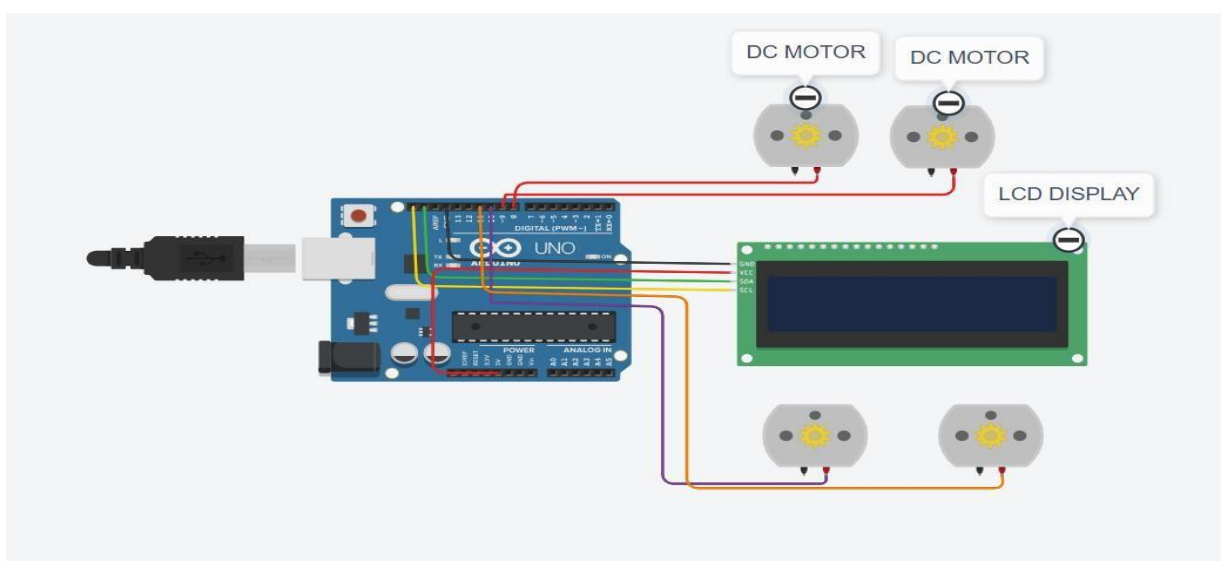


FIG:3.7.4.b DC MOTOR INTERFACE

3.7.5 RELAY

A relay module is an essential electronic component that serves as a switch controlled by an external electrical signal. It consists of an electromagnet, which, when energized, generates a magnetic field that actuates a mechanical switch mechanism. This switch can either open or close a circuit, allowing or interrupting the flow of current. Relay modules are widely used in various applications, including automation systems, control panels, and IoT devices, to facilitate the control of high-powered electrical devices or systems by low-voltage electronic signals. They are particularly useful in situations where a microcontroller or other low-power electronic device needs to control larger, higher-voltage loads, ensuring the safety and efficiency of the system.

Relay modules come in different configurations, ranging from single-pole single-throw (SPST) relays to more complex multi-pole versions. They are available in both solid-state and electromechanical variants. Solid-state relays use semiconductor devices to achieve switching without any moving parts, offering advantages like faster response times and longer lifespan. Electromechanical relays, on the other hand, utilize a physical switch mechanism and are well-suited for applications that require higher current and voltage ratings. Relay modules are crucial components in many electronic systems, enabling seamless integration between low-power control circuitry and high-power loads, thereby enhancing the versatility and functionality of electronic devices and automation setups.

By using relay we can easily handle the power the DC motor to run efficiently.

PIN CONFIGURATION:

- Analog 0th pin is connected to RXD pin of Relay
- Analog 1st pin is connected to TXD pin of Relay

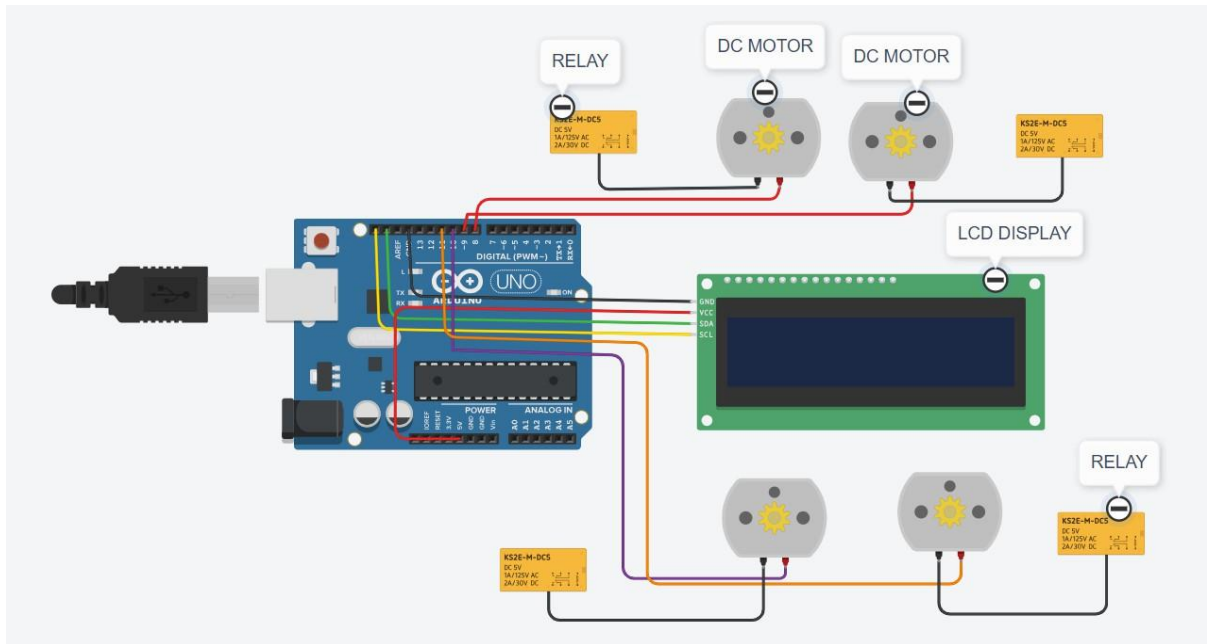


FIG :3.7.5.a:RELAY INTERFACE

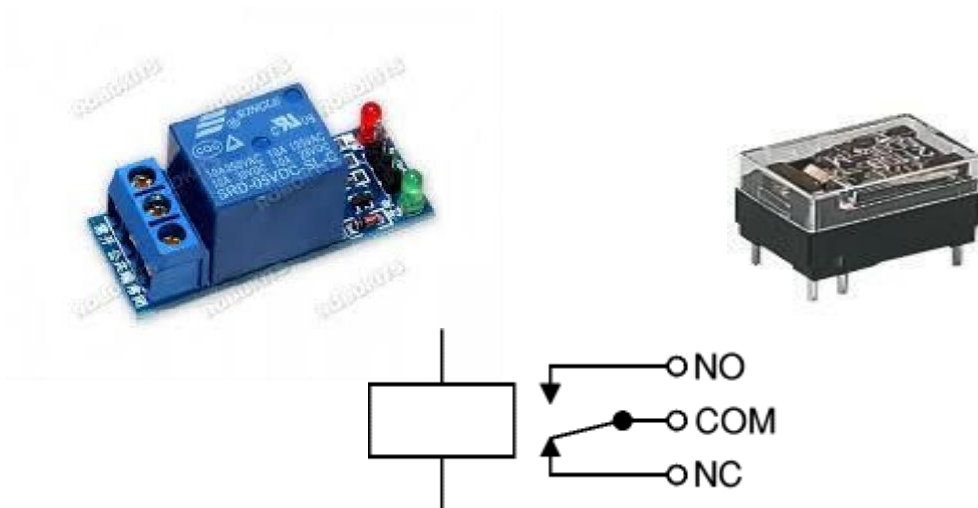


Fig:3.7.5.b: RELAY

3.8 SOFTWARE REQUIREMENT

3.8.1 ARDUINO SOFTWARE

The Arduino software, also known as the Arduino Integrated Development Environment (IDE), is a critical tool for programming and developing projects using Arduino microcontrollers. It provides a user-friendly platform for writing, compiling, and uploading code to Arduino boards.

The IDE is open-source and compatible with various operating systems, including Windows, macOS, and Linux. It features a simple yet powerful text editor with syntax highlighting, making it easy for beginners and experienced programmers alike to write and edit code.

Overall, the Arduino software is an indispensable tool for both hobbyists and professionals in the world of electronics and embedded systems, enabling the creation of a wide range of innovative and interactive projects.

Additionally, the Arduino IDE offers a robust serial monitor for debugging and real-time data visualization. Its open-source nature and vast community support have contributed to its popularity, making it a powerful tool for prototyping and creating a wide range of electronic projects, from simple blinking LEDs to complex robotics and IoT applications.

1. Open Arduino IDE as shown below

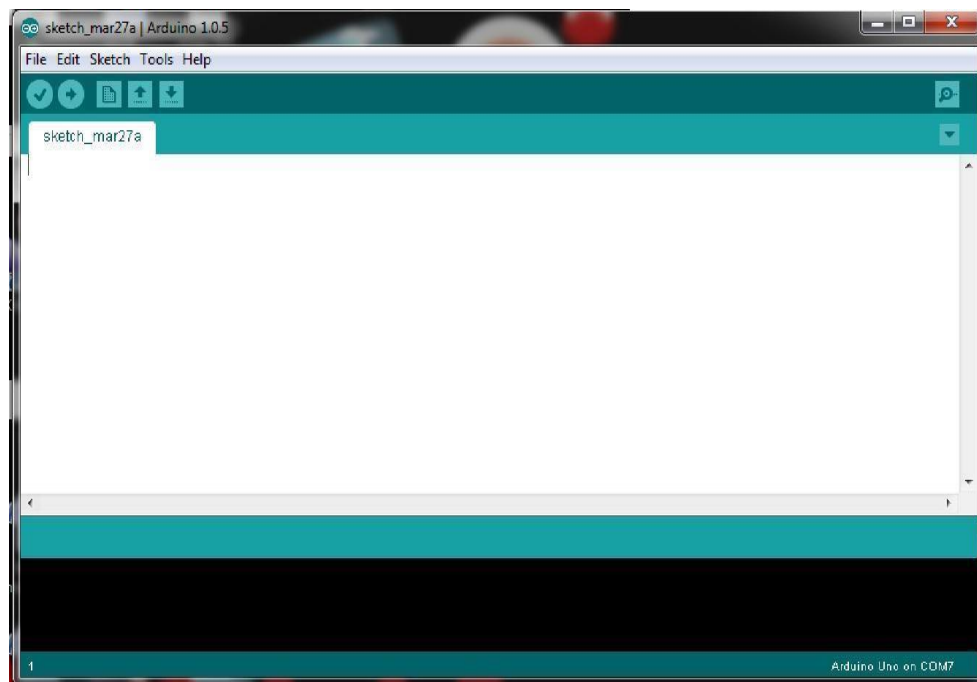
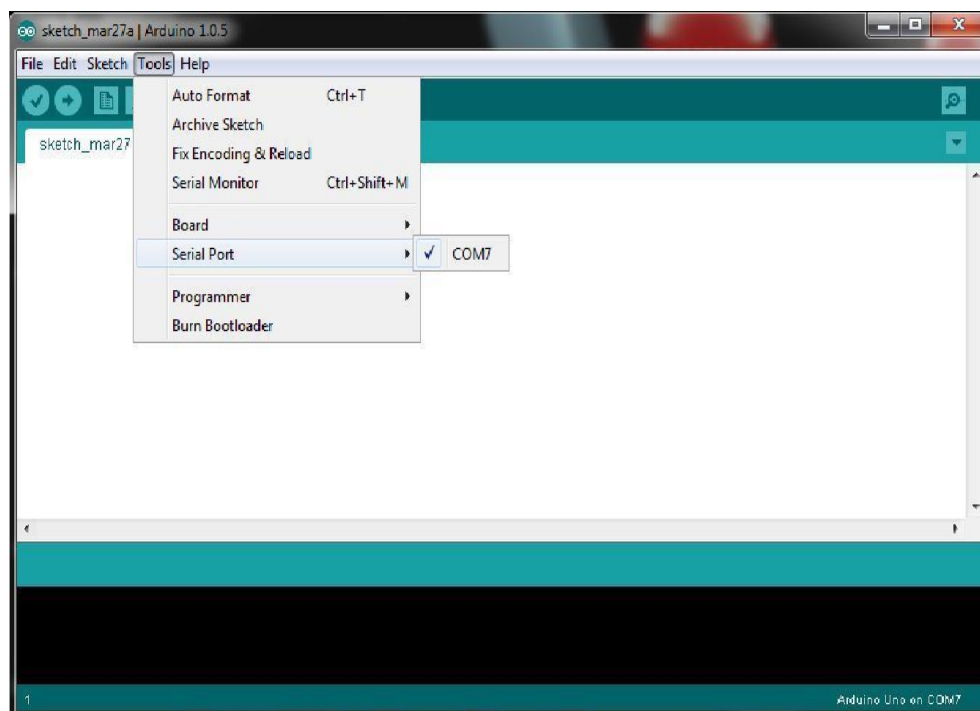
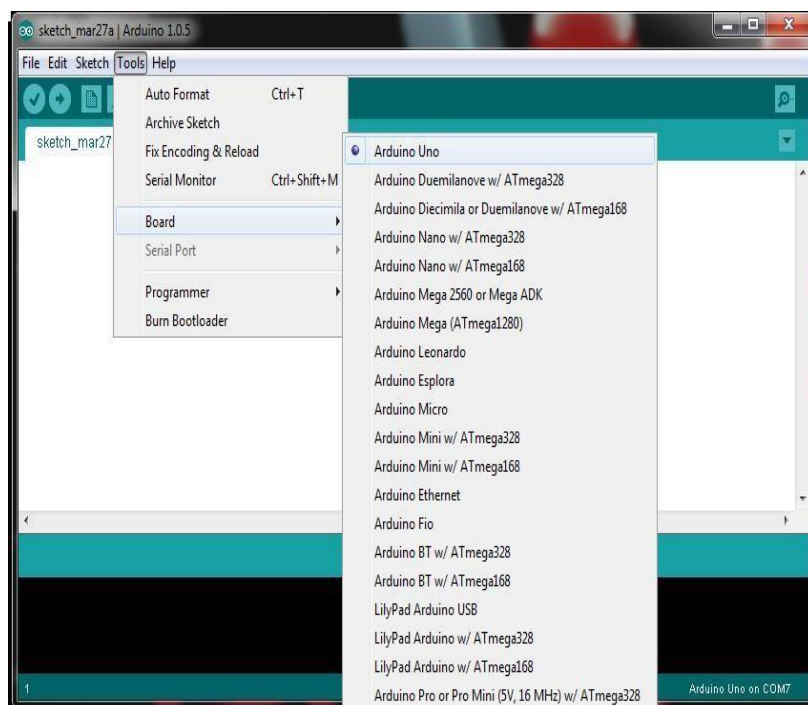


Fig:3.8 : ARDUINO UNO SOFTWARE

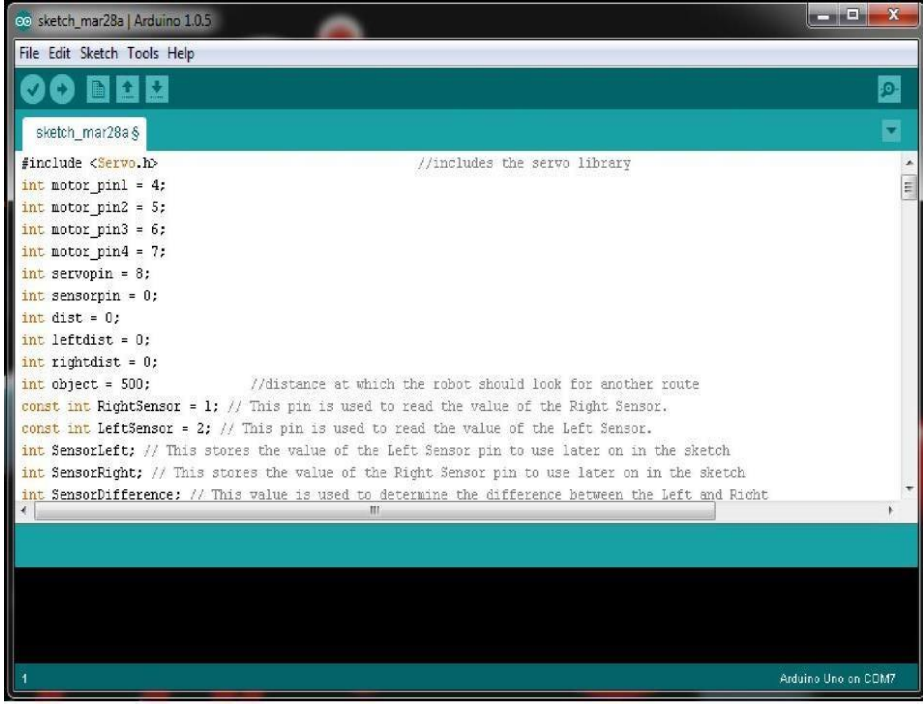
2. Select the COM Port from tool



3. Select the required Arduino board from Tools as shown below

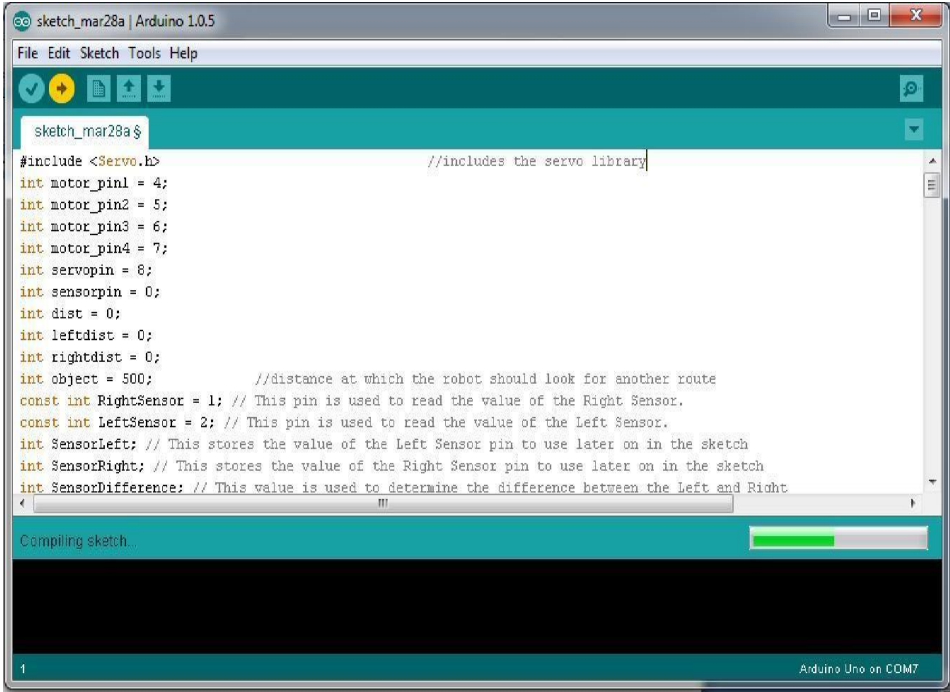


4. Write the sketch in Arduino IDE



```
sketch_mar28a $
#include <Servo.h> //includes the servo library
int motor_pin1 = 4;
int motor_pin2 = 5;
int motor_pin3 = 6;
int motor_pin4 = 7;
int servopin = 8;
int sensorpin = 0;
int dist = 0;
int leftdist = 0;
int rightdist = 0;
int object = 500; //distance at which the robot should look for another route
const int RightSensor = 1; // This pin is used to read the value of the Right Sensor.
const int LeftSensor = 2; // This pin is used to read the value of the Left Sensor.
int SensorLeft; // This stores the value of the Left Sensor pin to use later on in the sketch
int SensorRight; // This stores the value of the Right Sensor pin to use later on in the sketch
int SensorDifference; // This value is used to determine the difference between the Left and Right
```

5. Compile and upload the Sketch to Arduino board upload the Sketch to Arduino board.



```
sketch_mar28a $
#include <Servo.h> //includes the servo library
int motor_pin1 = 4;
int motor_pin2 = 5;
int motor_pin3 = 6;
int motor_pin4 = 7;
int servopin = 8;
int sensorpin = 0;
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int SensorRight; // This stores the value of the Right Sensor pin to use later on in the sketch
int SensorDifference; // This value is used to determine the difference between the Left and Right
```

Compiling sketch...

3.9 IMAGE PROCESSING OF PROJECTION

Image processing is a multifaceted domain integral to understanding, analysing, and interpreting images through algorithmic methodologies. Within this realm, one fundamental task is image identification or recognition, where automated systems aim to discern objects, patterns, or features present within an image. To commence this process, a series of preprocessing steps are typically executed to refine the image quality or accentuate relevant features. Such operations encompass noise reduction, image smoothing, contrast enhancement, and resizing, collectively enhancing subsequent analysis.

Following preprocessing, the subsequent stage involves feature extraction, whereby distinctive characteristics or patterns within the image are identified to serve as discriminative attributes for recognition. These features can span a spectrum of visual traits, including edges, corners, textures, and colors. Various techniques are employed for feature extraction, ranging from edge detection and corner identification to histogram-based methods, each tailored to capture specific aspects of the image's visual composition.

Once features are delineated, the process transitions to feature matching, where extracted features are juxtaposed against known patterns or images to ascertain matches. Techniques such as template matching, keypoint matching utilizing descriptors like SIFT or SURF, and histogram-based matching are commonly utilized for this purpose. Through meticulous comparison and correlation, matches between features aid in identifying objects or patterns within the image.

Following feature matching, classification and recognition mechanisms are deployed to assign labels or categories to identified objects. This often entails training machine learning models on label datasets, enabling them to discern patterns associated with different classes. Notable classification algorithms encompass Support Vector Machines, Convolutional Neural Networks, K-Nearest Neighbours, and Random Forests, with deep learning architectures like ResNet and VGG prominently employed for intricate recognition tasks.

Subsequent to classification, post-processing steps may be enacted to refine identification outcomes. These entail filtering out erroneous identifications, refining object boundaries, or enhancing localization accuracy, thereby culminating in more precise and reliable recognition outcomes. Collectively, these stages encapsulate the iterative and systematic approach adopted within image processing for the identification and interpretation of visual data.

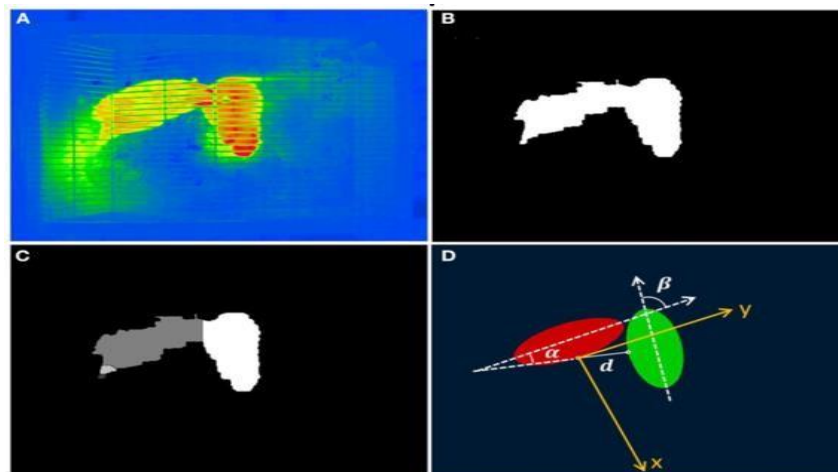


Fig:3.9: IMAGE DETECTION THROUGH IMAGE PROCESSING

3.10 PROTEUS 8 PROFESSIONAL SOFTWARE

Proteus is a suite of tools for designing, testing, and laying out printed circuit boards (PCBs). It is used in industry and education. In industry, it is a rapid prototyping tool for R&D, and in education, it is used to teach electronics, embedded design, and PCB layout.

Proteus 8.0 is an integrated application that includes ISIS, ARES, and 3D Viewer modules as tabbed modules. The program allows changes to the schematic to be reflected across PCB, BOM, and Design Explorer in real time. Proteus stores the design (DSN), layout (LYT), and common database in a single project file (PDSPRJ).

Proteus has a simple, clean user interface and over 50,000 components and footprints in the libraries. Some of the features of Proteus include:

- Wiring: Users can direct wire placement by mouse movement or quickly connect terminals by touch to the pin ends

- Shape based auto routing: Saves time with non-critical routing
- Direct access to over 15 million parts.

The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB (Printed Circuit Board) layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an auto router and basic mixed mode SPICE simulation capabilities.

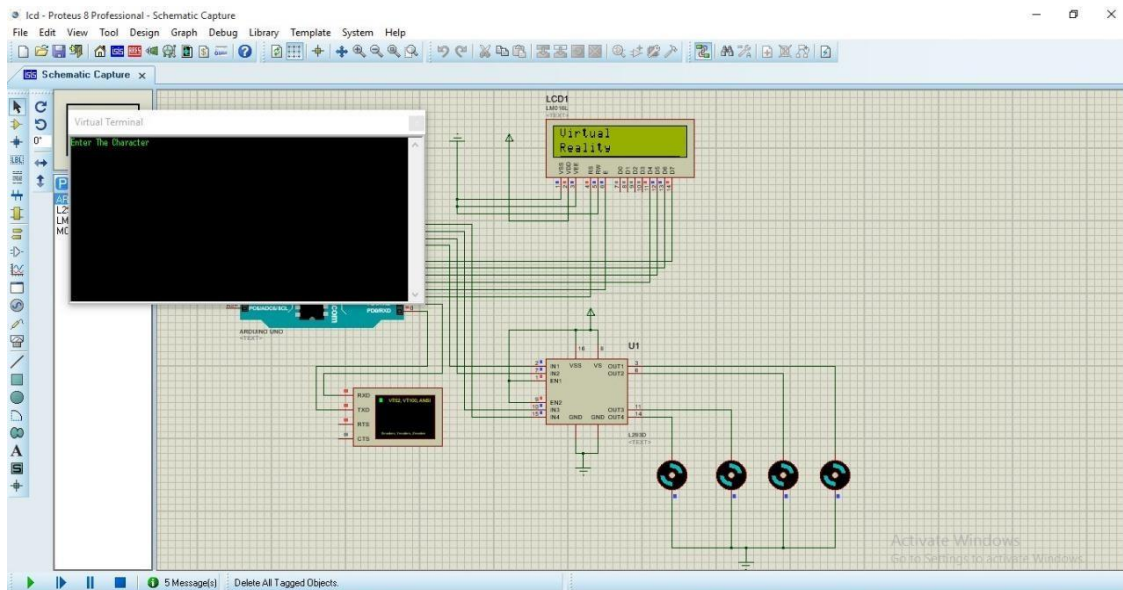


Fig:3.10.1: PROTEUS SOFTWARE

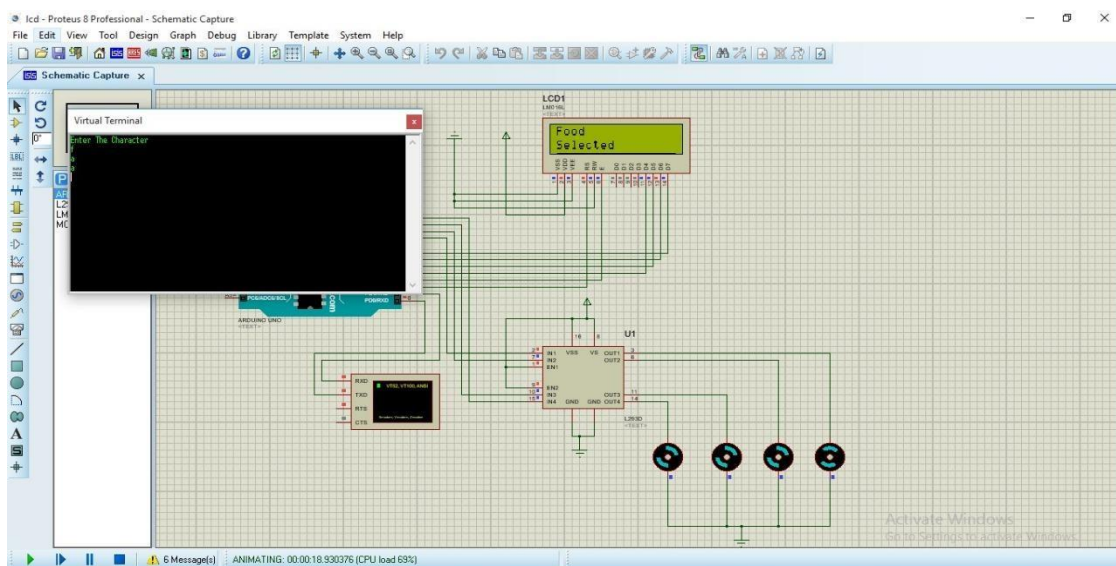


Fig:3.10.2: SELECTING ITEM

CHAPTER-4

WORKING EXPLANATION

The VR torch works on Hologram technique, consisting of 4 type of images such as food, medicine, water and clothes and the needy blocks the image based on his requirement. The Web camera senses the blocked image and a webpage is created. The web page is created on the computer by VR Software language based on software tool and the image is detected by Image Processing. And it recognize dots based on Image Processing and scanning process. In each image, there are pixels of different values and those values are sent in Binary type to the Zigbee Tx (WSN) medium signal. The receiver section gets a binary value based on ZigBee present at receiver side. This value is sent by UART communication based on Arduino uno (RISC MECHANISM). The Arduino uno is used to give input 12v relay. The Relay is used to give the power supply of 12v motor. Each motor runs based on the need of the flood victims and indicates through the LCD display. The LCD is used to display the function based on the flood victim's need.

In detail the connections made in project there is one power supply 12V which gives power to the prototype which is connected to the Arduino Uno board and transformer whenever we switch on the system the hologram light and power supply will ON. After when we project the hologram light which is connected with USB cable to laptop and a camera which is attached to the top of the hologram which captures the whatever the block displayed on the wall sending information to the laptop when the projection on wall or terrace of the building then 6 square blocks displayed over. After that we have install the code in the Arduino Uno which is use run the prototype and we have connect the LCD display to Arduino Uno and we have UART transmitter USB cable to the Laptop and receiver to the Arduino Uno for communication in wireless mode and we have connect a relay module to the Arduino Uno which it has to handle the 4 Dc motors while connection with the Dc motors and we use the resistors for connecting between relay module to DC motors to control flow of current the 4 DC motors which is connected to the relay we have separate it as FOOD, MEDICINE, WATER, BLANKET....., with the help jumper wires we can make as said above like

Arduino Uno to relay and relay to DC motors .So finally these are the connections connect in the prototype.

Finally, the presentation of the project starts firstly, we have to project hologram light to the wall which displays 6 square blocks which contains needs of the flood effected people like food ,medicine, blanket, water, medicine ,rescue, doctor... So, whenever he/she block the particular item light projection through image processing we get know what their needed and displayed on the LCD screen and particular DC motor starts running and supply need to what the flood effected people want through a conveyor belt without any man interrupt. And this prototype it will project to certain distance only. when we real it in implemented in helicopter and boats we use the concept laser beam light in place of projection. So, these are things happening in working .

The captured holographic data is then processed and analyzed using sophisticated algorithms and artificial intelligence. This enables the system to perform real-time assessments, determining the areas in most urgent need of food supplies and aid. By utilizing digital holography, the system provides precise information about the topography, infrastructure status, and population density in affected regions. This level of detail allows relief efforts to be strategically planned and executed, ensuring that resources are allocated efficiently and reach those in need promptly. Additionally, the system can dynamically adapt its relief strategies based on the evolving conditions on the ground.

4.1 FLOW CHART

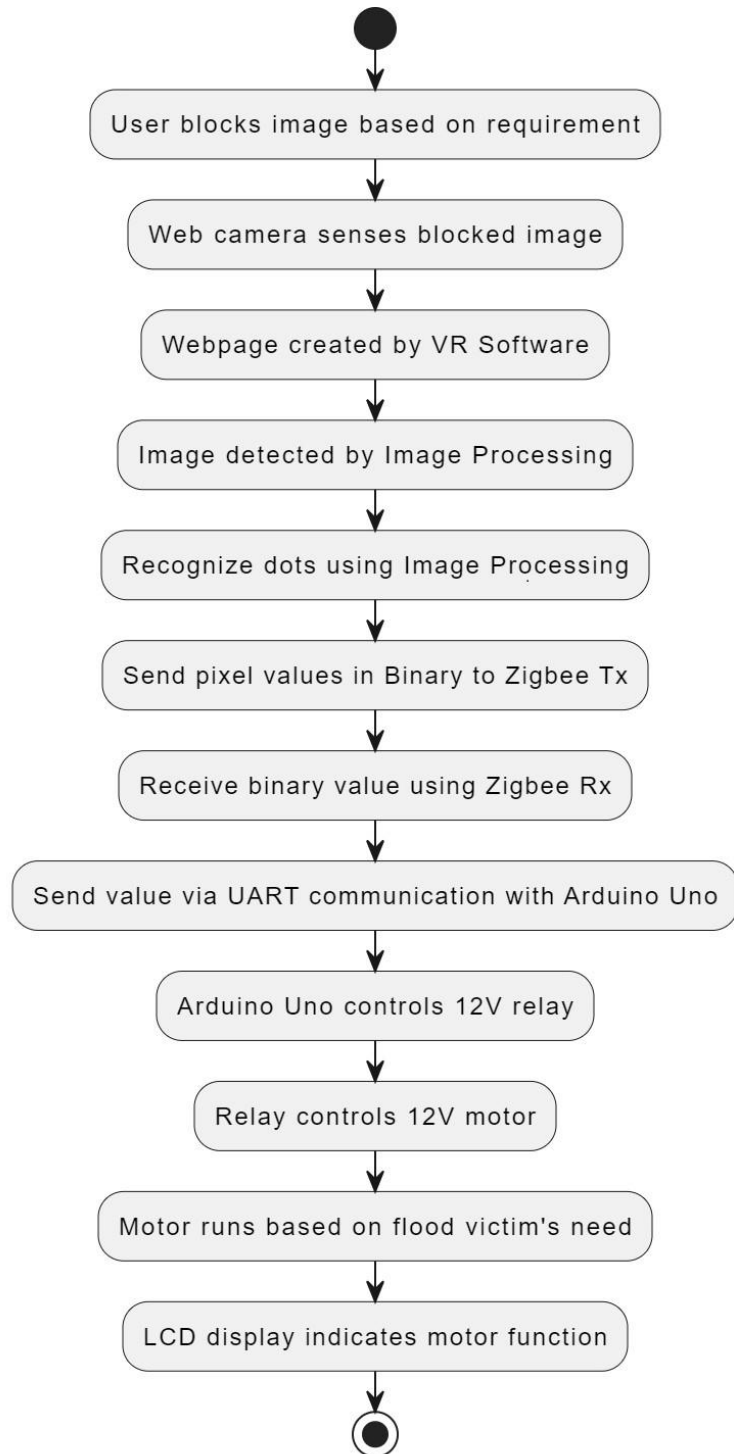


FIG:4.1: WORKING STEPS

The digital holographic system-based food supply system management and post-flood assessment system leveraging aerial projection is a multifaceted solution

designed to address critical challenges in food supply chain management and disaster response, particularly in the aftermath of floods.

1. Digital Holographic System Integration: The system utilizes digital holographic technology to create three-dimensional representations of food supply chains, warehouses, and distribution centers. This enables real-time monitoring and tracking of food inventory, transportation logistics, and storage conditions, ensuring efficient management and distribution of food resources.

2. Aerial Projection for Post-Flood Assessment: Following a flood event, drones equipped with aerial projection devices are deployed to assess the extent of damage to infrastructure, agricultural fields, and food distribution networks. These drones capture high-resolution images and data, which are then projected onto surfaces in affected areas, providing emergency responders and relief agencies with actionable insights for prioritizing rescue and recovery efforts.

3. Data Analytics and Decision Support: The system incorporates advanced data analytics algorithms to process and analyze the vast amounts of data collected from the digital holographic system and aerial projection devices. This enables predictive modeling of food supply chain disruptions and flood-related impacts, empowering stakeholders with real-time information for strategic decision-making and resource allocation.

4. Communication and Coordination: Effective communication and coordination among various stakeholders, including government agencies, NGOs, and local communities, are facilitated through the system. Integrated communication channels enable timely dissemination of information, coordination of relief efforts, and collaboration in post-flood recovery activities.

5. Remote Monitoring and Control: Remote monitoring and control capabilities allow system operators to remotely access and manage the digital holographic system, aerial projection devices, and drones from centralized command centers. This ensures continuous operation and adaptability to changing conditions during flood events and their aftermath.

6. Community Engagement and Resilience Building: The system promotes community engagement and resilience building through education, training, and capacity-building initiatives. Local communities are empowered to actively participate in disaster preparedness, response, and recovery efforts, fostering a culture of resilience and self-reliance.

4.2 ZIGBEE IEEE 802.15.4

802.15.4– ZigBee Physical Layer

ZigBee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power wireless M2M networks. The ZigBee standard operates on the IEEE 802.15.4 physical radio specification and operates in unlicensed bands including 2.4 GHz, 900 MHz and 868 MHz.

The 802.15.4 specification upon which the ZigBee stack operates gained ratification by the Institute of Electrical and Electronics Engineers (IEEE) in 2003. The specification is a packet-based radio protocol intended for low-cost, battery-operated devices. The protocol allows devices to communicate in a variety of network topologies and can have battery life lasting several years.

The ZigBee Protocol

The ZigBee protocol has been created and ratified by member companies of the ZigBee Alliance . Over 300 leading semiconductor manufacturers, technology firms, OEMs and service companies comprise the ZigBee Alliance membership. The ZigBee protocol was designed to provide an easy-to-use wireless data solution characterized by secure, reliable wireless network architectures.

The ZigBee Advantage

The ZigBee protocol is designed to communicate data through hostile RF environments that are common in commercial and industrial applications.

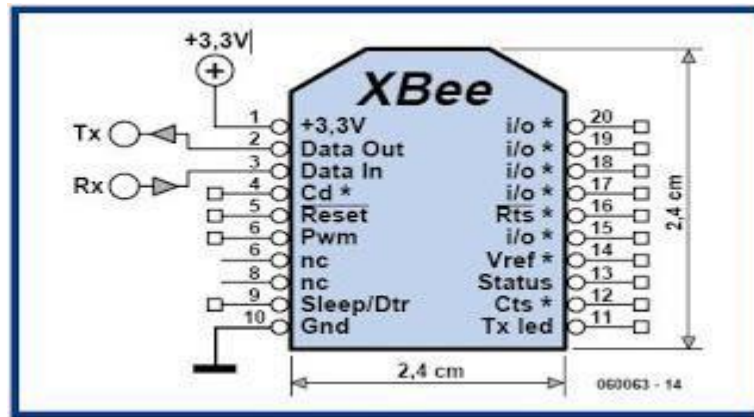


Fig:4.2: ZIGBEE PIN DIAGRAM

ZigBee is a specification for a suite of high-level communication protocols used to create personal area networks built from small, low-power digital radios. ZigBee is based on an IEEE 802.15.4 standard. Though its low power consumption limits transmission distances to 10-100 meters line-of-sight, depending on power output and environmental characteristics,^[1] ZigBee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee is typically used in low data rate applications that require long battery life and secure networking (ZigBee networks are secured by 128 bit symmetric encryption keys.) ZigBee has a defined rate of 250 kbit/s, best suited for intermittent data transmissions from a sensor or input device. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range low-rate wireless data transfer. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other wireless personal area networks (WPANs), such as Bluetooth or Wi-Fi.

Zigbee protocol features include :

- Support for multiple network topologies such as point-to-point, point-to-multipoint and mesh networks
- Low duty cycle - provides long battery life
- Low latency
- Direct Sequence Spread Spectrum (DSSS)

- Up to 65,000 nodes per network
- 128-bit AES encryption for secure data connections
- Collision avoidance, retries and acknowledgements.

Mesh Networks

A key component of the ZigBee protocol is the ability to support mesh networking. In a mesh network, nodes are interconnected with other nodes so that multiple pathways connect each node. Connections between nodes are dynamically updated and optimized through sophisticated, built-in mesh routing table.

Mesh networks are decentralized in nature; each node is capable of self-discovery on the network. Also, as nodes leave the network, the mesh topology allows the nodes to reconfigure routing paths based on the new network structure. The characteristics of mesh topology and ad-hoc routing provide greater stability in changing conditions or failure at single nodes.

ZigBee Applications

ZigBee enables broad-based deployment of wireless networks with low- cost, low-power solutions. It provides the ability to run for years on inexpensive batteries for a host of monitoring and control applications. Smart energy/smart grid, AMR (Automatic Meter Reading), lighting controls, building automation systems, tank monitoring, HVAC control, medical devices and fleet applications are just some of the many spaces where ZigBee technology is making significant advancements.

Digi ZigBee Technology

Digi is a member of the ZigBee Alliance and has developed a wide range of networking solutions based on the ZigBee protocol. XBee and XBee-PRO modules and other XBee-enabled devices provide an easy-to-implement solution that provides functionality to connect to a wide variety of devices.

CHAPTER-5

RESULT AND DISCUSSION

The final result of this project is mainly whenever the source which is needed is blocked by the affected people then the effective and simple approach for giving people the necessities they require. The usage of holographic projection in times of flood provides the people a choice to choose what they want. By receiving the input from people, the model provides desired product such as Food, Water, Medicine, Blanket using the motors connected to a motor relay. In addition, rescuing and help of doctor can also be received as input. The Arduino UNO is dumped with a set programming codes which allows it to receive inputs and deliver signal to the motor relay. The Arduino UNO receives signal from the CPU which gets the input signal from the sensing camera mounted with the holographic light, hence the desired motor will run. The prototype projects holographic light, sensed for any hindrance in the projection which will be taken as input and motor will run in addition a led display will display the output product name. The future ideas are using a Wireless Sensor Network (WSN) to operate the signal exchanges between the Computer and Motor relays. Usage of high Intensity Holographic projection can be used in places of high sunlight are also future ideas.



Fig:5.1: HOLOGRAM PROJECTION ON WALL

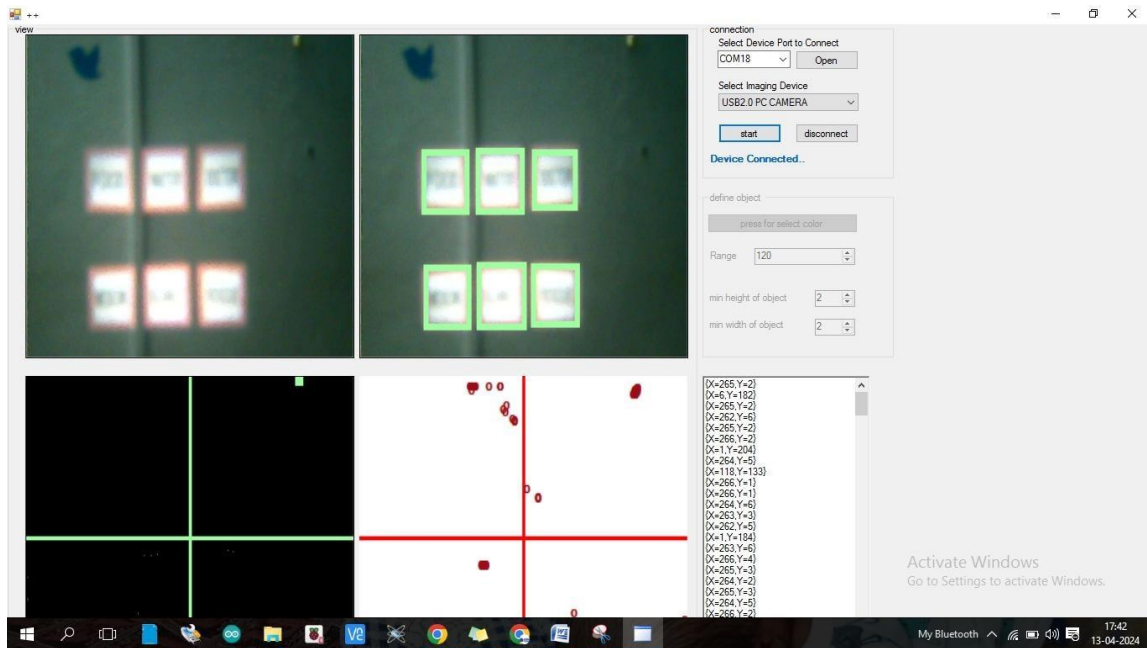


Fig:5.2: VR SOFTWARE SCREEN

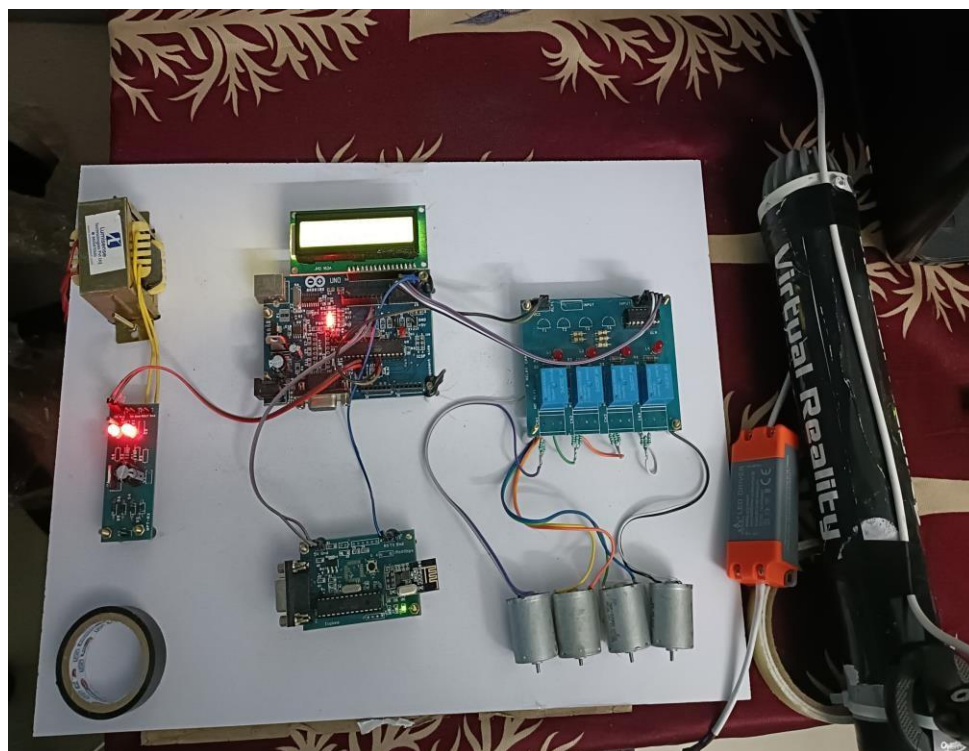


Fig:5.3: INTEGRATION OF HARDWARE COMPONENTS WITH VIRTUAL REALITY

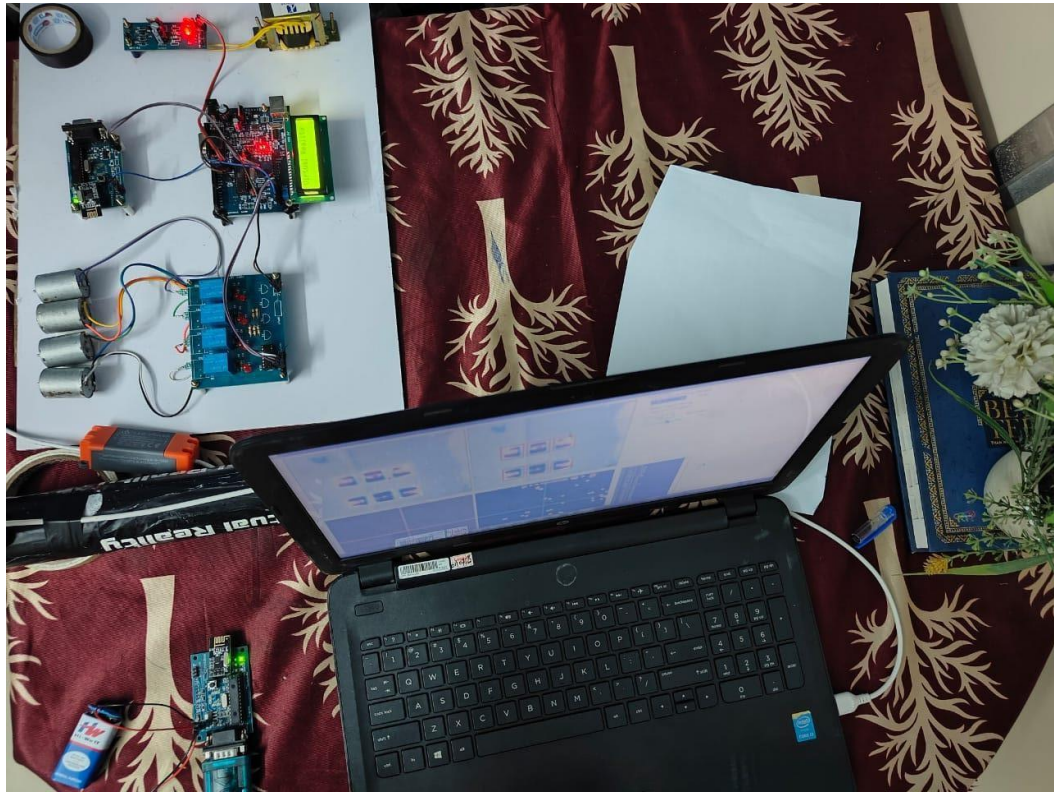


Fig:5.4: PROJECTION ANALYSING BY LAPTOP

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION

In conclusion, the Digital Holographic Based Food Supply Management During Post Flood Assessment System By Using Aerial Projection, augmented by aerial projection technology, represents a paradigm shift in disaster relief efforts. By seamlessly integrating digital holography and aerial projection techniques, this innovative system empowers relief organizations with unprecedented insights into the disaster-affected regions. The two-dimensional holographic representations offer a level of precision in assessment that was previously unattainable, enabling the identification of critical infrastructure damage and the distribution of affected populations with unparalleled accuracy.

Furthermore, the dynamic adaptability of the system, facilitated by advanced algorithms and artificial intelligence, ensures that relief efforts are not only efficiently allocated but can swiftly respond to evolving conditions on the ground.

So, We implemented the model within a framework that can be used for redirect food distribution within different virtual and physical environments. It is useful for the evaluation of redirected of parameters under varying conditions. to distribute the appropriate material for the flood victims and effectively treats the unfavorable conditions In this we using virtual reality due to light rays through the wall to display through the Buttons like FOOD, CLOTH, MEDICINE Etc. In real time application, it can be implemented using Virtual Reality, Holographic images and by using the LASER beam light we can cover a large area and long distance make the situation a desirable one.

Finally, This fusion of technology fundamentally transforms the way we approach disaster relief, redefining the speed, precision, and effectiveness with which aid is delivered in the aftermath of a flood disaster. This project marks a monumental advancement in humanitarian efforts, promising to save lives and alleviate suffering in the face of adversity.

6.2 FUTURE SCOPE

Using aerial projection is incredibly promising, with potential advancements and applications that could revolutionize disaster relief efforts worldwide.

Firstly, continued research and development in holographic technology can lead to even more precise and detailed holographic representations. This could include enhanced spatial resolution and the ability to capture finer details of affected areas, enabling relief organizations to make even more informed decisions about resource allocation and aid distribution. Additionally, advancements in holographic projection techniques may lead to improved display quality and the ability to project holograms over larger areas, further enhancing communication and coordination with affected populations.

Furthermore, the integration of artificial intelligence and machine learning algorithms could significantly enhance the system's analytical capabilities. By leveraging these technologies, the system could autonomously process and interpret the holographic data, providing real-time insights and recommendations for relief efforts. This could lead to faster response times and even more efficient use of resources.

Lastly, broader adoption and adaptation of this technology across different types of disasters and regions could further solidify its impact. By customizing the system to address specific challenges posed by different types of natural disasters, such as earthquakes or wildfires, we can extend its benefits to a wider range of emergency scenarios. Overall, the future for this Digital Holographic Based Food Supply Management During Post Flood Assessment System By Using Aerial Projection is bright, offering immense potential to reshape disaster relief efforts on a global scale.

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