

SMART FENCING BASED ON EMBEDDED SYSTEM

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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SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

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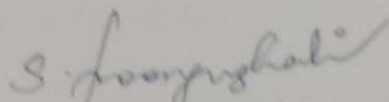
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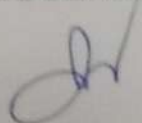
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the Bonafide work of **SANAMSETTY SAI** (39130393) who carried out the project entitled "SMART FENCING BASED ON EMBEDDED SYSTEM" under my supervision from November 2022 to April 2023.


Internal Guide

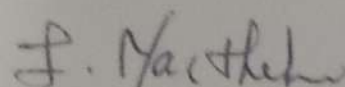
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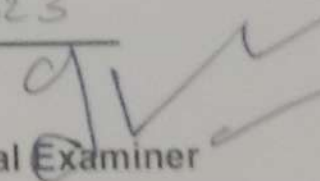


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ABSTRACT

In countries like India, agriculture is a huge contributor to the nation's social economy. Especially in India, it is higher than the world's average making up 6.1%. India stands second in farming and harvesting worldwide. Report says, along with the harvesting rate, the rate of losses of crops has been recorded to be high and needs to be fixed as soon as possible. Unlike the green revolution, the contemporary crop safety revolution is taking longer to reach the countryside but is an essential one to be carried out effectively. Keeping agricultural safeguards in mind Smart Fence Security Services in India with different fencing options for agricultural land proposed in our project. We mainly focus on Proper Power Utilization, for the crops, Instant notification of unwanted activity over the farming land with the light indicator to the center of the village. If needed Electrical fencing can also be a great solution to avoid restriction of Wild Animals in some cases to increase the productivity of crops.

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CHAPTER 1

INTRODUCTION

An embedded system is a combination of computer hardware and software designed for a specific function. Embedded systems may also function within a larger system. The systems can be programmable or have a fixed functionality. Industrial machines, consumer electronics, agricultural and processing industry devices, automobiles, medical equipment, cameras, digital watches, household appliances, airplanes, vending machines and toys, as well as mobile devices, are possible locations for an embedded system.

While embedded systems are computing systems, they can range from having no userinterface (UI) -- for example, on devices designed to perform a single task -- to complexgraphical user interfaces (GUIs), such as in mobile devices. User interfaces can include buttons, LEDs (light-emitting diodes) and touchscreen sensing. Some systemsuse remote user interfaces as well

India has agriculture as its primary occupation. According to IBEF (India Brand Equity Foundation), 58% of the people living in rural areas in India are dependent on horticulture. As per the Central Statistics Office 2nd advised estimate, the contribution of horticulture to the Gross Value Addition (India) is estimated to be roughly around 8% which is a very significant contribution. Under such a scenario, the usage of water especially the freshwater resource by horticulture will be enormous and according to the current market surveys it is estimated that horticulture uses 85% of available freshwater resources worldwide, and this percentage will continue to be dominant because of population growth and increased food demand. The indication is by a buzzer sound on arrival of an animal.This fencing system has served beneficially in minimizing the agricultural loss by wild life.Adding on to the pros, a safe shock for the animals is produced only for those animals in correlation with the database.

1.1 EXAMPLES OF EMBEDDED SYSTEMS

Embedded systems are used in a wide range of technologies across an array of industries. Some examples include:

Automobiles

Modern cars commonly consist of many computers (sometimes as many as 100), or embedded systems, designed to perform different tasks within the vehicle. Some of these systems perform basic utility functions and others provide entertainment or user-facing functions. Some embedded systems in consumer vehicles include cruise control, backup sensors, suspension control, navigation systems and airbag systems.

Mobile phones

These consist of many embedded systems, including GUI software and hardware, operating systems (OSes), cameras, microphones, and USB (Universal Serial Bus) I/O (input/output) modules.

Industrial machines

They can contain embedded systems, like sensors, and can be embedded systems themselves. Industrial machines often have embedded automation systems that perform specific monitoring and control functions.

Medical equipment

These may contain embedded systems like sensors and control mechanisms. Medical equipment, such as industrial machines, also must be very user-friendly so that human health isn't jeopardized by preventable machine mistakes. This means they'll often include a more complex OS and GUI designed for an appropriate UI. A **medical device** is any device intended to be used for medical purposes. Significant potential for hazards are inherent when using a device for medical purposes and thus medical devices must be proved safe and effective with reasonable assurance before regulating governments allow marketing of the device in their country. As a general rule, as the associated risk of the device increases the amount of testing required to

establish safety and efficacy also increases. Further, as associated risk increases the potential benefit to the patient must also increase

Characteristics of embedded systems

The main characteristic of embedded systems is that they are task-specific. Additionally, embedded systems can include the following characteristics: system, not various tasks; can be either microprocessor-based or microcontroller-based both are integrated circuits that give the system compute power are often used for sensing and real-time computing in internet of things (IoT) devices, which are devices that are internet-connected and do not require a user to operate; can vary in complexity and in function, which affects the type of software, firmware and hardware they use; are often required to perform their function under a time constraint to keep the larger system functioning properly. Structure of embedded systems Embedded systems vary in complexity but, generally, consist of three main elements:

Hardware

The hardware of embedded systems is based around microprocessors and microcontrollers. Microprocessors are very similar to microcontrollers and, typically, refer to a CPU (central processing unit) that is integrated with other basic computing components such as memory chips and digital signal processors (DSPs). Microcontrollers have those components built into one chip.

Software and firmware

Software for embedded systems can vary in complexity. However, industrial-grade microcontrollers and embedded IoT systems usually run very simple software that requires little memory.

Real-time operating system

These are not always included in embedded systems, especially smaller-scale systems. RTOSes define how the system works by supervising the software and setting rules during program execution.

1.2 PROBLEM STATEMENT

In addition to managing scarcity and conflict between water users, the available fresh water is further contaminated by the human and animal population and the pollution levels have increased at an alarming rate. This if continues, will be leading to the limitation of food production which in turn will affect human productivity, and thus the entire ecosystem will be affected in the years to come. The primary and the most important reason for this problem is the tremendous increase in the population which has increased at a rate that is faster than the food production rate. Since, agricultural lands were closer to forest areas wild animals intervened the agriculture reforms and this leads to loss of humans and agricultural yields. To overcome this, farmers established fence to protect their lands.

1.3 OBJECTIVES

1. To develop a clean and hygienic environment with a proper dust disposal system
2. To process the aquatic waste into profit for public use
3. To create an awareness and proper disposal system for upcoming generations
4. To make the customer aware of accountability behind the job such as the system for solid waste inspection and management
5. Messages broadcast over this connection must be converted to the interface signals of the processor. This function is performed by the protocol converter.
6. An Electric Fence is a fence which is electrically empowered to repel creatures or gatecrashers by a high voltage stun. It's anything but a physical yet a mental boundary.

1.4 SCOPE OF THE PROJECT

1. Cope with climate change, soil erosion, and biodiversity loss.
2. Satisfy consumers' changing tastes and expectations.

3. Meet rising demand for more food of higher quality.
4. Invest in farm productivity.
5. Adopt and learn new technologies.
6. Stay resilient against global economic factors
7. From all the above-discussed criteria we have nearly 33% loss due to improper fencing this made us improve the fencing methods effectively
8. Since 90% of the GDP of our country depends on huge farming done by farmers.
9. Power fencing system is used all over the world. The electric fences are formed around the farm field. Continuous power is being sent across the fence.

1.5 MODERN AGRICULTURE

This is the art of cultivating plants in gardens to produce food and medicinal ingredients, or for comfort and ornamental purposes. Horticulturists are agriculturists who grow flowers, fruits, nuts, vegetables, and herbs, as well as ornamental trees and lawns study and practice of horticulture have been traced back thousands of years. Horticulture contributed to the transition from nomadic human communities to sedentary, or semi- sedentary, agriculture communities. Horticulture is divided into focus on the cultivation and processing of different types of plants and food items for specific purposes. In order to conserve the science of horticulture, multiple organizations worldwide educate, encourage, and promote the advancement of horticulture. There are various organizations worldwide that focus on promoting and encouraging research and education in all branches of agriculture science; such organizations include the International Society for Agriculture Science and the American Society of Agriculture Science.

In the United Kingdom, there are two main horticulture societies. The Ancient Society of York Florists is the oldest agriculture society in the world and was founded in 1768; this organization continues to host four agriculture shows annually in York,

The organization shares the knowledge of horticulture through its community, learning programs, and world-class gardens and shows. The Chartered Institute of Horticulture (CIH) is the professional body that represents horticulturists in Great Britain and Ireland while also having an international branch for members outside of these islands.

The Australian Society of Agriculture Science was established in 1990 as a professional society to promote and enhance Australian agriculture science and industry.

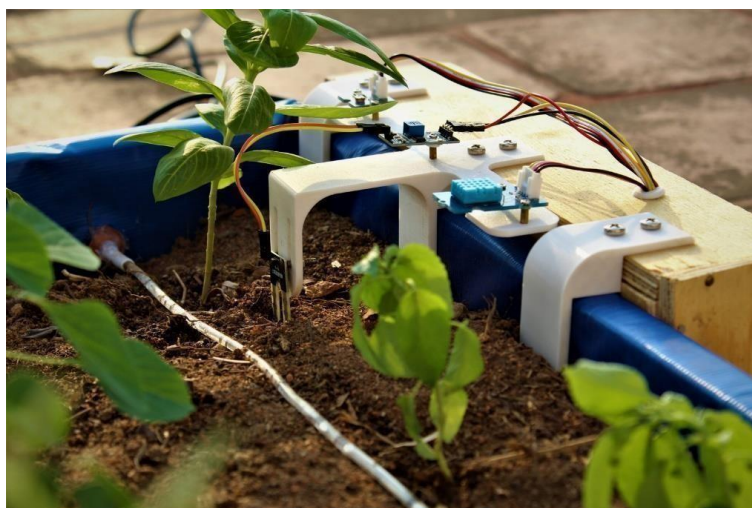


Fig:1.1 : Live Pit Model of Testing

Finally, the New Zealand Horticulture Institute is another known agriculture organization. In India, the Agriculture Society of India (now Indian Academy of Agriculture Sciences) is the oldest society which was established in 1941 at Lyallpur, Punjab (now in Pakistan) but was later shifted to Delhi in 1949. Another notable organization in operation since 2005 is the Society for Promotion of Horticulture based at Bengaluru. Both these societies publish scholarly journals viz., Indian Journal of Horticulture and Journal of Agriculture Sciences for the advancement of agriculture sciences. The National Junior Agriculture Association (NJHA) was established in 1934 and was the first organization in the world dedicated solely to youth and horticulture.

NJHA programs are designed to help young people obtain a basic understanding of horticulture and develop skills in this ever- expanding art and science. In order to overcome loss of humans on inclusion with other living beings, new system has been proposed, a smart fencing system. This development enhances the farm field protection by fencing. Firstly, the images of wild animals are stored in database. The Infra red camera is placed in the areas where there is frequent trespassing of animals. Secondly, if there is a similar image as in the database, a corresponding voltage of that particular animal has been raised on the fence which protects the farm fields by delivering a mild shock to the animals and it also alerts farmers by a buzzer. The hardware of embedded systems is based around microprocessors and microcontrollers. Microprocessors are very similar to microcontrollers and, typically, refer to a CPU (central processing unit) that is integrated with other basic computing components such as memory chips and digital signal processors (DSPs). Microcontrollers have those components built into one chip.

The magnitude of the back emf is directly proportional to the speed of the motor. Consider the load on a dc motor is suddenly reduced. In this case, the required torque will be small as compared to the current torque. The speed of the motor will start increasing due to the excess torque. Hence, being proportional to the speed, the magnitude of the back emf will also increase. With increasing back emf armature current will start decreasing. Torque is proportional to the armature current, it will also decrease until it becomes sufficient for the load. Thus, the speed of the motor will regulate.

On the other hand, if a dc motor is suddenly loaded, the load will cause a decrease in the speed. Due to the decrease in speed, back emf will also decrease allowing more armature current. Increased armature current will increase the torque to satisfy the load requirement. Hence, the presence of the back emf makes a dc motor “self-regulating”. The speed of the motor will start increasing due to the excess torque. Hence, being proportional to the speed, the magnitude of the back emf will also increase.

1.6 IOT IN AGRICULTURE AND SMART FENCING

India is the crop growing based country. Our ancient public entirely depended on the farming realizing. Agriculture is a cause of living of mainstream Indians and has great control on the economy of the country. In dry zones or in situation of lacking rainfall, irrigation comes to be difficult. So, it wants to be involuntary for correct produce and measured at all for farmer protection. Horticulture is a sub-sector of agriculture that plays a significant role in the economy, human nutrition, gender mainstreaming, and employment. Agriculture commodities include fruits, vegetables, flowers, spices, and condiments, which have grown steadily and turned into a major segment in agricultural trade. The objective of the Horticulture system is to keep a measure on food security and the aim of the automatic irrigation control system is to minimize the efforts of the human operator (gardener) in Horticulture activities. Over the years, monitoring soil moisture levels of farmlands have been performed manually.

1.7 COMPONENTS

ARDUINO UNO

The Arduino UNO is the best board to get started with electronics and coding. If this is your first experience tinkering with the platform, the UNO is the most robust board you can start playing with. The UNO is the most used and documented board of the whole Arduino family.

- Arduino is an open-source electronics platform based on easy-to-use hardware and software.
- Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

- You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (C++), and the Arduino Software (integrated development environment - IDE).
- A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

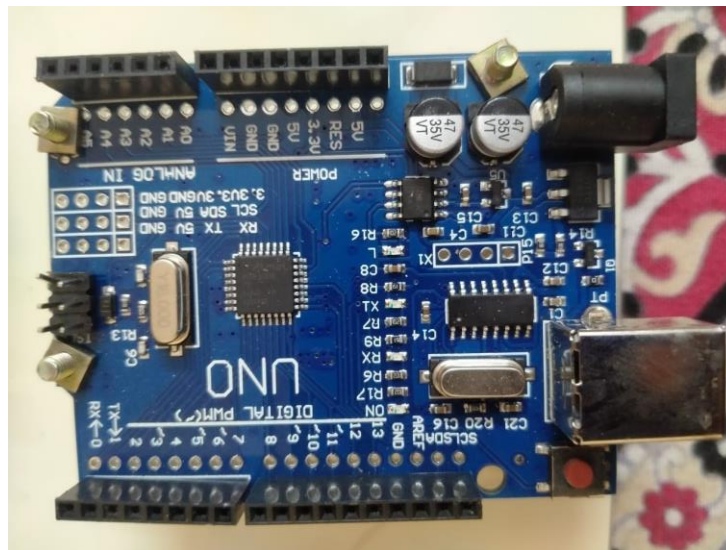


Fig:1.3: ARDINO BOARD

MAIN FEATURES

Arduino UNO is a microcontroller board based on the **ATmega328P**. 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. You can tinker with your UNO without worrying too much

about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. Inexpensive. Cross-platform - works on Windows, Mac, Linux etc. Simple, clear programming environment. Open-source hardware empowering users to build them independently and eventually adapt them to their particular needs. Software growing through the contributions of users worldwide.

APPLICATIONS

This application makes use of the Arduino Uno board, Bluetooth interface for connectivity, and smartphones. Software loaded boards are connected to the home devices like lamps, A/C, TV, Refrigerator, and Bluetooth software is interfaced with the board.

PIR sensor

A **passive infrared sensor** is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.

PIR sensors detect general movement, but do not give information on who or what moved. For that purpose, an imaging IR sensor is required.

PIR sensors are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector". The term *passive* refers to the fact that PIR devices do not radiate energy for detection purposes. They work entirely by detecting infrared radiation (radiant heat) emitted by or reflected from objects.

A PIR sensor can detect changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the

objects in front of the sensor. When an object, such as a person, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well.

PIRs come in many configurations for a wide variety of applications. The most common models have numerous Fresnel lenses or mirror segments, an effective range of about 10 meters (30 feet), and a field of view less than 180° . Models with wider fields of view, including 360° , are available, typically designed to mount on a ceiling. Some larger PIRs are made with single segment mirrors and can sense changes in infrared energy over 30 meters (100 feet) from the PIR. There are also PIRs designed with reversible orientation mirrors which allow either broad coverage (110° wide) or very narrow "curtain" coverage, or with individually selectable segments to "shape" the coverage.



Fig:1.4: PIR SENSOR

Designs have been implemented in which a PIR circuit measures the temperature of a remote object. In such a circuit, a non-differential PIR output is used. The output signal is evaluated according to a calibration for the IR spectrum of a specific type of

matter to be observed. By this means, relatively accurate and precise temperature measurements may be obtained remotely. Without calibration to the type of material being observed, a PIR thermometer device is able to measure changes in IR emission which correspond directly to temperature changes, but the actual temperature values cannot be calculated.

IR SENSOR

An infrared sensor (IR sensor) is a radiation-sensitive optoelectronic component with a spectral sensitivity in the infrared wavelength range 780 nm ... 50 μm . IR sensors are now widely used in motion detectors, which are used in building services to switch on lamps or in alarm systems to detect unwelcome guests.

IR sensors are now widely used in motion detectors, which are used in building services to switch on lamps or in alarm systems to detect unwelcome guests. In a defined angle range, the sensor elements detect the heat radiation (infrared radiation) that changes over time and space due to the movement of people.

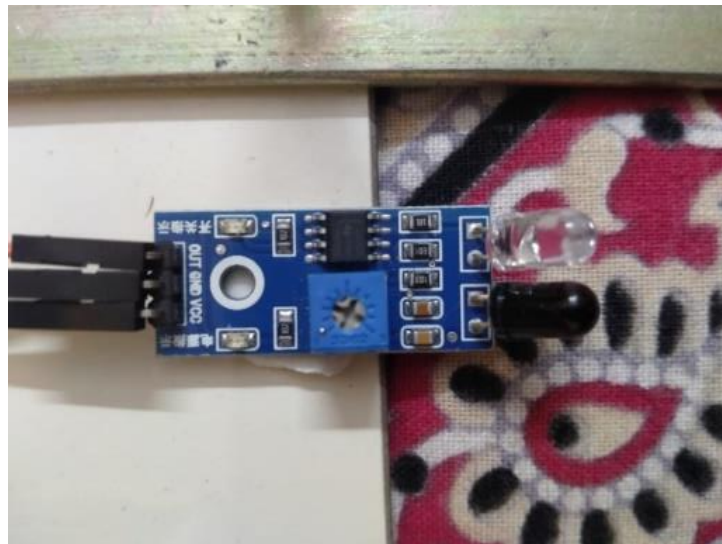


Fig:1.5 : IR SENSOR

APPLICATIONS

- Applications of infrared radiation:
- Laser applications.
- Epilation.
- Tattoo removal.
- Blue light therapy.
- Light therapy with daylight lamps.
- Sunbeds

GSM MODULE

A GSM module or a GPRS module is a chip or circuit that use to establish communication between a mobile device or a computing machine and a GSM or GPRS system.

It was created to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones and is now the default global standard for mobile communications – with over 90% market share, operating in over 219 countries and territories.

GSM was developed using digital technology. It has an ability to carry 64 kbps to 120 Mbps of data rates. Presently GSM supports more than one billion mobile subscribers in more than 210 countries throughout the world. GSM provides basic to advanced voice and data services including roaming service. A GSM/GPRS modem is a class of wireless modems, designed for communication over the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also, they have IMEI (International Mobile Equipment Identity) numbers similar to mobile phones for their identification.



Fig:1.6 : GSM MODULE

What is GPRS?

General Packet Radio Service (GPRS) is a packet-oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications (GSM).

GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. It is now maintained by the 3rd Generation Partnership Project (3GPP).

What is GSM Module?

A circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here GSM module or a GPRS module is a chip or These modules consist of a GSM module or GPRS modem powered by a power supply circuit and communication interfaces (like RS-232, USB 2.0, and others) for computers. A GSM modem can be a dedicated modem device with a serial, USB, or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

Difference between GSM/GPRS Modems, Modules, and Mobiles

A GSM module or GPRS modules are similar to modems, but there's one difference: A GSM/GPRS Modem is external equipment, whereas the GSM/GPRS module is a module that can be integrated within the equipment. It is an embedded piece of hardware.

A GSM mobile, on the other hand, is a complete system in itself with embedded processors that are dedicated to providing an interface between the user and the mobile network

ITS FUNCTIONS INCLUDE:

- Read, write and delete SMS messages.
- Send SMS messages.
- Monitor the signal strength.
- Monitor the charging status and charge level of the battery.
- Read, write and search phone book entries.

LIQUID CRYSTAL DISPLAY

The LiquidCrystal library allows you to control LCD displays that are compatible with the Hitachi HD44780 driver. There are many of them out there, and you can usually tell them by the 16-pin interface.

The LCDs have a parallel interface, meaning that the microcontroller has to manipulate several interface pins at once to control the display. The interface consists of the following pins:



Fig:1.7 : LCD DISPLAY

- **A** register select (RS) pin that controls where in the LCD's memory you're writing data to. You can select either the data register, which holds what goes on the screen, or an instruction register, which is where the LCD's controller looks for instructions on what to do next.
- **A** Read/Write (R/W) pin that selects reading mode or writing mode
- **An** Enable pin that enables writing to the registers
- **8** data pins (D0 -D7). The states of these pins (high or low) are the bits that you're writing to a register when you write, or the values you're reading when you read.

There's also a display contrast pin (Vo), power supply pins (+5V and GND) **and** LED Backlight (Bklt+ and Bklt-) pins that you can use to power the LCD, control the display contrast, and turn on and off the LED backlight, respectively. The process of controlling the display involves putting the data that form the image of what you want to display into the data registers, then putting instructions in the instruction register.

The Hitachi-compatible LCDs can be controlled in two modes: 4-bit or 8-bit. The 4-bit mode requires seven I/O pins from the Arduino, while the 8-bit mode requires 11 pins. For displaying text on the screen, you can do most everything in 4-bit mode, so example shows how to control a 16x2 LCD in 4-bit mode.

1.8 HARDWARE REQUIRED

- Arduino Board
- LCD Screen (compatible with Hitachi HD44780 driver)
- pin headers to solder to the LCD display pins
- 10k ohm potentiometer
- 220 ohm resistor
- hook-up wires
- breadboard

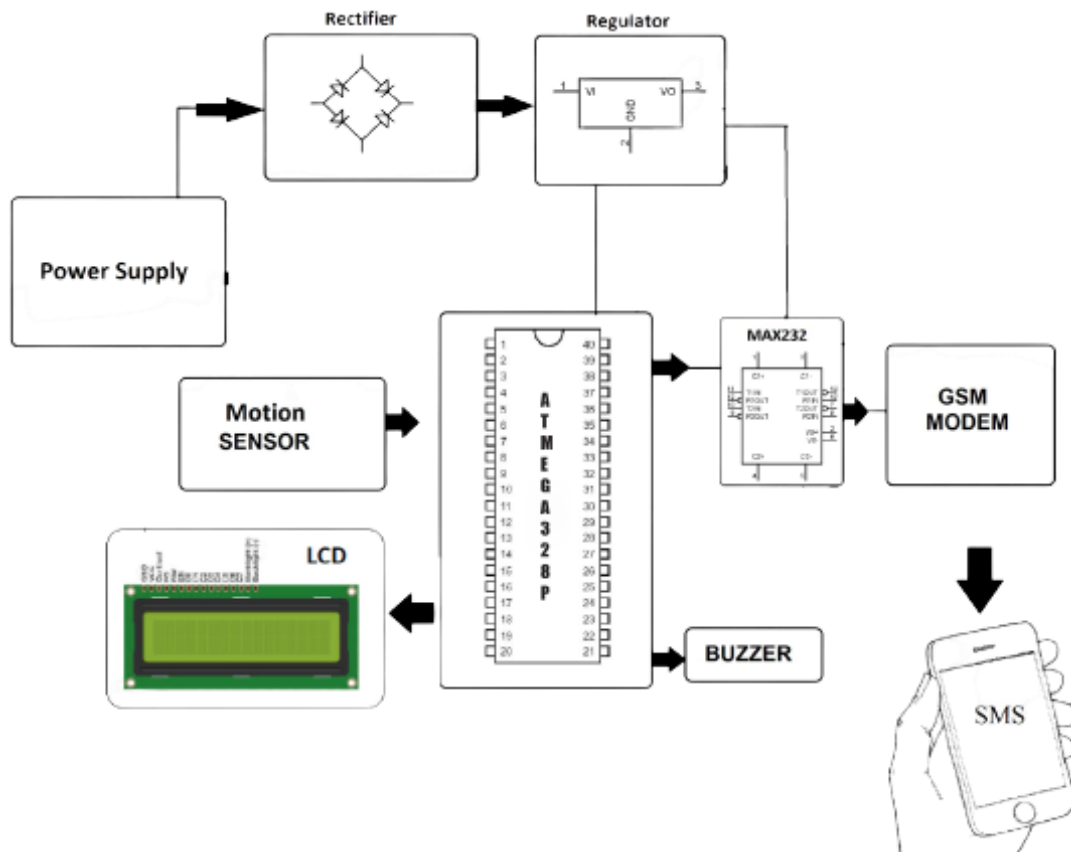


Fig:1.8 : Proposed System Block Diagram

This is often time-consuming and inefficient, necessitating a solution that is efficient in controlling and monitoring soil moisture conditions. This work, therefore, proposes an Internet of Things IoT-based soil moisture monitor that observes soil moisture level using an ESP32 consisting an of inbuilt Wi-Fi module to send data from the board to the user's cell phone or laptop. This control system is built around Arduino programmed using embedded C language. This process also involves sending data from the sensor to the cloud and then to the database server. Evaluation of the proposed soil moisture monitor using Thingspeak shows that the system is dynamic and efficient as it ensures water is not wasted. It is also cost-effective as it eliminates the huge budget for hiring farm workers.

Horticulture commodities; e.g., especially vegetables such as red chili, red onion, tomatoes, and potatoes are essential agricultural products in the food supply needs in Indonesia.

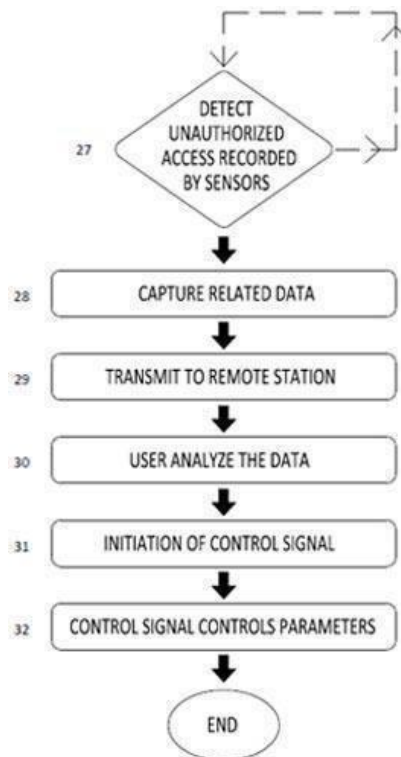


Fig:1.9 – Model Algorithm Flow Chart

These commodities are a significant issue because of frequent price fluctuations in the Indonesian market. The success of horticulture cultivation is highly dependent on climate and environmental factors such as local microclimate, groundwater content, the temperature of the growth environment, humidity, and light intensity. Thus, it is essential to develop technologies that can solve these problems and ensure that horticulture in Indonesia becomes more productive both in quality and quantity. Previously, several studies have been presented in which they applied the IOT-based technique for improving farming. However, a study of IOT-based horticulture fits with Indonesia's condition. In the Existing System, people used to check and verify the moisture content in the fields manually.

This is a very difficult and risky process to check the condition at midnight. Even though the climate is good the humidity is unknown, so in the previous system, we have disadvantages. Different sensors such as soil moisture and DHT11 are connected to the Arduino microcontroller's input pins within this device. The sensed sensor values are displayed in LCD. If the sensed value exceeds the threshold values set in the system, the relay circuit automatically switches the pump ON / OFF and it is connected to the driver circuit which helps to switch the voltage. By using this device, the farmer can at any time access the details of the field conditions.

Many methodologies such as the Design of IoT-based Monitoring System for Intelligence Indoor Micro1Climate Horticulture Farming in Indonesia, IOT-based Horticulture Monitoring System, Smart Agriculture, IOT based smart sensors agriculture, IOT Based Smart Agriculture Monitoring System, An Efficient Water Optimization for Horticulture Crops using it, Sensor based Automated Irrigation System, Design and Implementation of Automatic Plant Watering System has been proposed by many authors and the detailed explanation about these methods is as follows. Emil Robert Kaburuana (2019) proposed the micro-climate is very closely related to habitat and important for organisms on a micro- scale. Light intensity, soil moisture, soil temperature, air temperature, soil acidity, wind direction, and CO₂ level are micro-climate factors that are very influential in aquaculture productivity. Monika Rabka, Dion Mariyanayagam, Dr Pancasila (2021) proposed that Remote monitoring

and control of these farms is the obvious next step in trying to tackle the issues at hand. This is where the Internet of Things (IoT) comes into the fold. IoT is a network of Internet-connected devices that collect user-accessible data using sensors and processors and transfer it over wired or wireless networks. Controlled-Environment Agriculture will help make farmers' daily work more manageable by reducing the amount of time needed for physical monitoring. The way a pixel is controlled is different in each type of display; CRT, LED, LCD and newer types of displays all control pixels differently. In short, LCDs are lit by a backlight, and pixels are switched on and off electronically while using liquid crystals to rotate polarized light. A polarizing glass filter is placed in front and behind all the pixels, the front filter is placed at 90 degrees. In between both filters are the liquid crystals, which can be electronically switched on and off.

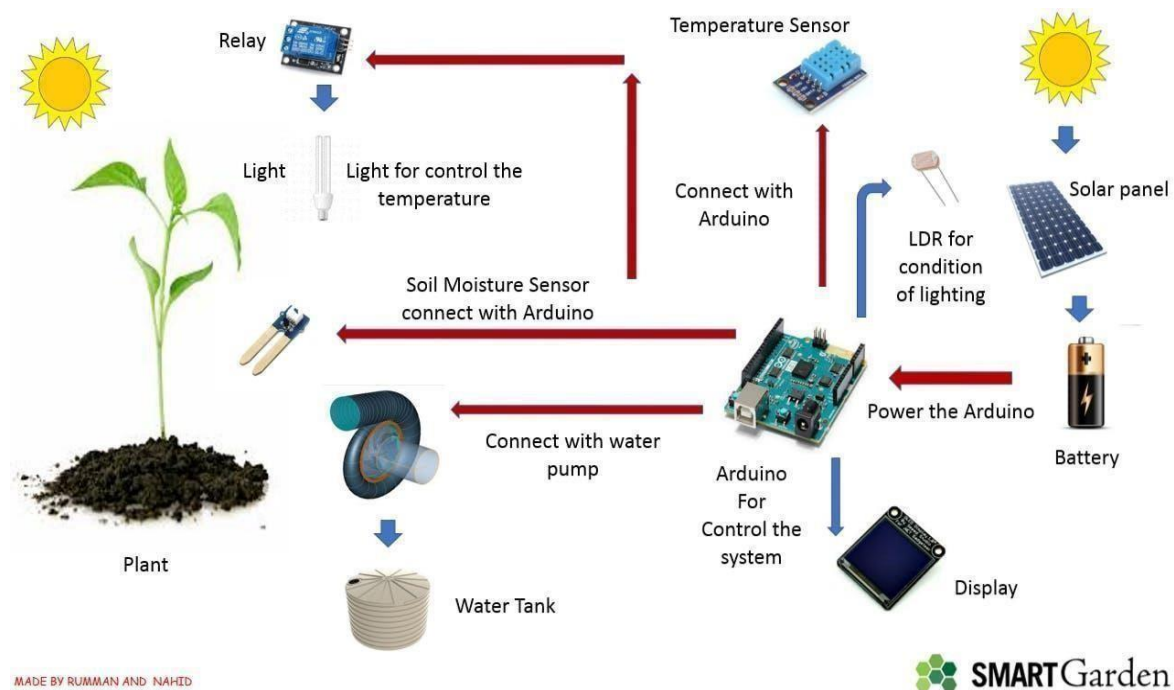


Fig:1.10 – Imaginary model of Garden Modelling System

The GSM and microcontroller are connected using MAX232. When moisture of the soil become low moisture sensor sense it and send signal to microcontroller, then the microcontroller gives the signal to mobile and it activate the buzzer. This buzzer indicates that valve needs to be opened by pressing the button in the called function signals are sent back to microcontroller. Microcontroller used can increase System Life and lower the power Consumption. There system is just limited to the automation of irrigation system and lacks in extra ordinary features[. By Observing above Methodologies there are some drawbacks such as while using Arduino it is expensive and it requires another microcontroller for WIFI purpose and memory purpose.

The GSM/GPRS module demonstrates the use of **AT commands**. They can feature all the functionalities of a mobile phone through a computer like making and receiving calls, SMS, MMS, etc. These are mainly employed for computer-based SMS and MMS services

1.9 BENEFITS OF HORTICULTURE

Depending on the goal of IoT implementation and technology used, you can expect various benefits for your company. Let's take a look at how applications of IoT in agriculture can help increase the efficiency and profitability of farming:

1. Reductions in depression
2. Less anxiety
3. Increased life satisfaction
4. Better quality of life
5. Enhanced sense of community.

Horticulture enriches diets, Growing fruits and vegetables provide critical nutrients for a balanced diet. Diets low in fruits and vegetables contribute significantly to some of the world's most widespread and debilitating nutrient-related disorders.

1.10 SCOPE OF FENCED

The output of food grains has witnessed a record surge, as for 2020-21, total **Foodgrain** production in the country is estimated at record 303.34 million tonnes which is higher by 5.84 million tonnes than the production of foodgrain of 297.50 million tonnes achieved during 2019-20. One can easily say that India is self-sufficient in food grain production. Right now, there is a demand for advancements in which our country has huge potential. There are so many concepts that are being covered under the name of Horticulture namely – monoculture, the concept of Permaculture to name a few. Apart from degree groups wherein students from all walks of life are actively participating to spread awareness about the field.

Horticulture Jobs and Career:

Horticulture is an extremely diversified field with limitless career opportunities in a variety of job settings. The level of training for the jobs may differ; it could range from a vocational to a proper college degree or KVK (*Krishi Vigyan Kendra created by Indian Council for Agricultural Research, abbreviated as ICAR*). Ideally, to grab a good job position in Horticulture, one must have a certified degree in this discipline. Having a proper degree acts as a bonus, as the person will have an in-depth knowledge of the field and will get offers at supervisory or managerial levels, while post-graduation and doctorate level degree will provide jobs in research or teaching.

Let us talk about job opportunities as per the branches:

1. **Floriculturists** are specialized in planning and design of exterior/interior landscapes for parks, recreational areas, campuses.
2. **Olericulturist** can kick-start their career in almost every industry, research institutes, universities and other organizations at different levels.

These personnel have more demand in the private sector as the vegetable growers

3. have a good future, especially in the seed industry.
4. **Pomologists** are well acquainted with breeding technology, tissue culture

techniques, integrated nutrient management (INM), integrated pest management technique (IPM) and protected cultivation techniques of fruits. They hold a bright future in the ICAR, State Agricultural Universities and in other organizations.

SECTOR-WISE HORTICULTURE JOBS IN INDIA

There is ample scope for people wanting to be full-time/part-time horticulturist, whether one has their own piece of land or not, this line is open to all. If one needs to know sector-wise jobs available in India, read on to check the same -

In Government and Public Sector:

1. **Civil Servants (IAS/IFS)** - For this, candidates have to appear for competitive exams conducted by Union Public Service Commission (UPSC).
2. **Lecturers, Assistant Professors or Training Associates** in Agricultural Universities and Colleges
3. **Horticulture/Agriculture Officers or Assistant Agriculture Officers - For this, candidates need to appear for competitive exams** conducted by State Public Service Commissions
4. **Technical/ Training Assistant** in SAU, ICAR, DRDO, IARI and CSIR
5. **Horticulture/Food/ Marketing Inspector/Agriculture Development Officer** in DSSSB/HPS

In the Private Sector:

One can be a Horticulturist or Supervisor (Landscape) in Industries, Hotels, Golf Courses and Construction Companies to name a few. For people with sufficient experience, marketing jobs are also offered by various pesticide and insecticide companies.

Self-employment in Horticulture:

With a graduation degree in Horticulture/Agriculture, it is quite easy to start an Agriculture clinic. One can also start their own Nursery and grow their fruit plants and

ornamental plants by the plant material using various techniques like grafting, budding, tissue culture, layering and vegetative propagation.

Fellowship in Horticulture Sector by UGC:

The Rajiv Gandhi National Fellowship (RGNF) Scheme is open to SC/ST candidates, wishing to pursue higher studies as regular and full-time PhD scholars in the discipline of Horticulture Science.

Fellowship in Horticulture Sector by ICAR:

Indian Council of Agriculture Research (ICAR), New Delhi offers JRF (Junior Research Fellowship) and SRF (Senior Research Fellowship) to those who qualify the respective examinations conducted by ICAR from time to time.

CHAPTER 2

LITERATURE SURVEY

The following shows a survey done for dual home automation for with and without internet on Realtime which includes an instant feedback mechanism that drives the appliances. This system is reliable to integrate on multiple platforms with the help of ESP32 master which serves as standard firmware. Further, the study was extended to multiple operation platforms like Linux, Windows, and IOS are discussed as follows. In this detailed survey, we have learned a lot in stabilizing our concepts from the existing feedback mechanisms that were designed in the previous study

Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, and Arun Kumar Mishra, IJSR “Smart Energy Efficient Home Automation System Using IoT”, IJSR Transaction on Computer Science Engineering 2021.

This paper presents a step-by-step procedure of a smart home automation controller. It uses IoT to convert home appliances to smart and intelligent devices, with the help of design control. An energy-efficient system is designed that accesses the smart home remotely using IoT connectivity. The proposed system mainly requires, Node MCU as the microcontroller unit, IFTTT to interpret voice commands, Adafruit a library that supports MQTT acts as an MQTT broker, and Arduino IDE to code the microcontroller..To ensure, that the Wi-Fi connection does not turn off, the main controller is programmed to establish an automatic connection with the available network and connected to the auto power backup.

Pros: The target scaling factor is efficient throughout the multiple platforms switching

Cons: Slower transit cycles when compared to CoAP, low scalability, and lack of security encryption

Shardha Somani, Parikshit Solunke, Shaunak Oke, Parth Medhi. Prof. P. P. Laturkar, IEEE “IoT Based Smart Security and Home Automation”, IEEE Transactions on Augmented Reality, 2021

This paper focuses on a system that provides features of Home Automation relying on IoT to operate easily, in addition to that it includes a camera module and provides home security. The android application basically converts smartphones into a remote for all home appliances. Security is achieved with motion sensors if movement is sensed at the entrance of the house; a notification is sent that contains a photo of the house entrance in real-time. This notification will be received by the owner of the house via the internet such that the app can trigger a notification. So, the owner can raise an alarm in case of any intrusion or he/she can toggle the appliances like opening the door if the person is a guest. The system uses Raspberry Pi, a small-sized computer that acts as a server for the system. The smart home consists of two modules. Home automation consists; of a fanlight and door controller, and a security module that consists; of a smoke sensor motion sensor, and camera module.

Pros: Implementation of IR Interface was an excellent Idea for creating universal remote

Cons: The system Uses Infrared Radiation for data transfer which is much faster than CoAP but could be easily mapped with 38 kHz of regular frequency.

Tui-Yi Yang, Chu-Sing Yang, IJEEE “A Dynamic Distributed Energy Management Algorithm of Home Sensor Network for Home Automation System”, IJEEE Transactions on Electrical and Electronics Engineers, 2017

This paper proposes an optimization of home power consumption based on PLC (Power Line Communication) for an easy-to-access home energy consumption

This also proposes a Zigbee and PLC-based renewable energy gateway to monitor the energy generation of renewable energies

ACS and DDEM algorithms are proposed for the design of intelligent distribution of power management systems to make sure ongoing power supply of home networks. To provide efficient power management the power supply models of home sensor networks are classified into groups viz. main supply only, main supply and backup battery, rechargeable battery power, and non-rechargeable battery power.

Pros: Fast and secured since the data encryption is 64bit ratio and it follows MQTT protocol

Cons: Does not support large database size, and it has no support for ROLE, COMMIT, and Stored Procedures

Tushar Chaurasia, and Prashant Kumar Jain “Enhance Smart Home Automation System based on Internet of Things”, Transactions on Artificial Neural Networks, 2019

This paper proposes a system that develops a model to reduce the computation overhead in existing smart home solutions that use various encryption technologies like AES, ECHD, hybrid, etc. these solutions use an intermediate gateway for connecting various sensor devices. The proposed model provides a method for automation with sensor-based learning. These smart home devices with sensors can configure themselves autonomously and can operate without human intervention. This work minimizes encryption decryption and focuses on authentication and automation of smart home devices with learning.

The system bypasses the local gateway mentioned in the existing system to provide better security for smart home devices and sensor data and save computation overhead. The real-time broker cloud is directly connected with the smart home and manages all incoming and outgoing requests between users and devices.

Pros: Bringing AR with Deep Neural schema is an Excellency and this system can be

integrated with the 7 senses of the future world.

Cons: It has a range of support between 3.5Hz to 75Hz which in turn directly matches the neural frequency that potentially messes up sensory organs.

Suraj, Ish Kool, Dharmendra Kumar, Shovan Barman “Visual Machine Intelligence for Home Automation”, MDPI Transactions on Applied Science, 2020

The paper presents a vision-based machine intelligence system to sense the on/off state of common home appliances. The proposed method of sensing the state of appliances results in a novel home automation system. The accessibility of the suite of devices in the home over a remote network is facilitated by the IP Addressing methods in the IoT. This project uses two boards viz. Raspberry Pi and Intel Galileo Gen 2. The communication between the User devices, Raspberry Pi, and the Intel Galileo boards happens over a wireless network. The UDP protocol is deployed to facilitate the wireless communication of the nodes present in the home automation network. A Pi Cam and a USB Logitech camera are attached to the rotating shaft of two different servo motor capture snapshots that are passed as inputs to the Machine Learning based models trained using dlib-C++ to detect the state of the operation of the appliances. The proposed method uses visual modality to automate the appliances, as privacy concerns may emerge while using the images from some specific places, as a counter to this issue, an SPDT switch is added to the Raspberry Pi which when turned off ensures that even if the images are taken from the webcams, they are just passed as inputs to the machine learning models and are not displayed on the website when the users access the website on the server address obtained from Raspberry Pi.

Pros: High Visual and Artificial Database was integrated which can be a link between and virtual and physical world. A creative contextual database has created a huge responsive factor

Cons: Superimposing virtual environmental capacity has no range of lower frequency

AR camera support.

Vikram N, Harish KS, Nihaal M S, Raksha Umesh, and, Shetty Asshik Ashok Kumar, “A Low-Cost Home Automation System using Wi-Fi-based Wireless sensor Network incorporating Internet of things”, Procedia Computer Science Transactions on Mobile Device, 2015

This paper illustrates a methodology to provide a low-cost Home Automation System (HAS) using Wireless Fidelity (Wi-Fi). This crystallizes the concept of internetworking of smart devices. A Wi-Fi-based Wireless Sensor Network (WSN) is designed for the purpose of monitoring and controlling the environmental, safety, and electrical parameters of a smart interconnected home. The different sections of the HAS are; the temperature and humidity sensor, gas leakage warning system, fire alarm system, burglar alarm system, rain-sensing, switching and regulation of load & voltage, and current sensing. The primary requirement of HAS to monitor and control devices is accomplished using a Smartphone application. The application is developed using Android Studio based on the JAVA platform and the User Interface is exemplified. The primary focus of the paper is to develop a solution cost-effective and flexible in the control of devices and implements a wide range of sensors to capture various parameters.

Pros: Implementing a local server reduces cognitive allocation in the server.

Cons: Error Factors are high since it is purely based on local server data.

Mrs. Paul Jasmin Rani, Jason Bakthakumar, Praveen Kumar B, Praveen Kumar U. Santhosh Kumar. “Voice Controlled Home Automation System using Natural Language Processing and Internet of Things”, INCC Transactions on National Security Science and Computation, 2018

The paper focuses on the construction of a fully functional voice-based home automation system that uses the Internet of Things, Artificial Intelligence, and Natural Language Processing (NLP) to provide a cost-effective, efficient way to work together

with home appliances using various technologies such as GSM, NFC, etc. it implements a seamless integration of all the appliances to a central console, i.e.,. The NLP in this project gives the user the freedom to interact with the home appliances with his/her own voice and normal language rather than complicated computer commands.

Pros: Only a few notable parameters throughout the project

Cons: The rate of prediction is proportionally less when compared to real-world predictions

Jonathan J. Hull, Berna Erol, Jamey Graham, Qifa Ke, Hidenobu Kishi, Jorge Moraleda, Daniel G. Van Olst, Research Gate “Paper-Based Augmented Reality”, Research Gate Transaction on Camera and Paper documentation, 2007

A new method for augmenting paper documents with electronic information is described that does not modify the format of the paper document in any way. Applicable to both commercially printed documents as well as documents that are output from PCs, the technique we call Paper-Based Augmented Reality substantially improves the utility of paper. We describe the recognition technology that makes this possible as well as several applications. An implementation on a camera phone is discussed that lets users retrieve data and access links from paper documents to electronic data. Recognition is performed at 4 frames per second on a Treo 700w and support is provided for several user applications, including “clickable paper” – printed web pages whose appearance is unchanged but that can be navigated with a camera phone.

Pros: Augmented reality with virtual automation was brought to the physical world with the paper content

Cons: Linking patches of text will increase a lot of security reasons.

Mikko Kytö, Barrett Ens, Thammathip Piumsomboon, Gun A. Lee, and MarkBillingham, Research Gate “Pinpointing: Precise Head- and Eye-Based Target Selection for Augmented Reality”, Research Gate Transactions on Augmented Reality in Computer Science Engineering, 2018

Head and eye movement can be leveraged to improve the user's interaction repertoire for wearable displays. Head movements are deliberate and accurate and provide the current state-of-the-art pointing technique. Eye gaze can potentially be faster and more ergonomic but suffers from low accuracy due to calibration errors and the drift of wearable eye-tracking sensors. This work investigates precise, multimodal selection techniques using head motion and eye gaze. A comparison of speed and pointing accuracy reveals the relative merits of each method, including the achievable target size for robust selection. We demonstrate and discuss example applications for augmented reality, including compact menus with deep structure, and a proof-of-concept method for online correction of calibration drift.

Pros: Accuracy has reached 97% with a simple algorithm

Cons: 97% precise and accurate but depends purely on real-time saturation and point of target images.

Subramani Roy Choudri, A. Divija, G. V V N Vijayalakshmi, P. Vamsi, JARTMS “TOUCHLESS HOME AUTOMATION USING AUGMENTED REALITY”, JARTMS Transactions on Augmented Reality and Web Interface, 2021

As human life is heading towards a busy schedule it becomes necessary to automate our home appliances. Human error is something that cannot be completely erased. With the busy schedule in hand, there is defiantly a possibility of missing something that may be trivial to us but can result in a catastrophe. For these reasons, Our Project home automation can increase efficiency, security, and reliability. AR has recently evolved for the automation of various electrical appliances by popping virtual

objects into the real world.

Pros: Target Image can be linked to the Virtual world

Cons: Target Image can be linked-to automation with an augmented environment but in the case of wet hands, this linking process will not produce tokens to respective servers.

CHAPTER 3

EXISTING METHODOLOGY

3.1 EXPERIMENTAL METHODS

Lot of Farming strategies are based on Sensors and Pest controls. Here technology helps us grow in a better way with the help of sensor data. But through the wild activity around 33% of the crop production is on loss. Traditional methods of electrical bob wire will create serious injuries to our own cattle. Our Proposed system will self-monitor the electrical bob wires based on Siren alert and control

3.2 PROPOSED METHODOLOGY

Our Proposed model is based on the active and effective use of an Electrical power source over the animals through bob wires. Indications are set to eradicate the intrusions. In the initial stage PIR motion sensor activity control is set. Followed by high decibel siren to express the wild intrusions and thieves' activity. Proper IoT-connected network will indicate the notification to the farmers regarding the activity. Finally electric bob wire will be activated. The Infra red camera is placed in the areas where there is frequent trespassing of animals.

3.3 ADVANTAGES OF PROPOSED SYSTEM

The system has the capacity to adapt based on the user input which the farmer can input through the smart horticulture application. The farmer can select a profile based on the season and the crop for irrigation and schedule and plan the water resource utilization sensibly. In the absence of this system, the farmer has to manually inspect all the crops by inspecting the soil in the fields which is tedious, time-consuming, and straining.

calculating the current consumption, we estimate that the power bank can support the client for up to 4 days continuously.

The Firebase JSON nodes as recorded during the greenhouse client test. The current date and time are accessed using the Network Time Protocol (NTP) and stored in variables that are then used as part of the data path for the JSON object. This allows the creation of separate nodes for each day and better organization of stored data. Simple MATLAB code was used for RGB to gray conversion and thresholding of the photo. The Thingspeak channel with all the sensor data visualized on graphs along with the unprocessed and processed photos of the plant being monitored in the greenhouse.

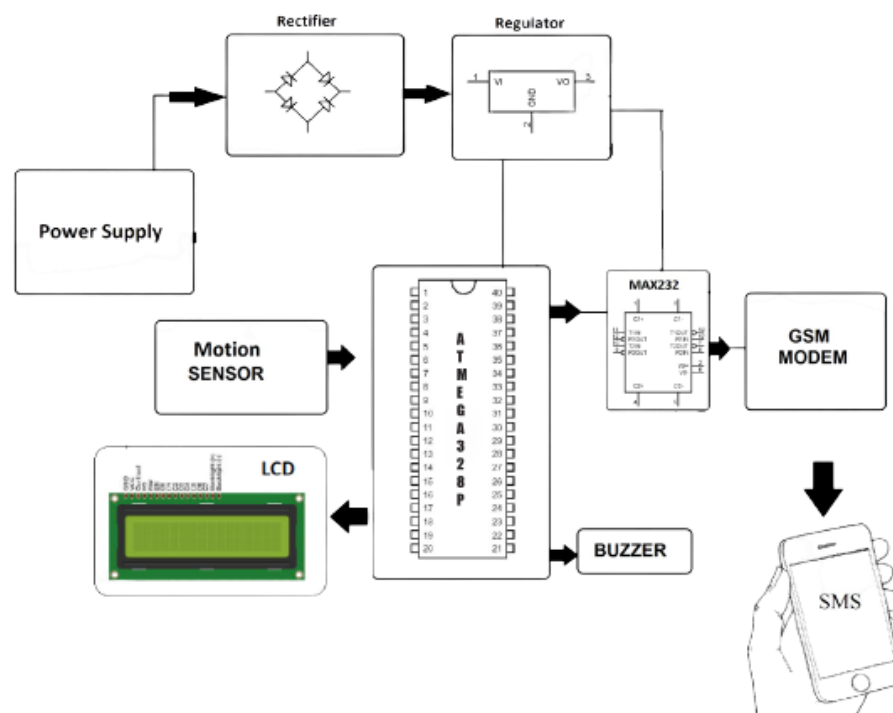


Fig:3.1: PROPOSED SYSTEM

CHAPTER 4

IMPLEMENTATION DETAILS

4.1 DEVELOPMENT AND DEPLOYMENT SETUP:

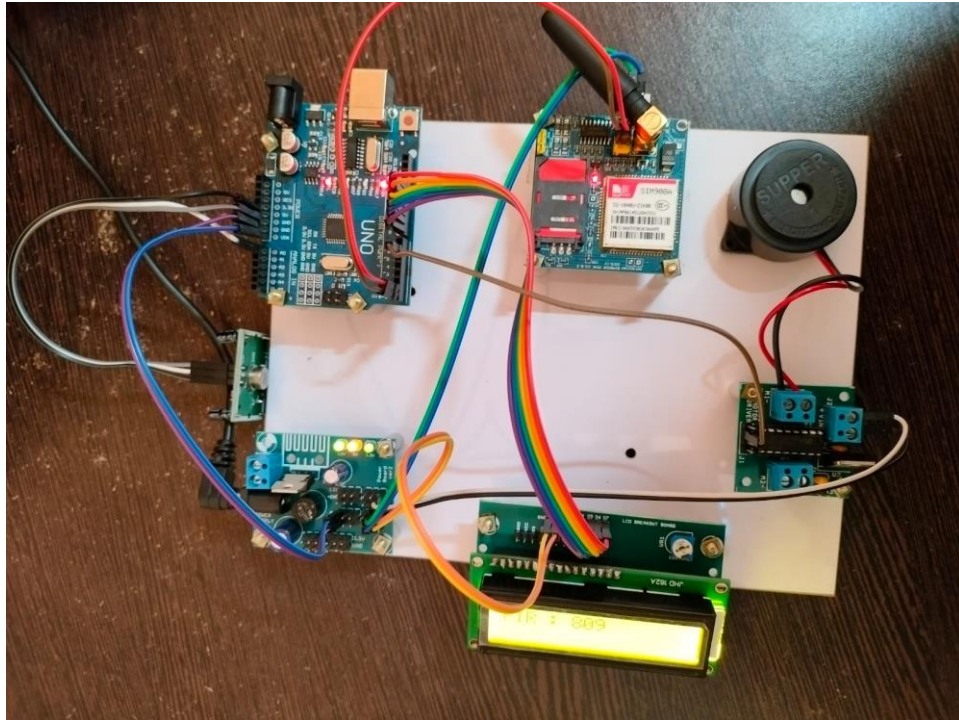


Fig:4.1: Hard ware connections of the project

4.2 SOFT WARE

Arduino :-

The **Arduino Integrated Development Environment** - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

Arduino microcontrollers are pre-programmed with a boot loader that simplifies the uploading of programs to the on-chip flash memory. The default bootloader of the Arduino Uno is the Optiboot bootloader.^[32] Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic (TTL) level signals. Current Arduino boards are programmed via Universal

Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other variants, such as the Arduino Mini and the unofficial Boarduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. When used with traditional microcontroller tools, instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used.

- Arduino is an open-source electronics platform based on easy-to-use hardware and software.
- Arduino board designs use a variety of microprocessors and controllers.
- Arduino senses the environment by receiving inputs from many sensors, and affects its surroundings by controlling lights, motors, and other actuators.
- The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub *main()* into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program *avrdude* to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

IDE 2.0

On September 14, 2022, the Arduino IDE 2.0 was officially released as stable. Previously, on October 18, 2019 the initial alpha preview was released as the Arduino Pro IDE. On March 1, 2021, the beta preview was released, renamed IDE 2.0. The system still uses Arduino CLI (Command Line Interface), but improvements include a more professional development environment, autocompletion support, and Git integration.¹ The application frontend is based on

the Eclipse Theia Open Source IDE. The main features available in the new release are:

- Modern, fully featured development environment
- Dual Mode, Classic Mode (identical to the Classic Arduino IDE) and Pro Mode (File System view)
- New Board Manager
- New Library Manager
- Board List
- Basic Auto-Completion (Arm targets only)
- Git Integration
- Serial Monitor
- Dark Mode.

APPLICATIONS

- Arduinome, a MIDI controller device that mimics the Monome
- Ardupilot, drone software and hardware
- ArduSat, a cubesat based on Arduino
- C-STEM Studio, a platform for hands-on integrated learning of computing, science, technology, engineering, and mathematics (C-STEM) with robotics
- Data loggers for scientific research
- OBDuino, a trip computer that uses the on-board diagnostics interface found in most modern cars
- OpenEVSE an open-source electric vehicle charger
- XOD, a visual programming language for Arduino

EMBEDDED SYSTEMS PROGRAMMING

- Embedded systems programming is different from developing applications on a desktop computers. Key characteristics of an embedded system, when compared to PCs, are as follows:
- Embedded devices have resource constraints(limited ROM, limited RAM, limited stack space, less processing power)

- Components used in embedded system and PCs are different; embedded systems typically uses smaller, less power consuming components. Embedded systems are more tied to the hardware.

EMBEDDED SYSTEMS USING DIFFERENT TYPE OF LANGUAGES:

- Machine Code
- Low level language, i.e., assembly
- High level language like C, C++, Java, Ada, etc.
- Application level language like Visual Basic, scripts, Access, etc.

DIFFERENCE BETWEEN C AND EMBEDDED C

- Though C and embedded C appear different and are used in different contexts, they have more similarities than the differences. Most of the constructs are same; the difference lies in their applications.
- C is used for desktop computers, while embedded C is for microcontroller based applications. Accordingly, C has the luxury to use resources of a desktop PC like memory, OS, etc. While programming on desktop systems, we need not bother about memory. However, embedded C has to use with the limited resources (RAM, ROM, I/Os) on an embedded processor. Thus, program code must fit into the available program memory. If code exceeds the limit, the system is likely to crash.
- Compilers for C(ANSI C) typically generate OS dependant executables. Embedded C requires compilers to create files to be downloaded to the microcontrollers/microprocessors where it needs to run. Embedded compilers give access to all resources which is not provided in compilers for desktop computer applications.
- Embedded systems often have the real-time constraints, which is usually not there with desktop computer applications.
- Embedded systems often do not have a console, which is available in case of desktop applications.

So, what basically is different while programming with embedded C is the mindset; for embedded applications, we need to optimally use the resources, make the program code efficient.

The Arduino Integrated Development Environment or Arduino Software (IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

WRITING SKETCHES

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text.

The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information.

The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

NB: Versions of the Arduino Software (IDE) prior to 1.0 saved sketches with the extension.pde. It is possible to open these files with version 1.0, you will be prompted to save the sketch with the.ino extension on save.

FILE

- **Verify**
Checks your code for errors compiling it.
- **New**
Creates a new instance of the editor, with the bare minimum structure of a sketch already in place.
- **Open**
Allows loading a sketch file browsing through the computer drives and folders.
- **Open Recent** Provides a short list of the most recent sketches, ready to be opened.

- **Sketchbook**
shows the current sketches within the sketchbook folder structure; clicking on any name opens the corresponding sketch in a new editor instance.
- **Examples**
any example provided by the Arduino Software (IDE) or library shows up in this menu item. All the examples are structured in a tree that allows easy access by topic or library.
- **Close**
closes the instance of the Arduino Software from which it is clicked.
- **Save**
saves the sketch with the current name. If the file hasn't been named before, a name will be provided in a "Save as.." window.
- **Save as...**
Allows saving the current sketch with a different name.
- **Page Setup**
It shows the Page Setup window for printing.
- **Print**
sends the current sketch to the printer according to the settings defined in Page Setup.
- **Preferences**
Opens the Preferences window where some settings of the IDE may be customized, as the language of the IDE interface.
- **Quit**
Closes all IDE windows. The same sketches open when Quit was chosen will be automatically reopened the next time you start the IDE.

EDIT

- **Undo/Redo**
Goes back of one or more steps you did while editing; when you go back, you may go forward with Redo.

- Cut
Removes the selected text from the editor and places it into the clipboard.
- Copy
Duplicates the selected text in the editor and places it into the clipboard.
- Copy for Forum
Copies the code of your sketch to the clipboard in a form suitable for posting to the forum, complete with syntax coloring.
- Copy as HTML
Copies the code of your sketch to the clipboard as HTML, suitable for embedding in web pages.

CHAPTER 5

RESULTS AND DISCUSSION

5.1 OUTPUT

- When any object is enter into IR radius zone it wil detect the object by detecting the IR rays.

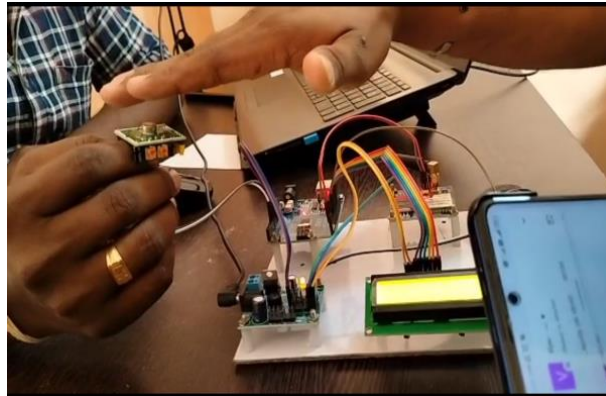


Fig:5.1: DETECTING OBJECT

PIR sensors can detect human or animal motion. Humans emit infrared radiation. When a human comes into the sensing range of the PIR sensor, these changes in radiations are detected by the PIR sensor which causes the output of the sensor to go high.

- When the body is not detected then the PIR value is initially at “0”

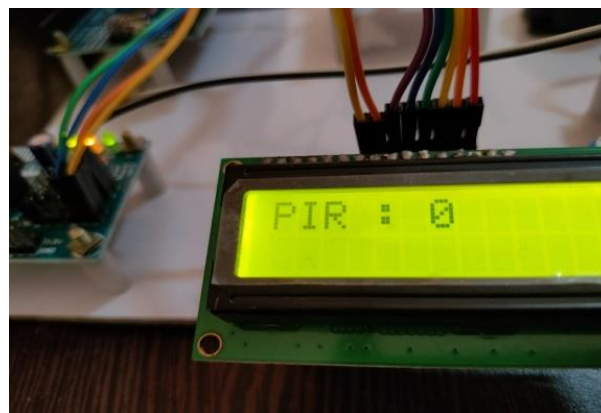


Fig:5.2: INTIAL PIR VALUE

PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m. Passive Infrared: Detection distances range from 25 cm to 20 m. Indoor Curtain Type: The detection distance ranges from 25 cm to 20 m. Outdoor Passive Infrared: The detection distance ranges from 10 m to 150 m.

- when any body is detected then the PIR value is increased to maximum.



FIG:5.3: PIR VALUE OF MAXIMUM

The PIR sensor is suitable for indoor and outdoor use thanks to its IP-value of IP65. The sensor can be connected to LED lights with a maximum power of 1000 Watts. Since PIR sensors have ranges of up to 10 meters (30 feet), a single detector placed near the entrance is typically all that is necessary for rooms with only a single entrance. The PIR motion sensor has a detection distance of 8 metres, with a 360° angle of detection.

PIRs come in many configurations for a wide variety of applications. The most common models have numerous Fresnel lenses or mirror segments, an effective

range of about 10 meters (30 feet), and a field of view less than 180°

- when animal is detected we can have display on LCD screen as 'ANIMAL DETECTED' .



FIG:5.4: Display on LCD screen

The liquid crystal display (LCD) panel is designed to project on-screen information of a microcomputer onto a larger screen with the aid of a standard overhead projector, so that large audiences may view on-screen information without having to crowd around the TV monitor.

Very compact, thin and light, especially in comparison with bulky, heavy CRT displays. Low power consumption. Depending on the set display brightness and content being displayed, the older CCFT backlit models typically use less than half of the power a CRT monitor of the same size viewing area would use, and the modern LED backlit models typically use 10–25% of the power a CRT monitor would use. No theoretical resolution limit. When multiple LCD panels are used together to create a single canvas, each additional panel increases the total resolution of the display, which is commonly called stacked resolution. Can be made in large sizes of over 80-inch (2 m) diagonal.

- I have used GSM module to get message to mobile so when animal is found in IR radius zone we get message automatically.



Fig:5.5: INFORMATION RECEIVED

A customised Global System for Mobile communication (GSM) module is designed for wireless radiation monitoring through Short Messaging Service (SMS). This module is able to receive serial data from radiation monitoring devices such as survey meter or area monitor and transmit the data as text SMS to a host server. The GSM module can be coupled with an Arduino board for internet connectivity, sending and receiving SMS messages, and making voice calls via the GSM library.

CODE

```
#include<LiquidCrystal.h>

LiquidCrystal lcd (8,9,10,11,12,13);

void setup()
```

```

{
  Serial.begin(9600);
  lcd.begin(16,2);
  lcd.setCursor(0,0); lcd.print("Smart Fencing");
  delay(1000);
  lcd.clear();
  pinMode(14,INPUT);
  pinMode(6,OUTPUT);
  pinMode(7,OUTPUT);
  digitalWrite(6,0);digitalWrite(7,0);
}

void loop()
{

  int pir=digitalRead(14);
  if (pir==0)
  {
    lcd.setCursor(0,0); lcd.print("Detected");
    digitalWrite(6,1);digitalWrite(7,1);
    Serial.println("AT");
    delay(2000);
    Serial.println("AT+CMGF=1");
    delay(2000);
    Serial.println("AT+CMGS=\"+918008538224\\\"\\r");
  }
}

```

```
delay(2000);  
Serial.println("Detected");  
delay(2000);  
Serial.println((char)26);  
delay(2000);  
digitalWrite(6,0);digitalWrite(7,0);  
}  
else  
{  
  lcd.setCursor(0,0); lcd.print("Not Detected");  
  digitalWrite(6,0);digitalWrite(7,0);  
}
```

```
delay(1000);  
lcd.clear();  
}
```

CHAPTER 6

CONCLUSION

6.1 CONCLUSION

Use of Motion detection Sensors can help us get activated with high decibel sirens since these sensors work on IR heat modules that can even respond at night time without lags. Our proposed system is based on IoT Linkage so instant notification will be sent to the farmers in the middle of the village regarding wild animal activity. The use of Bob wires with an electrical supply would be the next biggest solution to avoid intruder activity. Hence our proposed system would surely increase the proper effective use of agricultural farming lands. Efforts will be on real profits with the help of proper technology

6.2 FUTURE WORK

For future work, the networking model could be improved by scrapping the server side and introducing a 4G/LTE module. So, the sensor data could be sent directly to the cloud without the need for a Wi-Fi access point. Over-the-air implementation along with UI and image processing improvements in the mobile application would be advantageous. Additionally, a Machine Learning based notification system for diseased plants, an autonomous watering system, and a larger range of sensors to increase the RAHMS could also implement end-to-end encryption of the data between the communication streams, with unique session IDs per client to prevent spoofing attacks or use unique credentials for each client using a RADIUS server.

6.3 PRODUCTIVITY AND EFFECTIVENESS

Our Proposed model is a real-time installation model. We used Wireless technology to operate the gadgets. Control of Battery management and SMPS

distributor is present in our model. Through solar controllers, we can manage the battery backup effectively. Few drawbacks to our proposed system, using alternative power sources will increase the product cost and selling cost of the product but this we considered as the future scope of our project. An extra maintenance fee will be required to provide AMC. Compared to the traditional methods this will help us to save crop damage from the wild intrusions.

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