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FARMLAND SURVEILLANCE ANDPROTECTION WITH SMART IRRIGATION SYSTEM

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Abstract: India is the agriculture-based country. Our ancient people completely depended on the agricultural harvesting. Agriculture is a source of livelihood of majority Indians and has great impact on the economy of the country. In dry areas or in case of inadequate rainfall, irrigation becomes difficult. So, it needs to be automated for proper yield and handled remotely for farmer safety. Increasing energy costs and decreasing water supplies point out the need for better water management. Irrigation management is a complex decision-making process to determine when and how much water to apply to a growing crop to meet specific management objectives. If the farmer is far from the agricultural land he will not be noticed of current conditions. So, efficient water management plays an important role in the irrigated agricultural cropping systems. A low-cost alternative solution for efficient water management currently in use is drip irrigation systems that consist of an automated controller to turn on & off the control values, which in turn helps the farmers by managing the water supply to the crop fields and further maintains the moisture levels of soil that helps in better crop production. This project probes into the design of the automated irrigation system based on Arduino. This Embedded project is to design and develop a low-cost feature which is based on embedded platform for water irrigation system. This project uses temperature and soil moisture sensors to detect the water quantity present in agriculture. The project uses Arduino micro controller which is controller to process the information. The aim of the implementation was to demonstrate that the automatic irrigation can be used to reduce water use

Index Terms **– GSM: Global system of mobile**

I. LITERATURE REVIEW

The intention of the literature survey in the field of farm land surveillance and protection with smart irrigation system was to get a brief knowledge about the previous discussions and ideas regarding the technology and whether it has been successful and if not, what were the limitations. Maanak Gupta , Mahmoud Abdelsalman , Sajad Khorsandroo,And Sudip Mittal et al: The proliferation of smart devices with communication and sensing capabilities have unleashed plethora of user services, and at the same time made tasks more convenient and effi- cient for humans. However, wide adoption of such internet connected devices and data driven applications across various domains have raised security and privacy issues, making these systems vulnerable to cyber-attacks. This paper dis- cusses such cybersecurity challenges in smart farming and elaborates open research questions. The paper first outlines a multi-layer smart farming architecture illustrating different entities pertinent to real time use-cases supported by edge and cloud environments. Based on the architecture, the paper outlines security and privacy issues and highlights different attacks scenarios in smart farms as well as scenarios affecting the entire food supply chain. Thereafter, this article sur- veys the state-of-the-art research and acknowledges impor- tant works related to cybersecurity in the domain. Finally, the paper illustrates several open challenges and research problems pertinent to security and privacy aspects in preci- sion agriculture. We envision this paper will simulate research to solve platitude of security and data privacy issues in fast growing and economically important smart farming sector. [1] Dr. J. Jegathesh Amalraj, S. Banumathi, J. Jereena John et al: worked on the paper called A Study On Smart Irrigation Systems For Agriculture Using Iot which reviewsNowadays innovations can be consolidated to let down the cost and maximize utilization of resources. Currently, farmers control irrigation method manually and irrigate their area at a systematic period. These mechanisms diminish high amount of water and the conclusion is water loss. While dry areas have less rainfall and irrigation is challenging. The smart agricultural system guarantees higher productivity with efficient use of water. Smart irrigation can be automated with the help of current technologies presented above and its main advantages are increase in productivity, reduce water consumption and reduce soil erosion.[2] A.Anitha,Nithya Sampath,M.Asha Jerlin et al: The sand and the water level are the critical parameter for the development of smart irrigation system. Generally, the soil moisture is affected by a sundry parameters such as air temperature, soil temperature, air humidity, ultra violet rays, and much more. This paper proposed an IoT based smart irrigation system utilizing sensors to record the data and store it in the cloud storage. The future work can be prediction of soil moisture using the recorded data and it may provide cost effective. The auto mode makes it a smart system and it can be further customized for application categorical scenarios.[3] Vikas Bavane, Arti Raut, Swapnil Sonune,Prof.

A.P.Bawane,Dr.P.M.Jawandhiya et al: The problem of crop vandalization by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution. Thus this project carries a great social relevance as it aims to address this problem. Hence we have designed a smart embedded farmland protection and surveillance based system which is low cost, and also consumes less energy. The main aim is to prevent the loss of crops and to protect the area from intruders and wild animals which pose a major threat to the agricultural areas. Such a system will be helpful to the farmers in protecting their orchards and fields and save them from significant financial losses and also saves them from unproductive efforts that they endure for the protection of their fields. This system will also help them in achieving better crop yields thus leading to their economic wellbeing. [4] Qazi Mudassar Ilyas and Muneer Ahmad et al: This study proposes design of a geographical paddock to monitor spatiotemporal behaviors of livestock. In a conven- tional livestock tracking system, the farmers have to do phys- ical exertion for tracing the cattle that go beyond the common access points. The proposed solution addresses these issues by providing convenience to farmers to define a geographical safe zone for livestock. The farmers are notified by the system when cattle try to go beyond the defined boundary of the zone. Besides, the navigation and communi- cation are automatically controlled according to the genetic diversity of different animals. The motion sensor suspends the navigation and communication when the animal is recorded in a static state to optimize the energy and commu- nication bandwidth for significant utilization. The signifi- cance of the proposed livestock management system is reflected in reducing the time and energy complexity of the system and integrated modules.[5] Mehta Piyush, Negi Arun, Chaudhary Rashmi, Janjhua Yasmin And Thakur Pankaj et al: The study concluded that since the economy of Himachal Pradesh is predominantly agricultural and majority of its population is dependent on this sector. The vegetables and other cash crops play a crucial role in agricultural development in the state. However, the farmers are facing the crop damage problems due to the crop raiding wild animals. The farmers have to cope with these animals and on the same page forest cover is reducing due to an encroachment, wildlife habitat is reducing. The crop damage is resulted as when the animals venture into the agricultural fields in search of food. The study has observed that the family income of farming community has drastically decreased due to crop raiding by wild animals. It was also revealed in the study that farmers agree that the quantity of produce is affected due to crop raiding by wild animals which eventually lead to less production whereas some of the respondents agree that the quality of produce is affected by crop damage by wild animals which fetch poor prices in the market to the farmers. Study categorically reported that wild boar is the most problematic animal in this area, followed by monkeys and the barking deer,The majority of farmers also believed that the Government protects wildlife to a large extent. The main reason is the shortage of the forest land and the encroachment into forest land which destroys the habitat of wildlife. Some of the farmers also said that lack of fencing is also one of the main reason. [6] R Nikhil, B S Anisha and P Ramakanth Kumar et al:The implemented smart agriculture program is costeffective for maximizing agricultural farm water supplies, crop prediction, and wild animal protection. Depending on the level of soil moisture, the proposed device can be used to turn the water sprinkler on / off, thereby making the process easier to use. The system proposed can be used to predict the crop based on the soil condition which helps the farmer grow the correct crops. Through this project it can be inferred that with those of IOT and Automation there can be significant progress in irrigation. The proposed system is thus a solution to the problems facing the current irrigation cycle. The program proposed also helps in the prevention of trespassing wild animals in the agricultural sector. Using ultrasonic sound, the machine irritates wild animals and makes them leave the area. Using the alarm tone flooding technique without any data has increased the wireless sensor network's efficiency because there is no transmitting load. This therefore requires less energy In addition, the device is eco-friendly, because there is no harm to the ecosystem and no disruption to humans. The requirement may be expanded and applied by adjusting the frequency range of the ultrasonic sound wave to avoid the trespassing of different animals. [7] Ibam Emmanuel Onwuka Mark O. Afolabi Idowu O. John, Idowu A. Olalekan et al: WSNs have the potential to transform the security of farming in the agricultural sector of any nation. Integrating WSNs with existing services is also a possibility with promises of revolutionizing precision agriculture. Unlike other networks, WSNs are designed for specific applications. WSNs are becoming integral parts of our lives through various applications, even though each application differs in features and requirements. Since the system operation mainly depends on large scale farming, the system can be extended based on our interest. The model presented in this work can be adapted to many applications in the real world. The main idea is to have a system that is wireless and can be controlled through mobile devices even in remote areas. By creating wireless sensor nodes (WSN) to large scale farming, access to farm lands can be monitored and security enforced, thereby contributing to precision agriculture. Future works would focus on optimizing the entire system and incorporating automated defensive (attack) mechanisms to wade off intruders in farmlands.[8] Hiren Chafekar1 , Harsh Shah2 , Anmol Hariyani3 , Sneha Ambhore Et al: The Internet of Things (IoT) is a new platform for technology. It is joining one's daily contents information wisely to the internet to make communication between objects and people. Several common technologies and procedures are available to keep one's home safe from intruders, but commonly smart home security systems work on wireless GSM(Global System for Mobile) communication. This technology provides security from natural, intended, unintended, incidental, accidental and human-made problems by monitoring homes with distinct sensory systems such as smoke, motion, gas, temperature, door break or glass break detectors along with fire alarm. This paper identifies the utilization of varied types of sensors which consists of PIR(Passive Infrared Sensor), motion, Fire and Gas Leakage Sensor to detect any changes in or around the home and alert the owner of the house by notifying him/her with an SMS via GSM module SIM800L. [9]. Pema Chodon, Devi Maya Adhikari, Gopal Chandra Nepal, Rajen Biswa, Sangay Gyeltshen, Chencho et al: In this paper, a PIR sensor based security system is proposed. Despite some delays taking place in recording the video captured, it was observed that the proposed system can save the memory space of the recording system as it starts recording when the webcam is turned ON. Also the power consumed by the lighting system at night can be reduced as the lighting system only gets turned ON only when PIR sensor gets activated. Both webcam and lighting system gets ON only when there is an intruder in the detection range of the PIR sensor.[10]

II. INTRODUCTION

The goal of the literature review in the subject of electric vehicles was to gain a basic understanding of prior conversations and views about the technology, including if it has been successful and, if not, what the constraints were. SEFPHV stands for Solar/Electric/Fuel Powered Hybrid Vehicle, and it is a solution that addresses the key issues of fuel and pollution. The term "hybrid vehicle" refers to a vehicle that is powered by a combination of different sources. Solar power, electric power, and a small amount of

FARM LAND SURVEILLANCE AND PROTECTION: The concept of IoT was introduced by a member of RFID development community in the year 1999. After it became more famous to the practical world because of rapid growth in mobile devices, embedded systems, cloud computing, ubiquitous computing and data analytics. The IoT technology can play a crucial role to improve the quality of lives in the application fields like transport, home appliances, healthcare, natural hazards and industrial automation. In several areas, surveillance plays a major role, be it at home, hospitals, schools, public places, farmlands, etc. This lets us track a certain area and prevent fraud, and also provides evidence in the event of these incidents happening. Surveillance of farmlands or agricultural land is very important in order to prevent unauthorized persons from gaining access to the field and also to protect the field from animals. Different strategies aim only at surveillance that is mainly for human intruders, but we appear to overlook that the biggest enemies of these farmers are the animals that eat the crops. In the states of Tamil Nadu, Himachal Pradesh, Punjab, Haryana, Kerala and many other states, the issue of wildlife attack on crops i.e. crop vandalization is becoming very common. Wild animals such as monkeys, elephants, wild pigs, deer's, wild dogs, bison, nilgais, feral animals such as cows and buffaloes and even birds such as parakeets do a lot of harm to crops by running over them, eating them and vandalizing them entirely. This leads to low crop yield and substantial financial loss for farmland owners. This problem is so severe that due to such regular attacks on animals, the farmers often prefer to leave the areas barren. This system allows us to keep these wild animals away from the farmlands and also provides flexibility for surveillance. It was found that the smell of rotten egg helps prevent the wild pigs and deers from eating the crops, so farmers spray the rotten egg solution manually on their fields, and firecrackers are used to fend off the wild elephants that eat the crops. Depending on the need, the system is automated so there is no manual labor, thus saving time and also avoiding crop loss.

SMART IRRIGATION SYSTEM: Smart irrigation systems are a combination of an advanced technology of sprinklers with nozzles that improve coverage and irrigation controllers that are watering and water conservation systems that monitor moisture-related conditions on your property and automatically adjust watering to optimal levels. By using the concept of modern irrigation system, a farmer can save water up to 50%. This concept depends on two irrigation methods those are: conventional irrigation methods like overhead sprinklers, flood type feeding systems i.e., wet the lower leaves and stem of the plants. The area between the crop rows become dry as the large amount of water is consumed by the flood type methods, in which case the farmer depends only on the incidental rainfalls. The crops are being infected by the leaf mold fungi as the soil surface often stays wet and is saturated after irrigation is completed. Overcoming these drawbacks new techniques are been adopted in the irrigation techniques, through which small amounts of water applies to the parts of root zone of a plant. The plant soil moisture stress is prevented by providing required amount of water resources frequently or often daily by which the moisture condition of the soil will retain well. The diagram below shows the entire concept of the modern irrigation system. The traditional techniques like sprinkler or surface irrigation requires uses nearly half of water sources. Even more precise amounts of water can be supplied for plants. As far as the foliage is dry the plant damage due to disease and insects will be reduced, which further reduces the operating cost. The dry rows between plants will leads to continuous federations during the irrigation process. Fertilizers can be applied through this type of system, and the cost required for will also reduce. The erosion of soil and wind is much reduced by the recent techniques when compared with overhead sprinkler systems. The soil characteristics will define the form of the dripping nature in the root zone of a plant which receives moisture. As the method of dripping will reduce huge water losses it became a popular method by reducing the labor cost and increasing the yields. When the components are activated, all the components will read and gives the output signal to the controller, and the information will be displayed to the user (farmer). The sensor readings are analog in nature so the ADC pin in the controller will convert the analog signals into digital format. Then the controller will read the information and it will display in the screen.

III. WORKING

This block diagram the arrangement of components in the farmland surveillance and smart irrigation system, here there the flow of the flow of instruction and command direction is clearly mentioned. Here in this project farmland surveillance and smart irrigation system the are fifteen different components used and the main heart of the project is Arduino mega which is programmed using c language and the Arduino mega sends and receives signals or instructions to the components Here the regulated power supply is used to send the supply to the components. The regulated power supply may be with the help of any adopters. In this project we have used 12v regulated power supply. LM2596 is a dc-to-dc voltage regulator which is used to step down the power supply to lower voltage which will not affect any components, here most of the component's woks in the range of 5V and the LM2596 is used to make the voltage to 5 volts then the supply directly goes to GSM which is known as global system of mobiles. This device is used to send call and message to the farmer or to the owner of the farmland if any fault is detected. The infrared sensors are placed in four ends of the farmland, and this is used to detect the motion of the animals or the presence of any unauthorized person as soon as the detection is done it send the message to the Arduino and the Arduino makes the camara to turn the angle of the motor to the side where the object is detected. The speaker turns on an makes scary sound to make the animal run and the GSM sends the message object detected the LCD display shows that the animal is detected, Fire detector sensors are placed which will detect if there is any presence of Fire and calls the farmer through GSM Moisture sensor detects the amount of moisture content and according to that the Arduino will decide whether to turn on or off the pump, dht11 senses the humidity and temperature and will be displayed in LC.

IV. SCOPE OF THE PROJECT

In This system produces healthier, uniform and more profitable plant material. As water is applied locally and leaching is reduced, fertilizer/nutrient loss is minimized. Yield of crops are maximum. Energy cost is reduced as it is operated in lower pressure than other irrigation methods., The farm field is well protected from any unauthorized entries and also protects the damages caused by birds and animals.

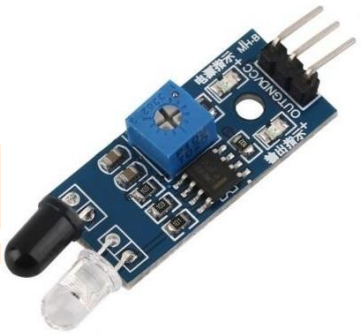
V. OVERVIEW

The surge in oil prices, as well as concerns about pollution, has heightened interest in the development of electric vehicles. The

primary premise of a solar-powered electric vehicle is to use energy stored in a battery to power a motor that propels the vehicle forward or backward. The photovoltaic (PV) module can be connected in series or parallel, and the charge controllers route the solar energy to the batteries. The DC voltage from the PV panel is then boosted using a boost DC-DC converter, and then an inverterconverts DC power to AC power, which then powers the Brushless DC motor that serves as the vehicle's drive motor. The subject of this paper is the design, simulation, and implementation of the numerous components for the vehicle application, including the solar panel, charge controller, battery, DC-DC boost converter, DC-AC power converter (inverter circuit), and BLDC motor. In thisEV,we also introduce On-Road Charging. The idea is to use an alternator to convert mechanical energy to electrical energy, whichmay subsequently be used for driving by storing the charge in a battery as chemical energy. The first solar car appeared in 1955[3],World Solar Challenge (WSC) events have been held in Australia since 1987 [4], and regular solar car challenge events have beenheld in the United States since 2005 [5]. Solar vehicles are currently not sold as everyday mobility devices, but rather as demonstration vehicles and engineering exercises by university professors, frequently with government funding agencies. Many institutions and colleges have been successful in developing a solar car. Solar car races are held by a variety of groups to encouragepeople to design and build solar-powered automobiles. The basic technique and design criteria were presented in this document togive the reader a quick overview of solar car design.

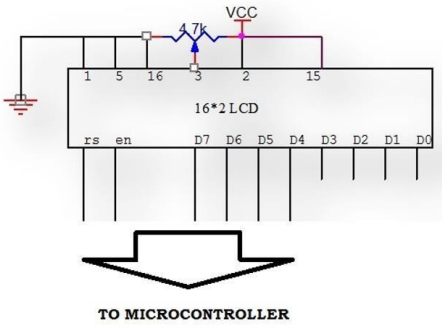
VI. MAIN COMPONENTS

1. IR SENSOR



IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode. Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received. There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LEDs of specific wavelength used as infrared sources.IR Sensor Working Principle There are different types of infrared transmitters depending on their wavelengths, output power and response time. An IR sensor consists of an IR LED and an IR Photodiode, together they are called as Photocoupler or OptoCoupler.IR Transmitter or IR LED Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations called as IR LED's. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye.

2. LCD 16*2

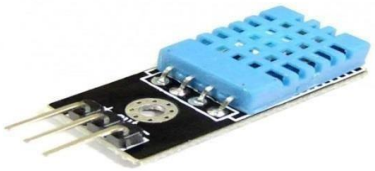


LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

3. GSM

A customized 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.
Specification: SIM800L V2. 0 GSM/GPRS Module is a QUAD-BAND GSM/GPRS module which compatible with Arduino. Interface Type-TTL UART Antenna Interface-ASMA, IPX Voice Interface-3.5mm Approximate price**:**400 Rs

4. DHT11



Digital Humidity and Temperature sensor is a readymade module which is used to observe humidity and temperature by interfacing Arduino microcontroller. We use DHT library for interfacing module, with the help predefined functions we observe humidity and temperature values.
The calibration coefficients are stored as programmed in the OTP memory, which are used by the sensor's internal signal detecting process. The single-wire serial interface makes system integration quick and easy. Its small size, low power consumption and up-to-20-meter signal transmission making it the best choice for various applications, including those most demanding ones. The component is 4-pin single row pin package. It is convenient to connect and special packages can be provided according to users' request. Attentions of application (1) Operating conditions Applying the DHT11 sensor beyond its working range stated in this datasheet can result in 3%RH signal shift/discrepancy. The DHT11 sensor can recover to the calibrated status gradually when it gets back to the normal operating condition and works within its range. Please refer to (3) of Conditions Minimum Typical Maximum Power Supply DC 3V 5V 5.5V Current Supply Measuring 0.5mA 2.5mA Average 0.2mA 1mA Standby 100uA 150uA Sampling period Second 1 Page | 9 this sec on to accelerate its recovery. Please be aware that opera ng the DHT11 sensor in the non-normal working conditions will accelerate sensor's aging process. (2) Attention to chemical materials Vapor from chemical materials may interfere with DHT's sensi ve-elements and debase its sensitivity. A high degree of chemical contaminate on can permanently damage the sensor. (3) Restoration process when (1) & (2) happen Step one: Keep the DHT sensor at the condition of Temperature 50~60Celsius, humidity 70%RH for 5 hours. (4) Temperature Relay humidity largely depends on temperature. Although temperature compensate on technology is used to ensure accurate measurement of RH, it is s strongly advised to keep the humidity and temperature sensors working under the same temperature. DHT11 should be mounted at the place as far as possible from parts that may generate heat.

5. SOLAR PANEL

A DC motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing direct-current

lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil. The total amount of current sent to the coil, the coil's size, and what it is wrapped around decide the strength of the electromagnetic field created. the series-wound DC motor develops its highest torque at low speed, it is often used in traction applications such as electric locomotives, and trams. The DC motor was the mainstay of electric traction drives on both electric and diesel-electric locomotives, street-cars/trams and diesel electric drilling rigs for many years. The introduction of DC motors and an electrical grid system to run machinery starting in the 1870s started a new second Industrial Revolution.

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