



ENNOBLE IP
Sets Knowledge Through Action

ADVANCES IN CREATIVE ENGINEERING DESIGN & IMPLEMENTATION

Edited By
R.N.Baral

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Preface

The term "Engineering" seems more serious, as if it means using some theoretical knowledge to create something precise and substantial. Engineering is a profession practised by civil, mechanical, aeronautical, and other engineering specialists. This book's goal is to investigate what engineering is all about. The main takeaway is that engineering is fundamental to who we are as a species. Through the history of engineering and its connections to art, craft, science, and technology, we will examine the role that engineering plays in the present world. We shall observe how engineers adapt to human demands by utilising natural events. The narrative continues, so we now consider some of the future contributions engineers will need to make in order to maintain and advance human well-being.

Engineering was recently characterised by a UK parliamentary committee as "bringing ideas into reality," which is pithy but probably not all that useful. The art, science, and craft of turning an idea into a reality from conception, feasibility, design, manufacture, or building to operation and ultimately decommissioning of something that satisfies a human need, according to the dictionary definition. Engineering is the science and art of imagining, designing, making, operating, maintaining, and disassembling complex equipment, structures, systems, and processes that aid human endeavour.

A book on introduction to engineering design and practical implementation is in fact thought to be highly unlikely, if not impossible or meaningless, today. Today, such books are common in many engineering programmes, and we are happy to have contributed to the success of that curricular adaption. We've also participated in a comparable revision of engineering capstone courses, which were frequently performed more for the sake of accreditation than out of a desire for real-world projects at the time. Today's capstone courses with an external focus, some modelled like the Engineering Clinic at various reputed institutions that not only give students real-world design experience but also frequently introduce them to collaborating with peers from around the globe. Additionally, there are now different students in the classroom or design studio: These days, there are a lot more female and underrepresented minority engineering majors. These changes have been accompanied by a development in the design discipline and in how engineering school faculty view engineering design. With a vocabulary, framework, and procedures that reflect our growing capacity to explain what we are doing when we create anything, design in particular is now a recognised intellectual field. And like many other fields, design encompasses both broad and precise notions.

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Editor

Prevention of Unauthorized Intrusion to Electronic Gadgets with Scrambled Keypad

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Abstract

Security or authentication plays very significant role and everyone wants to be secure in their own life. But in recent days, security theft and unauthorized intrusion very significant and hackers use several techniques to steal Personal Identification Number (PIN) of electronic gadgets like thermal imaging, fluorescent masking or making use of some chemicals like phenolphthalein. In proposed system, graphical keypad is used based on Graphical User Interface (GUI) technique where we are generating icon based keypad on LCD screen which gives UART output and using this after each individual use pattern of keypad of electronic gadget keeps on scrambling using Random Pattern Development (RPD) Algorithm. Hence the chances of authentication key being overseen by third party or hacker is significantly reduced. This causes difficult for hacker or intruder to pirate the password.

Keywords

Graphical User Interface (GUI), LCD, Personal Identification Number (PIN), Random Pattern Development (RPD) Algorithm.

INTRODUCTION

In modern world, most of the electronic gadgets are keyboard based and authentication is the major problem. Sometimes, our finger movements on keyboard itself subjecting our authenticity at risk. All Electronic gadgets which are accessed by keyboard system usually subjected to higher risk of password overseen especially in ATM centers whenever we access our account to withdraw money person behind us can intentionally oversee the finger movements on keypad and if someone steals our pin can snatch or pickpocket our ATM card and withdraw money using already guessed password by using our finger movements. Hence we designed an innovative authentication system, scrambled keypad using graphical user interface technique, here we are implementing scrambled keyboard whose pattern arrangement will shuffle each time when user uses it. Each time individual user uses the keyboard to access his account, user gets the scrambled pattern.

LITERATURE SURVEY

In [1],[2] authors developed wireless communication between users and ATM centers using Bluetooth application, whenever person inserts ATM card to access his account ATM

Bluetooth asks authentication key to enter. This system reduces guessing of password and password snooping. In [3],[4], They used face recognition technique in ATM's using Artificial intelligence. This system is completely software based and recognizes head and eye of individual user and system compares identified user's characteristics with database by developing matrix algorithm.

Holistic Matching method: In this approach, entire face is considered for face catching technique. Best examples for this method are Eigen face [6], Linear discriminate analysis [5].

METHODOLOGY

Generic keyboards, which are in normal use, cannot be scrambled as they are usually made up of plastic or metals. Therefore, it is essential to design a system in which keys must be images or icons. This can be achieved only using graphic design technique by utilizing graphical user interface, where touch screen is mounted on graphical LCD and by implementing separate touch, screen holder gives touch position as UART output. Circuit diagram for scrambled keypad implementation is shown in figure 1.

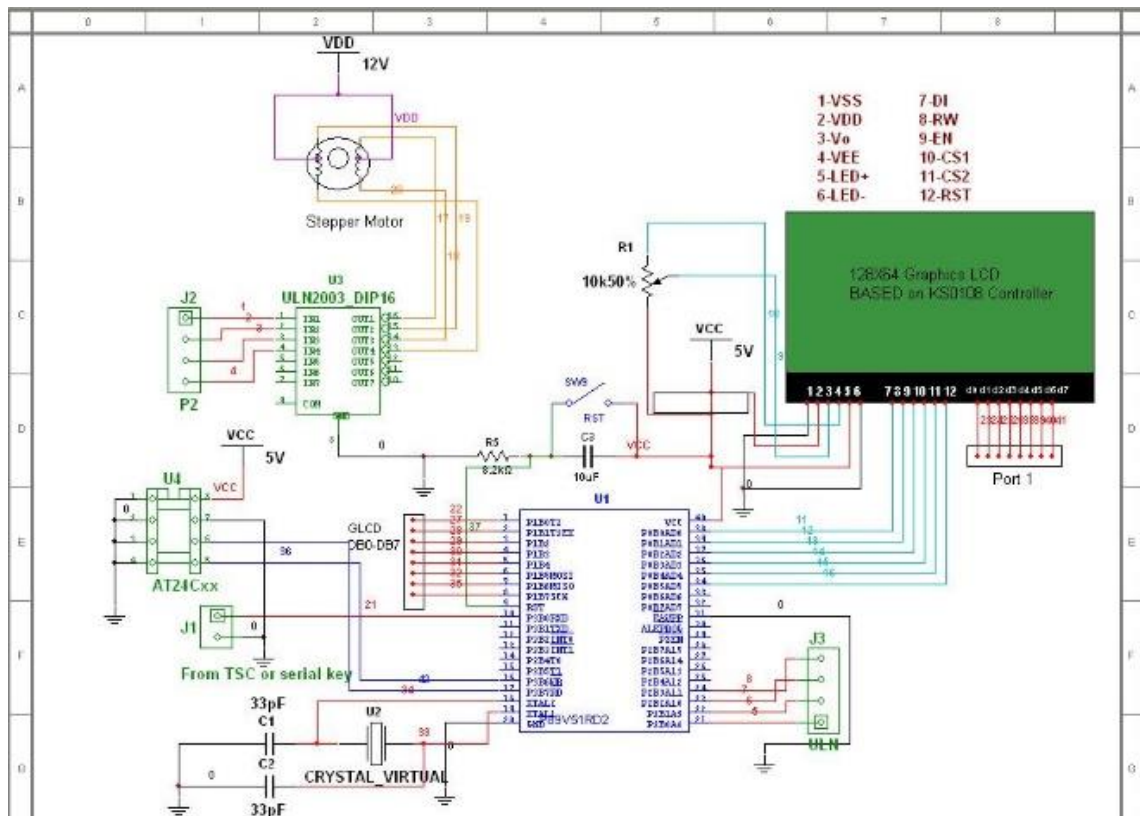


Figure 1: Implementation of Scrambled Keypad

As shown in circuit diagram LCD is connected to P0 and P2 of microcontroller, P0 is used to monitor GLCD, and P1/P2 can be used for data. P1.0 and P2.0 is for relay control and the input key location is received from UART Rx pin P3.0 serially. Whenever proper password arrangement is entered access granted message will be displayed on monitor screen and relay activates. If faulty password is entered access denied message is shown and relay doesn't activate. Design of scrambling keypad can be implemented using random pattern development algorithm. According to RPD, input devices are abstract and they can send only key location as alphabets from A to L, where 'A' represents first key and 'L' represents 12th key respectively. To avoid confusion between transmitted and displayed key correlation alphabets A to L are used.

Mainly scrambled keyboards achieved using graphic LCD of 128*64 Pixels screen and keys on keyboard are showed as buttons and each of these buttons are designed utilizing different combination of pixels.

An entire graphical implementation is required to show desired output on monitor. Single button as key is shown in below figure 2.

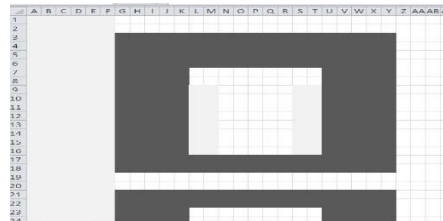


Figure 2: Single button as key

There are set of random key locations and from those a set is selected randomly and displayed on the screen. Top and bottom parts of the button are constant but only key/numeric part varies so that after each use keyboard pattern keeps changing. Entire system RPD Algorithm is summarized in below flow charts.

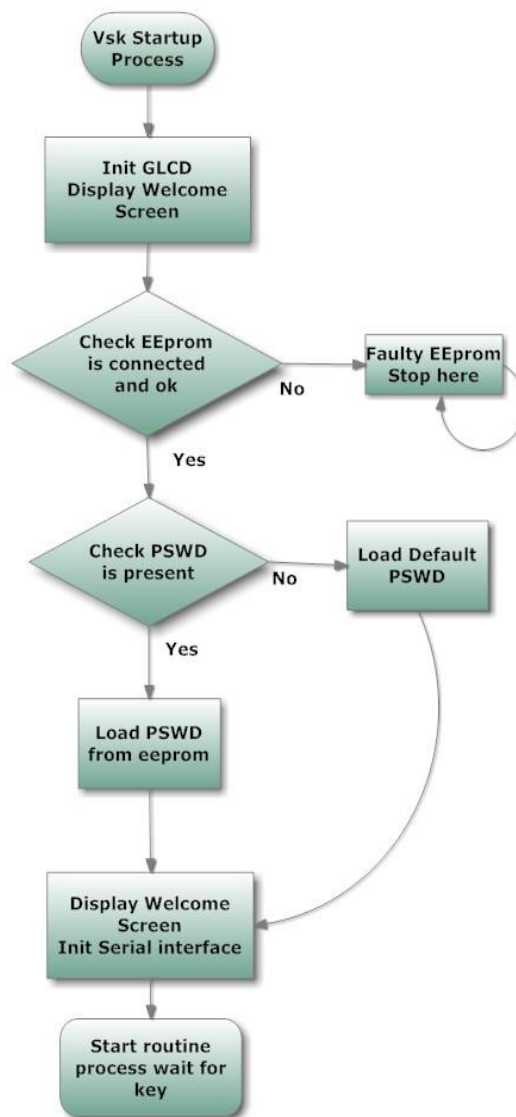


Figure 3: Rapid Pattern Development startup process

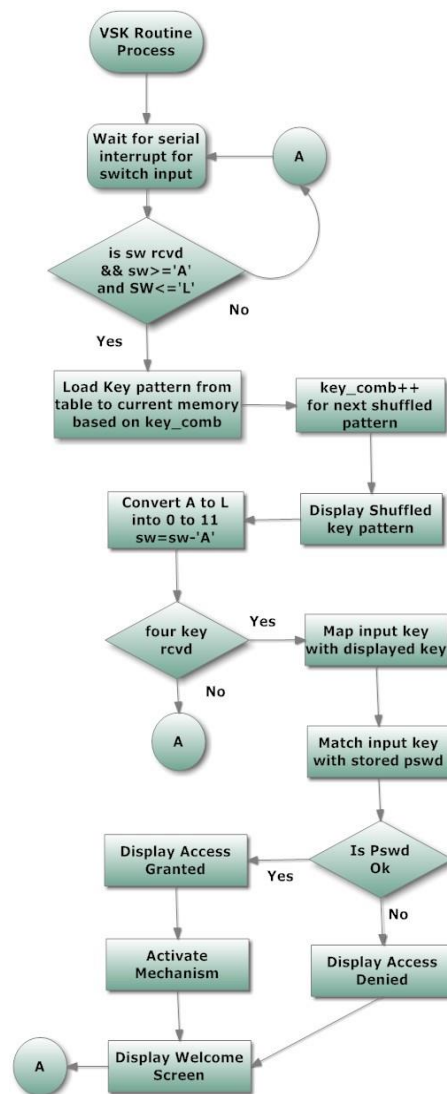


Figure 4: Process of accessing scrambled keypad

CONCLUSION

Proposed system presents a prototype for the improvisation of the existing system especially keypad based electronic gadgets using scrambled keypad. It provides an efficient way to prevent password theft. This idea of scrambled keyboard confuses the hacker and intruder in pin guessing or thieving. Therefore, in future using this technique we can achieve higher authentication while accessing electronic gadget.

FUTURE WORK

In future we can integrate all authentication techniques like face recognition, wireless communication using Bluetooth technology along with scrambled keyboard technique to achieve higher degree of authentication to prevent unauthorized access to our electronic gadgets.

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Design of Biometric Auto Ignition System

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Abstract

Biometric Auto Ignition System is developed to make the vehicles more secure against thefts. Biometrics is the measurement of physiological characteristics such as finger print, iris patterns, or facial features that can be used to identify an individual. Biometrics is one of the safest ways to secure our things and hence has been implemented in our phones, high end lockers. In the current project, finger print sensor R307 is used to recognize the user and activate the DC motor connected to the Arduino board. Since, both the biometric and the key can be used to start the vehicle, a greater number of people have access to the car. The objective is to make people and their family have easy access to their vehicles.

Index Terms

Arduino board, Auto-ignition, Biometrics, DC Servo motor, Finger print sensor.

INTRODUCTION

Vehicle security is an important issue due to the rise in Vehicle hijacking and car theft. Because of easy access to the vehicle's framework. The biometric system gives a secure and easy approach to start or stop the vehicle and the system enables approved user to start the vehicle. The biometric authentication system is used in various fields for a security mechanism. Biometrics refers to the programmed recognizable proof of a living individual dependent on physiological or social qualities for confirmation purposes. The four important strategies used in Biometrics are Palm, Fingerprint, Iris, Voice, and Face. The biometric method requires the person to be physically present in order to be identified. This emphasizes its preference for classical methods of identifying such as passwords, smartcards, and so on. Because biometrics can provide a reasonable level of confidence in authenticating a person with less friction for the user, it has the potential to dramatically improve enterprise security.

Computers and devices can unlock automatically when they detect the fingerprints of an approved user. This proves that biometric recognition system offers much superior security than any other traditional method of personal recognition. One of the most well-known and well-publicized biometrics is fingerprint identification. Fingerprints have been used for identification for over a century due to their uniqueness and consistency over time, but have only recently become automated (i.e a biometric) due to advances in computing capabilities. Fingerprint recognition is popular due to its inherent ease of acquisition, the numerous sources

(10 fingers) available for collection, and law enforcement and immigration's long history of using and collecting it.

GENERAL-DESCRIPTION

Arduino UNO: It is a microcontroller board dependent on ATmega328P. It is open-source electronics prototyping stage making the user to create intelligent electronic tasks. It is programmed using Arduino IDE by connecting it to a computer through a cable.

Finger Print Sensor: It is used to make a digital image of the user’s fingerprint. It is used for two purposes one is to scan and store the digital image of the fingerprint and other is to scan and match the fingerprint with the previously stored data.



Figure 1: Picture showing R3 07 Finger print sensor

The program for Biometric Authentication Process is written using the Arduino IDE and it is uploaded to the Arduino Board. The fingerprint sensor and the ignition system of the vehicle are connected to the Arduino Board. The ignition switch of the vehicle is turned on if the fingerprint is matched with the previously stored data. Otherwise, it is not turned on.

PROPOSED SYSTEM

The connections are completed by integrating the Arduino board with Finger print sensor, Servo motor and connecting it to the computer loaded with the code. The code is uploaded to the Arduino uno and the finger prints are enrolled to the code using the finger print sensor. When the authorized finger print is scanned on the finger print sensor, the finger print is checked by the code if it has been already enrolled. Then the process gets started and the signal is passed through the system and the motor starts which means the ignition system is turned on.

EXPERIMENTAL SETUP

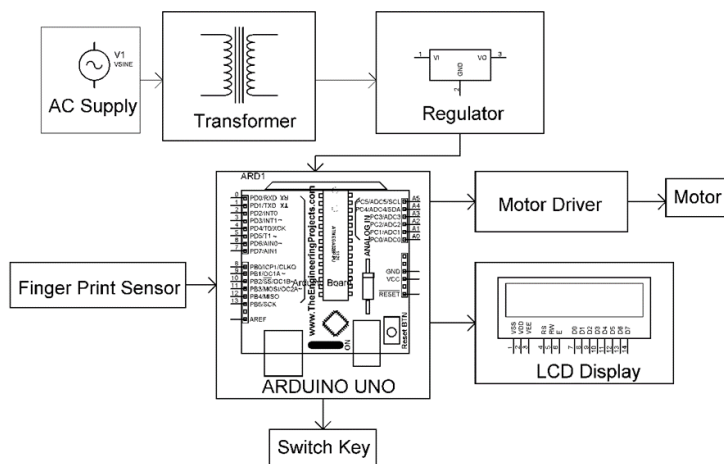


Figure 2: Block diagram of Biometric Auto-ignition system

Components used for the system:

1. Arduino Uno
2. R307 Fingerprint sensor
3. 16x2 LCD Display
4. Switch key
5. Servo motor
6. 12V DC Battery
7. Power Supply

Firstly, 230V AC supply is being given to the 0-12V transformer which is the step-up transformer. As we know, A transformer in which the output (secondary) voltage is greater than its input (primary) voltage is called a step-up transformer. The step-up transformer decreases the output current for keeping the input and output power of the system equal. Then the LCD display, displays car ignition system.

A 16×2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5×7 pixel matrix. The 16×2 intelligent alphanumeric dot matrix display can display 224 different characters and symbols. This LCD has two registers, namely, Command and Data. This project used three 4 buttons: UP/DOWN, ENROLL, D/T, OK. Using these 4 buttons, we can store and delete the fingerprints. So, for that Press UP/DOWN button, then press OK to set the location of the fingerprint for e.g., 1,2,3, and so on. Once we have set the location press D/T button, then it will display Please wait and after that it will show place the finger on the fingerprint sensor that is R307 sensor.

Finger Print Sensor Module or Finger Print Scanner is a module that captures finger's image and then converts it into the equivalent template and saves them into its memory on selected ID (location) by Arduino. Here all the process is commanded by Arduino like taking an image of a fingerprint, convert it into templates, and storing location, etc. And then it will display image taken and then remove the finger and place the finger again. After that, the LCD will display STORED! So, again it will display press UP/DOWN button and then place the finger.

After placing the finger, it is showing Gate opened that means, the car is ignited. And the ignition is done by the servomotor. For the ignition, we have used the servomotor. As we know, Servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.

Steps for Fingerprint Enrolment:

1. In the Arduino IDE, go to File > Examples > Adafruit Fingerprint Sensor Library > Enroll.
2. Upload the code to the Arduino.
3. You should enter an ID for the fingerprint in which you want to store your fingerprint. As this is my first fingerprint, I typed 1 in the top left corner, and then, click the Send button.
4. Then the light on the fingerprint sensor will blink which indicates that you should place your finger on the sensor and after that follow the steps showing on serial monitor till it acknowledges you for successful enrolment.

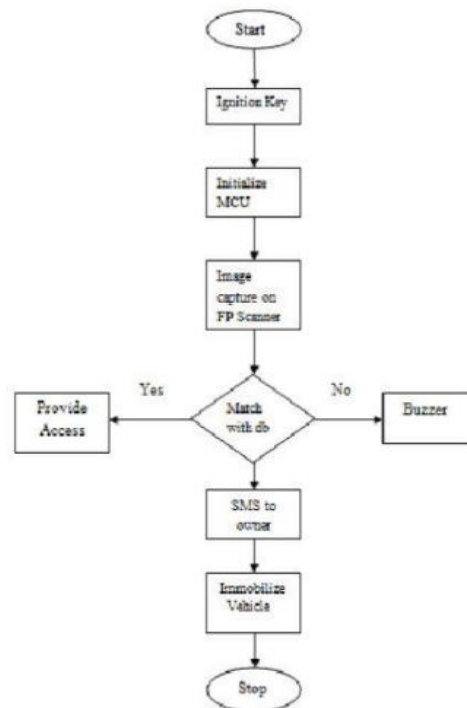


Figure 3: Flow chart of the process in Finger print enabled Auto-ignition system

RESULTS AND DISCUSSIONS

The proposed system's expected outcome is that Engine will only start when the approved person scans his or her finger on the fingerprint module. The biometric ignition system is designed to give the vehicle a high level of security and protection. Only an approved user's fingerprint is programmed to ignite the car will control the ignition circuit. The system verifies and unlocks the ignition circuit in 0.3 seconds which makes the system more robust.

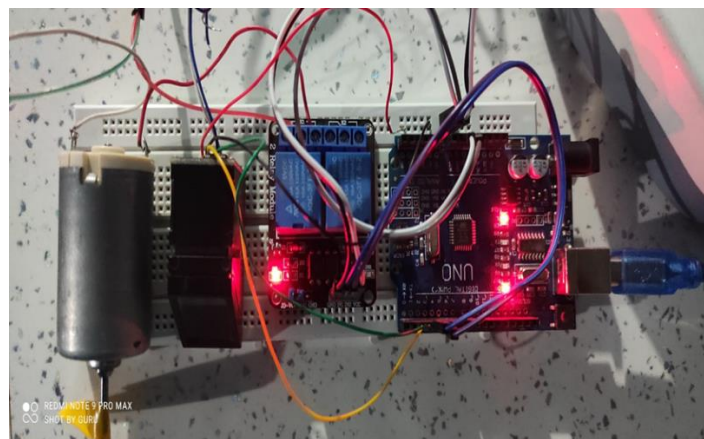


Figure 4: Picture showing the connections and working of Auto ignition system

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Book Recommendation System Utilizing Memory Based Collaborative Filtering

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Abstract

Recommendation System (RS) proposes comparative things to a client dependent on their prior exercises like bought items, item audit, inclinations, and so on These frameworks are being utilized by different online business organizations like Amazon, Flipkart, eBay, and so on to prescribe better items to clients. Shared Filtering (CF) is a sort of RS which depends with the understanding that assuming the client has evaluated 10 books, to an appraised 8 clients of these books then the other 2 books can be suggested. This paper tends to the utilization of memory-based CF in Book Crossing (BX) Dataset Memory Based CF (otherwise called neighbour-based models) access whole information bases of client gave evaluations to find relationships between clients/things.

Keywords

Recommendation framework, Collaborative separating, Filtering, Book crossing.

INTRODUCTION

Proposal System (RS) updates remain of enormous fixation to a collection of components in addition to burn-through the point of convergence of raised insightful and business research. Various business and altruistic locales, including Amazon, Flipkart, eBay and significantly more use RS to help their customers in purchasing things by making thoughts reliant upon their past judgments and those of the most-equivalent customers. Such ideas have transformed into a fundamental piece of online business arranges and are used to alter the shopping experience.

Generally speaking, RSs have the option to stand named either content-based, aggregate filtering (CF)- made, or a combination of the twofold. In content-based procedures, things are endorsed to the genuine customer by checking out the information content of the customer's past practices like purchased things, thing study, tendencies, etc Interestingly, CF-set up systems propose things based concerning an assessment of customer input close by the tendencies of similar customers; this additional force makes CF the most extensively used and productive RS methodology. CF approaches can be also portrayed into model-and memory-based techniques. Model-based systems apply a pre-built model for anticipating customer tendencies, while memory-based approaches (in any case called neighbour-based models) access entire informational indexes of customer gave assessments to find connections between customers/things. Memory-based proposition computations can generally be also divided into customer and thing-based approaches.

Memory-based approaches process the connections among customers and things to convey a tendency score that predicts the likelihood of a customer getting a thing later on and give contrasting ideas. Customer and thing-based estimations are the most broadly perceived sorts of memory-based proposition strategies. Customer based procedures make proposition as demonstrated by the comparable qualities between customers, however thing-based systems figure resemblances inside a space of things to find strong relationship with things that have adequately been assessed by a working customer.

Client based CF procedure basically includes four phases:

1. Client to-client connections are applied to track down the most comparable clients to an objective client (the neighbours).
2. Subsequent to gathering things evaluated by neighbours, those that have as of now been gotten by the objective client are taken out, leaving a bunch of competitor things.
3. A level of inclination score is produced to decide the probability of future buy by the objective client for every competitor thing.
4. In view of their individual expectation scores, the things are positioned and a rundown of suggestions involving the things with the most noteworthy positions is created.

In thing-based CF, similarities among things are determined by other clients' assessments. By and large, thing-based CF follows similar strides as the client-based strategy, then again, actually connections are determined across the space of things.

WRITING SURVEY

Kurmashov et. al. utilized Pearson connection coefficient-based CF to give web-based proposals to book perusers and assessed the framework through an internet-based review. Mathew et.al. proposed a framework that saves subtleties of books bought by the client. From these Book substance and evaluations, a mixture calculation utilizing community-oriented sifting, content-based separating and affiliation rule creates book proposals. Parvatikar et.al. proposed thing based collective separating and affiliation rule mining to give suggestions. Likeness between various clients was registered through Adjusted Cosine Vector Similarity work. Better proposals were acquired as through this technique information sparsity issue was taken out. Choi et.al. proposed RS dependent on HYRED, a cross breed calculation utilizing both substance and communitarian sifting on a conservative dataset (by diminishing client interest things) and neighbor information. HYRED utilized modified Pearson Coefficient based Collaborative separating and distance-to-limit (DTB) Content sifting. This would bring about better and quicker proposal for a lot of information.

Writing review proposed that suggestion frameworks are being utilized by an enormous number of online advertisers to build their deals by offering items to clients which match their preferences. These RS experience the ill effects of numerous issues like information sparsity, cold beginning, trust, versatility and protection. In this manner there is a requirement for further developed suggestion frameworks which tackle these issues.

CURRENT APPROACH

The most normally utilized ordinary memory-based CF strategies are:

1. Pearson's Correlation Coefficient

Pearson's connection coefficient (PCC) is utilized to find relationships among clients. Be that as it may, the PCC strategy can be mistaken when the information is meagre, as missed

evaluations make it hard to track down relationships between clients. This prompt high/low similitudes and, hence, frail suggestions. The relationship among clients can be characterized as:

$$S(x,y)^{PCC} = \frac{\sum_{i \in I_{xy}} (r_{x,i} - \bar{r}_x)(r_{y,i} - \bar{r}_y)}{\sqrt{\sum_{i \in I_{xy}} (r_{x,i} - \bar{r}_x)^2} \sqrt{\sum_{i \in I_{xy}} (r_{y,i} - \bar{r}_y)^2}},$$

2. Compelled Pearson Correlation

The RINGO recommender was created to give clients proposals of music collections and specialists. Under RINGO, clients give criticism on an ostensible scale from one ("in number aversion") to seven ("in number like"), with an impartial worth ("neither like nor disdain") in the scale. The relationship is determined as:

$$S(x,y)^{CPCC} = \frac{\sum_{i \in I_{xy}} (r_{x,i} - r_m)(r_{y,i} - r_m)}{\sqrt{\sum_{i \in I_{xy}} (r_{x,i} - r_m)^2} \sqrt{\sum_{i \in I_{xy}} (r_{y,i} - r_m)^2}},$$

where r_m signifies the middle worth of the rating scale.

3. Cosine strategy

The cosine strategy is a vector-space model that applies a straight variable based math way to deal with characterize the connections between sets of clients [6] as vectors, with client similitudes registered as the cosine distance between each pair of rating vectors.

$$S(x,y)^{Cosine} = \frac{\sum_{i \in I_{xy}} (r_{x,i})(r_{y,i})}{\sqrt{\sum_{i \in I_{xy}} (r_{x,i})^2} \sqrt{\sum_{i \in I_{xy}} (r_{y,i})^2}},$$

4. Jaccard strategy

The Jaccard strategy just considers the quantity of co-evaluations for every client pair to characterize their relationship. Two clients will have a solid relationship if they have comparable rating examples, as well as the other way around. In any case, the Jaccard calculation process doesn't think about the outright upsides of appraisals. Officially, the comparability between client's x and y is given by:

$$S(x,y)^{Jaccard} = \frac{|I_{xy}|}{|I_x \cup I_y|},$$

where $|I_x \cup I_y|$ addresses the association set of things evaluated by clients x and y .

5. Sigmoid capacity-based PCC

Sigmoid capacity is utilized to decrement the closeness esteems between things for which not many clients have evaluated the two things. The sigmoid capacity based PCC (SPCC) approach produces comparability esteems in the reach $[0, 1]$ utilizing the accompanying detailing:

$$S(x,y)^{SPCC} = s(x,y)^{pcc} \cdot \frac{1}{1 + \exp\left(-\frac{|I|}{2}\right)},$$

Be that as it may, a couple of clients with comparative evaluations can in any case have a low similitude under this methodology. For instance, two clients with evaluations vectors of $u_1 = (4,3,5,4)$ and $u_2 = (4,3,3,4)$ will have fundamentally the same as appraisals yet a SPCC similitude of nothing.

6. Jaccard and mean squared contrast measure

The Jaccard strategy is hybridized with a mean squared distinction way to deal with produce the JMSD measure, which is registered as follows:

$$S(x, y)^{JMSD} = s(x, y)^{MSD} + s(x, y)^{Jacc}$$

Where,

$$S(x, y)^{MSD} = \frac{|I_{xy}|}{\sum_{i \in I} (r_{x,i} - r_{y,i})^2}$$

The JMSD approach tends to the particular downsides of the Jaccard and mean squared contrast draws near, yet experiences the cool beginning issue, doesn't think about the believability of normal evaluations, and is powerless against nearby data and the use of rating issues.

PROPOSED TRIAL SETUP AND DISCUSSION

Analyses were performed utilizing three broadly utilized freely accessible datasets, specifically BX-Users, BX-Books, BX-Book-Ratings. For this review they were utilized to assess the presentation of normal memory-based CF strategies. The proposed methodology sequence of steps is depicted in the following diagram:

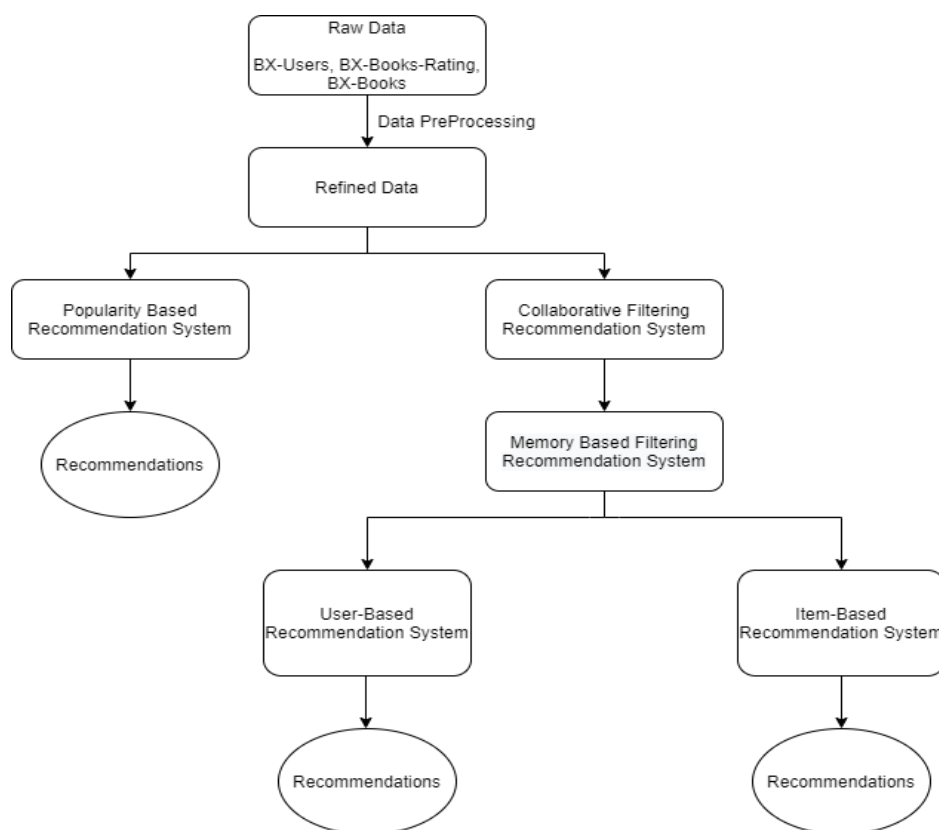


Figure 1: Block Diagram

1. Informational collection Description

The Book-Crossing dataset is included 3 tables:

A. BX-Users

This contains the Book-Crossing clients. There is a 'Client ID', and some segment information ('Location', 'Age') if accessible.

B. BX-Books

Books are recognized by their ISBN number, and invalid ISBNs have as of now been eliminated from the dataset. Where accessible, book data is given here ('Book-Title', 'Book-Author', 'Year-Of-Publication', 'Distributer'). In case there are a few writers for one book, just the first is given. URLs connecting to cover pictures are likewise given in little, medium, and huge arrangements ('Image-URL-S', 'Picture URL-M', 'Picture URL-M').

C. BX-Book-Ratings

Contains all of the book rating data. Appraisals ('Book-Rating') are either EXPLICIT (on a size of 1-10 - higher being better), or IMPLICIT, which is communicated by a 0. for example, a ZERO is certainly not an awful appraising, yet entirely an implied one.

2. Test Process

The exploratory interaction to assess the proposed technique was led as follows:

- a. Data pre-processing steps were acted in the BX-dataset.
- b. Recommendation System was prepared
- c. 10 other comparable clients were found for a specific client utilizing the closest neighbour calculation, given the user_id and appraisals grid.
- d. Prediction dependent on client thing mixes were determined
- e. Finally, suggestions box.

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Solar-Powered USB Charger Using Arduino Uno

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Abstract

The ideal of this design is to design a Solar Powered Portable Power Bank for mobile phone using sun as its ultimate power, which can be used effectively during disaster events. It has in- erected solar panel which converts the solar energy to electrical energy. The charge is also transferred to a battery for storehouse of charge for farther use. The battery is connected to a charging circuit having an USB harborage as affair to the separate Mobile phones. The whole connection is given through an Arduino, where the law is handed in such a way that the battery doesn't heat. The main challenges faced in designing the design are having crimes in connections, choosing wrong COM harborage, connecting the UNO to computer and developing an error free law. The main end of designing this design is to give an compact and featherlight power bank to conserve the coffers. Complete use of sustainably renewable coffers has been made that can be fluently reclaimed corridor exercise dismembering at the end of the life. It also manages dangerous chemical substances and minimizes the use of number of hitching cables and lines.

Index Terms

Solar power, Portable charger, Arduino Uno, C Programming language.

INTRODUCTION

Today's world is energy driven and batteries have come an integral part as an energy source considering the technological advances in consumer electronics to electric vehicles, renewables, and smart grids. Batteries are energy limited and bear recharging. Recharging batteries with solar energy by mean of solar cells can offer a accessible option for smart consumer electronics. Meanwhile, batteries can be used to address the intermittency concern of photovoltaics. This perspective discusses the advances in battery charging using solar energy. Conventional design of solar charging batteries involves the use of batteries and solar modules as two separate units connected by electric cables. Advanced design involves the integration of in situ battery storehouse in solar modules, therefore offering conciseness and smaller packaging conditions with the eventuality to come less expensive. This advancement can be profitable for consumer electronics where space, size, and packaging conditions hold lesser value. Three major criteria, videlicet energy viscosity, effectiveness, and stability, have been addressed by presenting applicable challenges and implicit openings. The integrated design is still in the early R&D phase. There's a need for innovative designs that explore high-capacity, effective, and stable accoutrements. Meanwhile, to demonstrate its practical viability,

this integrated design should also concentrate on real- world operations similar as wearables that demand specific conditions of energy and power.

A solar bowl employs solar energy to supply electricity to device or bowl batteries. They're generally movable. In a stationary position a series of solar cells are installed and can be connected to a battery bank to store energy for out- peak operation. utmost movable dishes can gain energy from the sun only.

Arduino is an electronic tackle or open-source electronic circuit board in which there's a main element, a microcontroller chip with AVR type from Atmel company. The microcontroller itself is a chip or IC (Integrated Circuit) programmed using a computer. In general, Arduino consists of two corridors, videlicet

- (1) Tackle in the form of input/ affair board (I/O) is an open source.
- (2) Arduino software which is also open source, including Arduino IDE software to write programs and motorists for connection with computer.

The utility of the Arduino depends on us making the program. Arduino can be used to control the LED, control the business lights, and can also be used for robot design. presently there are colorful forms and types of Arduino boards that are acclimated to the designation, not only board (board) Arduino there's also another module ready to use(guard), as well as accessories similar as USB appendage and so on. numerous programming languages are generally used for microcontroller programs, similar as assembly language. But Arduino programing language used the language C. Language C is a programming language that's veritably generally used since the morning of the computer was created and veritably necessary in software development. Arduino Integrated Development Environment (IDE) is a software handed at Arduino cc point designated as a sketch development tool and used as an Arduino ideas program (IDE), which means an intertwined program development tool where colorful requirements are handed and expressed in the form of menu- grounded interface. By using Arduino ideas, we can write a sketch, check for crimes or not on sketch, and also upload a collected sketch to an Arduino board.

LITERATURE REVIEW

Paper (1) works on the principle that when light falls on the solar cell, electrons – holes dyads are created in also type emitter and in the p-type base. The development of solar bowl goes from the abecedarian position like soldering lamination and making the panel etc. The developed bowl is planned for 6 Volts with maximum capacity at bright sun and step down to 5 Volts using controller. The authors used the conception (2) of energy harvesting by using solar energy for battery charging purpose. The thing of wireless sola mobile phone bowl is to develop a small solar panel that can be placed on mobile phone itself, so the mobile can charge singly. There won't be any need of electrical outlets or solar panels. The mobile phone will be charged anywhere when exposed to sun. Paper (3) discusses system structures, in which mobile phones act as either active or unresistant bias depending on available communication between smart phones and their solar dishes.

A suitable small size solar cell panel is named that's easy to carry to any locales further from megacity electric grids. The paper (4) proposes a universal mobile bowl which can work on wind as well as solar energy. This bowl is largely effective and veritably provident as it uses non-conventional energy sources of power. The work in (5) is about using non-conventional energy i.e. solar energy for mobile battery charging. Solar dishes are simple, movable and ready to use bias which can be used by anyone especially in remote areas. The major factor that drove us to this design is that it's one the system of charging that utilizes the renewable sources of

energy where we can overcome the exhaustible operation of power and charge. It reduces the environmental pollution and is important stoner friendly. Solar bowl needs light to work. The effectiveness of the photovoltaic panels has increased greatly over the last decade or so, reaching the point where they don't need direct sun to work but will now produce a satisfactory current indeed under heavy conditions.

Charging a device by solar bowl is important slower than the main bowl. Now a days mobile plays a vital part in our life. So only one thing that I can prognosticate about everyone is, everyone has endured frustration at least formerly in your continuance because of the low battery charge in your mobile phone. Am I right? But as I endured it, I started to suppose about a Solar mobile bowl with phone. Solar power is far and wide in the world. We don't want to find a power draw. Just take the phone in contact with solar system. currently, solar power is gaining increased attention. As a result, Cost of solar panels has lowered dramatically. Solar power is renewable and it doesn't have any environmental impact. The Solar mobile bowl has ensuing corridor

i. Solar panel 6V You can buy solar panels online at cheap rates. It costs lower than 10\$. The Solar panel is the most important part of this design

ii. Rechargeable Batteries 4×1.2 v and holder, the affair of a solar power isn't constant. The main disadvantage of solar power is that it may not be suitable to give enough power for our operation in cloudy days. To avoid this problem, we can apply a set of rechargeable batteries in the design. So, we can recharge the battery inside the bowl and make it available latterly.

iii. Diodes IN4007 A diode is an electrical device allowing current to move through it unidirectional with fluently in compare with other. The most common type of diode in ultramodern circuit is the semiconductor diode, though other diode technologies live. Take IN4007 Silicon Diode (any diode will work)

iv. Capacitor 10nf the affair of a solar panel may not be constant. Any small variations may affect the effective charging of the mobile phone battery. To avoid this problem, we can use a 10nf capacitor in resemblant to the circuit.

Arduino Uno: Arduino is a single- board microcontroller meant to make the operation more accessible which are interactive objects and its surroundings. The tackle features with an open-source tackle board.

A solar mobile battery bowl is a device that can automatically recharge a mobile battery when the charging in it gets low and the device is in directly contact with the solar radiation. Now a days mobile phones plays the vital part of everyone's life and hence bear frequent charging of battery owing to longer duration uses. Solar battery dishes produced as a simple, teardrop, timekeeper grounded, intelligent, universal battery bowl- analyzers, presto, palpitation, inductive, USB grounded, solar dishes and stir powered dishes. These battery dishes also vary with respect to the operations like mobile phone bowl, battery bowl for vehicles, batteries dishes for electric vehicle and charge stations. Charging styles are described into two orders fast charge system and slow charge system. Fast charge is a system used to recharge a battery as early as possible in about two hours or lower than this, and in the slow charge system it takes much further time as compare to gormandize battery bowl. But Slow charging is profitable because it doesn't bear any charge discovery circuit. Also, it's cheap in price. The only debit of this charging system is that it takes maximum time to recharge a

First, assemble the solar powered battery bowl circuit. This uses the energy from some solar cells to charge the batteries, and boosts the voltage from it to the 5V used by the Arduino Uno. This circuit was grounded on the stupendous tutorial by deba168, Solar powered Arduino

rainfall station. Solar cells are connected to the input of the lithium battery bowl(TP4056), whose affair is connected to the 18560 lithium battery. A 5V step- up voltage supporter is also connected to the battery and is used to convert from 3.7 V dc to 5V DC. Some legs were soldered to the bottom of both modules (TP4056 and supporter), to allow easier connection to breadboard. However, you might connect the factors with cables and solder them, if you do not to use a breadboard. At this point it's needed to power the Arduino Uno, connecting it to supporter's USB connector, and your Arduino will work until the battery is depleted. When there's enough sun light, the battery will automatically start to charge. Notice that the TP4056 input is limited between 4.5 and 5.5V. In this circuit there's no voltage limiter between the solar panel and the battery bowl. A Zener diode might be used limit the voltage and cover your circuit. Depending on your power consumption, your battery will discharge snappily The Solar mobile bowl using Arduino circuit illustration is given below.

After the timekeeper circuit is working, connect it affair to Arduino 5V and GND legs. It'll look like the one in the Figure over. The Arduino will be powered every 5 twinkles and stay on for 27 seconds. You might change those values opting different values for the resistors and capacitors as described before.

EXPERIMENTAL SET-UP AND METHODOLOGY

System Implementation

A Solar mobile battery charger is a device that can automatically recharge a mobile battery when the charging in it gets low and the device is in directly contact with the solar radiation. Now a days mobile phones plays the vital role of everyone's life and hence require frequent charging of battery owing to longer duration uses. Solar battery chargers produced as a simple, trickle, timer based, intelligent, universal battery charger-analyzers, fast, pulse, inductive, USB based, solar chargers and motion powered chargers. These battery chargers also vary with respect to the applications like mobile phone charger, battery charger for vehicles, batteries chargers for electric vehicle and charge stations. Charging methods are described into two categories: fast charge method and slow charge method. Fast charge is a method used to recharge a battery as early as possible i.e in about two hours or less than this, and in the slow charge method it takes much more time as compare to fast battery charger. But Slow charging is advantageous because it does not require any charge detection circuit. Also, it is cheap in price. The only drawback of this charging system is that it takes maximum time to recharge a battery. The assemblage of solar power battery has been done as shown in figure 1.

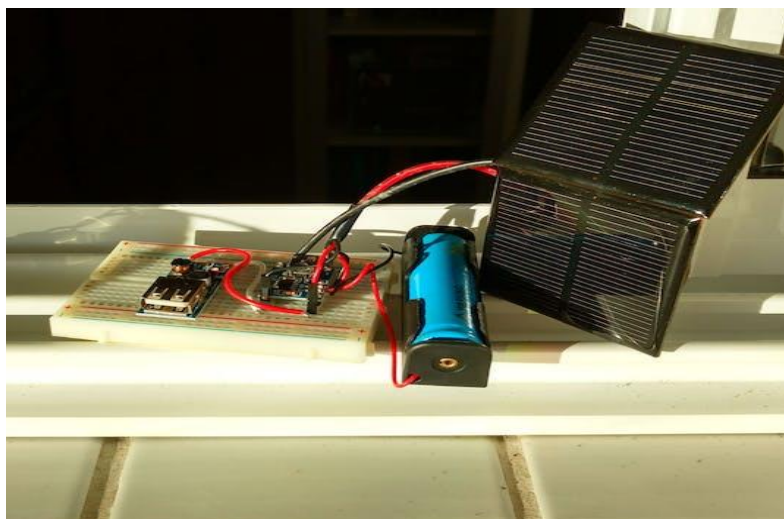


Figure 1: Assemblage of solar power battery

PROPOSED SYSTEM

First, assemble the solar powered battery charger circuit. This uses the energy from some solar cells to charge the batteries, and boosts the voltage from it to the 5V used by the Arduino Uno. This circuit was based on the awesome tutorial by deba168, Solar powered Arduino weather station. Solar cells are connected to the input of the lithium battery charger (TP4056), whose output is connected to the 18560-lithium battery. A 5V step-up voltage booster is also connected to the battery and is used to convert from 3.7V dc to 5V DC. Some pins were soldered to the bottom of both modules (TP4056 and booster), to allow easier connection to a breadboard. If you don't to use a breadboard, you might connect the components with wires and solder them. At this point it is required to power the Arduino Uno, connecting it to booster's USB connector, and your Arduino will work until the battery is depleted. When there is enough sun light, the battery will automatically start to charge. Notice that the TP4056 input is limited between 4.5 and 5.5V. In this circuit there is no voltage limiter between the solar panel and the battery charger. A Zener diode might be used limited the voltage and protect your circuit. Depending on your power consumption, your battery will discharge quickly The Solar mobile charger using Arduino circuit diagram is given below in figure 2.

After the timer circuit is working, connect it output to Arduino 5V and GND pins. It will look like the one in the Figure above. The Arduino will be powered every 5 minutes and stay on for 27 seconds. You might change those values selecting different values for the resistors and capacitors as described earlier.

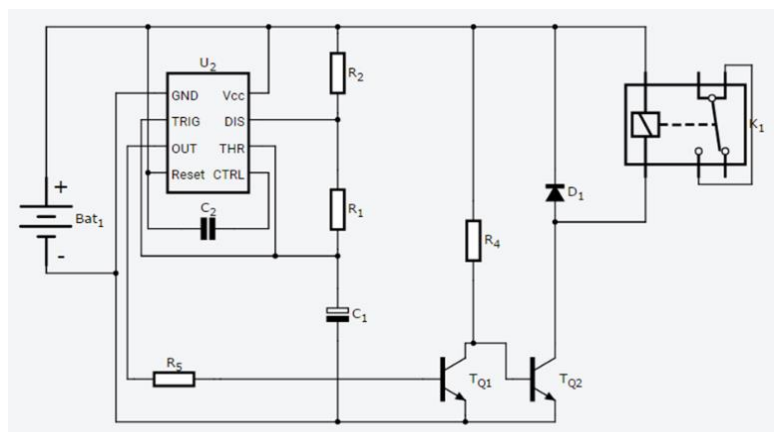


Figure 2: Proposed System

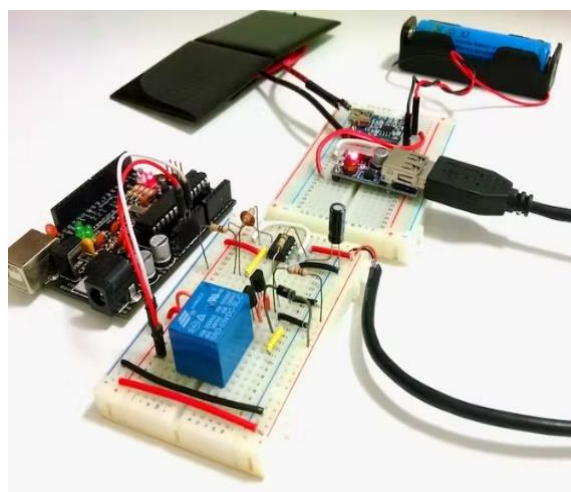


Figure 3: Assemblage of solar power battery with Arduino

CONCLUSION

This research has successfully developed a device capable of converting solar energy into electrical energy automatically and in real time. This study has succeeded in developing equipment that can convert DC electric power into 10 W AC power, so it can be utilized to fulfill the electrical power supply of office equipment or electronic equipment that is used every day. It is expected that this research can be developed again so that it can produce a larger electric power by optimizing the storage of electrical energy generated by solar cells. This exploration has successfully developed a device able of converting solar energy into electrical energy automatically and in real time. This study has succeeded in developing outfit that can convert DC electric power into 10Watt AC power, so it can be employed to fulfill the electrical power force of office outfit or electronic outfit that's used every day. It's anticipated that this exploration can be developed again so that it can produce a larger electric power by optimizing the storehouse of electrical energy generated by solar cells.

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IoT Based Industry Protection System using Embedded C and Arduino

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Abstract

This work is done for the purpose of advanced protection system of industries using Arduino. It is an IoT based system which is designed to protect industries from losses due to accidents and report it on your smartphone or other devices using on the application of wireless communication. Different components such as light sensor, gas sensor, temperature sensor, fire sensor have been used to make this project. Using Arduino Mega, it is able to serve number of different sensors at the same time making it more convenient to use. Several design criteria have been used in this system. The working of this model has been tested indoors and the sensors used are perfect in detecting and sending the necessary signals to the user through Arduino. Overall, this work provides us a platform that monitors the parameters and helps to create better and pollution free future life.

Keywords

Embedded C, Gas Protection, Arduino, Programming, Sensors.

INTRODUCTION

The IOT industry protection system using Arduino is a system designed to protect industries from losses due to accidents using Internet of things. Gas leakages may lead to fires leading to huge industrial losses, also instant fire detection is needed in case of furnace blasts or other conditions. Also, low lighting in industries may create improper work conditions increasing the probability of accidents. The system makes use of Arduino to achieve this functionality. The main goal of our project is to create a system that makes use of temperature sensing along with light and gas sensing to detect fire, gas leakage as well as low lighting to avoid any industrial accidents and prevent losses. The system consists of light, gas and temperature sensors interfaced with Arduino and LCD screen. The sensor data is constantly scanned to record values and check for fire, gas leakage or low light and then this data is transmitted online. The Wi-Fi module is used to achieve internet functionality. The following are the steps to be used:

- Coding the software using embedded C.
- Simulation of the project using Tinker cad.
- Working of the project using all the hardware mentioned in the deliverables.

SOFTWARE AND TOOLS USED

Hardware tools

- Temperature Sensor
- Gas Sensor

- Fire Sensor
- Light Sensor
- Fan
- Lamp
- Wi-Fi module
- LCD Display
- Rectifier
- Arduino MEGA
- Buzzer
- Temperature Sensor
- Fan
- LED
- Jumper Wires
- Resistor

Software

- Arduino IDE 2.0
- IOT (wi-fi)

Block diagram & Description

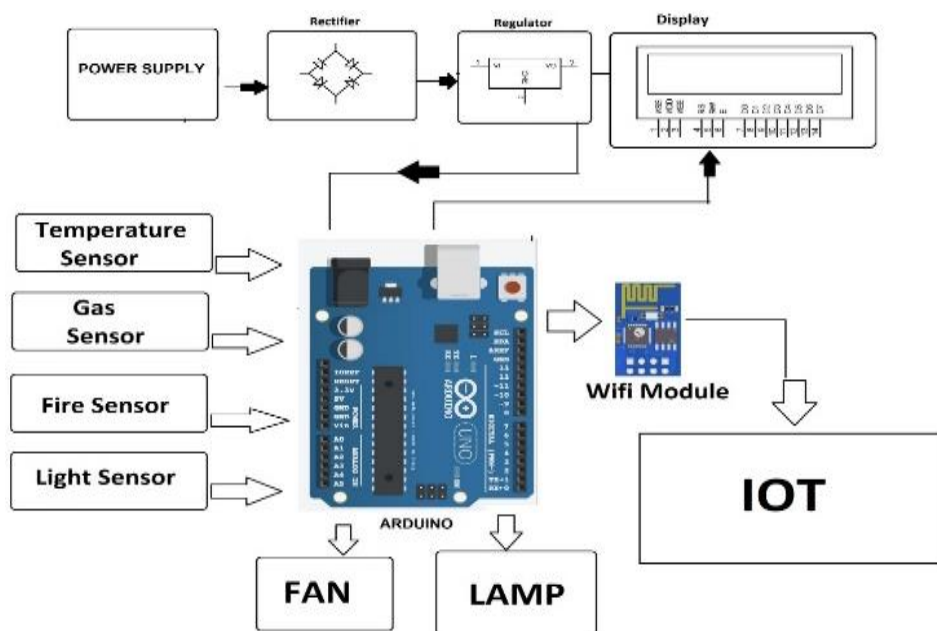
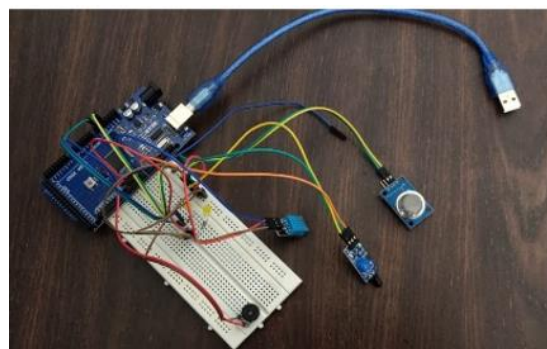


Figure 1: Block diagram of the project.

Results (Model's Image)



Challenges faced

- Generally, laboratories contain many chemicals, in that many are reactable to high temperature or heat. So, every lab must contain this smoke detection so that vigorous reaction of chemicals with fire can be avoided. But the complete range of the sensors is limited and hence there is a need for multiple systems to exist.
- Most of these devices and IoT products don't get enough updates while some don't get critical security updates at all.
- To protect their customers against such attacks, each device needs proper testing before being launched into the public and companies need to update them regularly.
- Lack of proper data protection can be one of the critical IoT security concerns. This issue can occur because of hazardous communications or data storage.

CONCLUSION

The IOT industry protection system using Arduino is a system designed to protect industries from losses due to accidents using Internet of things. Gas leakages may lead to fires leading to huge industrial losses, also instant fire detection is needed in case of furnace blasts or other conditions. Also, low lighting in industries may create improper work conditions increasing the probability of accidents. The system makes use of Arduino to achieve this functionality.

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Invasive Vehicle Detection System

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Abstract

Parking of vehicles in areas with heavy traffic, in front of gates, narrow roads, often leads to traffic congestion and driver frustration. Inefficient and improper parking behavior is caused due to the lack of information and monitoring of such areas. Constant monitoring of the areas by people would be a demanding task owing to the large number of such areas in the country and the amount of vehicle users. Tracking them down and taking action manually would be inefficient. Smart parking sensors and technologies can be used for this purpose. It can be used to automatically detected the parked vehicles in the restricted areas and alert the driver to move the vehicle away from that spot. Magnetometers, ultrasonic sensors and machine vision are a few of the sensors and technologies that can be implemented for this purpose. In this study an ultrasonic sensor has been used to the object using ultrasound waves.

Index Terms

Invasive, Ultrasonic, Sensors, Traffic Congestion, Smart Parking, Computer vision, Arduino UNO.

INTRODUCTION

Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound. It sends an ultrasonic pulse out which travels through the air and if there is an obstacle or object in its path, it will get reflected back to the sensor. Once the transducer receives this wave, a signal is sent to the module which carries out the alert system which is under a timer of 1 minute. Therefore, the sensor is able to detect the object and alert the driver to move the vehicle out of the restricted parking area automatically without any human input or monitoring. This sort of automation helps in decreasing traffic and road rage and can ensure proper flow of traffic without any human intervention [1].

GENERAL DESCRIPTION

Overview of the system

Increasing number of cars as a result of population growth across the globe continue to put pressure on road network infrastructure. The resultant effect of this pressure on the road network is congestion and traffic jams. Intelligent Transport System (ITS) a technology that

bring into play various sensing and connection devices that makes it possible for traffic flow, density and speed to be estimated and information used for decision making to help improve the traffic flow [2]. Security System for Invasive Vehicle Detector is aimed at bringing down sudden accidental events caused due to the invasive parking of vehicles at wrong areas on main roads and on sidewalks of buildings in metro cities.

PROPOSED SYSTEM

When a vehicle moves into the detection area, it gets detected by the sensor using ultrasonic waves. This gives a signal which triggers the timer. If the object is continually detected by the sensor for a minute, another signal is sent which triggers the buzzer and the led which act as alerts. The alert gets disabled when the object moves out of the detection area. The timer gets reset, if the object moves out of the detection area before a minute on the timer, the alert is automatically disabled and the timer gets reset. The methodology adopted for the study has been shown in figure1.

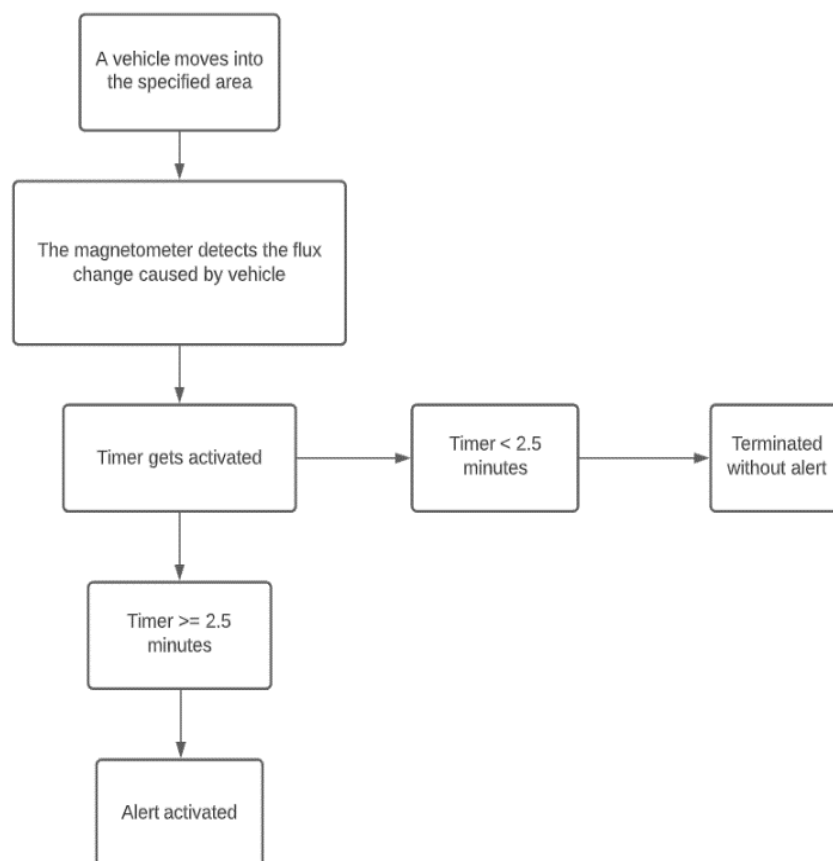


Figure 1: Methodology adopted for the study.

HARDWARE, SOFTWARE AND TOOLS USED

The following hardware, software and tools have been used in carrying out this study.

Hardware

The hardware used in this study have been listed below:

- Arduino UNO
- Breadboard (generic)
- Buzzer

- LED (generic)
- Ultrasonic sensor
- Resistor (220 kΩ)
- Jumper wires

Software

The following software have been used in this study. Embedded C is the language used for the code. Arduino IDE for the compiling.

Tools Used

To prepare a model the following tools have been used.

- Soldering Kit
- Wire Cutters

EXPERIMENTAL SETUP

Simulation Study Using Tinkercad

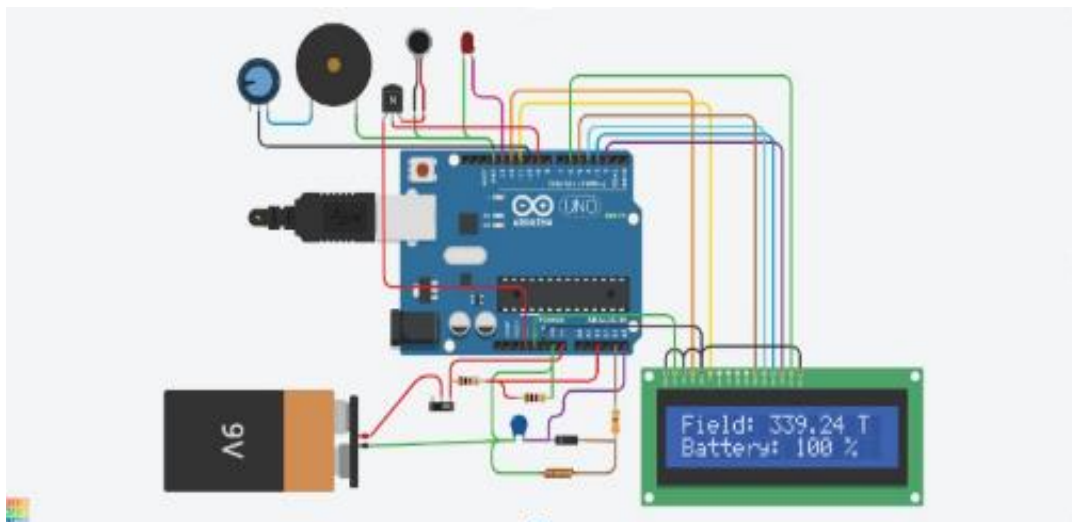


Figure 2: Tinkercad circuit diagram

The wire connections made between the components have been shown in figure 3.

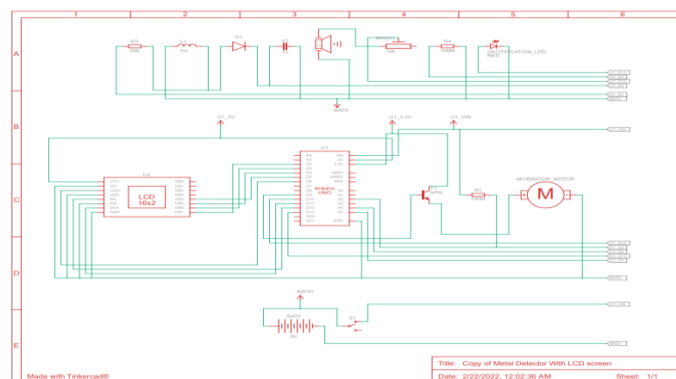


Figure 3: Wire connections made between the components

In this study, the reverse voltage of inductor (which will act as detector coil) will be converted into magnetic field detector, which displays on LED. It also displays the remaining battery

percentage on the LED display. The potentiometer before the buzzer control sound output. Notification is provided through vibrator motor, Red LED, and buzzer. The change in sensitivity of coil be done by changing resistance value of resistor connected before diode and coil.

Working Model

The use of ultrasonic detector for identification of the status of parking slots in a smart parking system [3]. The invasive vehicle information acquisition system proposed in this study has been implemented with basic open-source microcontroller, ultrasonic sensor, and data communication channel that transmit the state of invasive vehicle to a computer system (server). An Arduino UNO, an Ultrasonic Sensor, and a laptop were primarily used for the acquisition and processing of the signals captured for this experiment. The invasive vehicle detection model has been shown in figure 4.

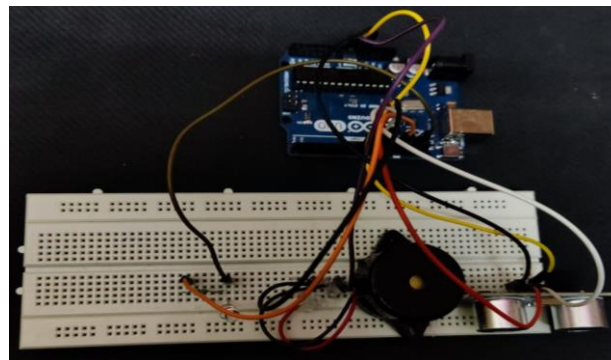


Figure 4: Invasive vehicle detection model

Connections

The HC-SR04 Ultrasonic Module has 4 pins, Ground, VCC, Trig and Echo. The Ground and the VCC pins of the module needs to be connected to the Ground and the 5 volts pins on the Arduino Board respectively and the trig and echo pins to any Digital I/O pin on the Arduino Board.

The HC-SR04 sensor attach to the Breadboard

The Sensor VCC connect to the Arduino Board +5V

The Sensor GND connect to the Arduino Board GND

The Sensor Trig connects to the Arduino Board Digital I/O 9

The Sensor Echo connects to the Arduino Board Digital I/O 10

Buzzer and LED

The Buzzer attaches to the Breadboard

The Buzzer long leg (+) connect to the Arduino Board Digital 11

The Buzzer short leg (-) connect to the Arduino Board GND

The LED attach to the Breadboard

The Resistor connect to the LED long leg (+)

The Resistor other leg (from LED's long leg) connect to the Arduino Board Digital 13

The LED short leg (-) connect to the Arduino Board GND

Code

```
// defines pins numbers
  const int trigPin = 9;
  const int echoPin = 10;
  const int buzzer = 11;
  const int ledPin = 13;
// defines variable long duration;
  int distance;
  int safetyDistance;
void setup()
{
  pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
  pinMode(echoPin, INPUT); // Sets the echoPin as an Input
  pinMode(buzzer, OUTPUT);
  pinMode(ledPin, OUTPUT);
  Serial.begin(9600); // Starts the serial communication
}
void loop() {
// Clears the trigPin
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
// Sets the trigPin on HIGH state for 20 micro seconds
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(6000);
  digitalWrite(trigPin, LOW);
// Reads the echoPin, returns the sound wave travel time in microseconds
  duration = pulseIn(echoPin, HIGH);
// Calculating the distance
  distance= duration*0.034/2;
  safetyDistance = distance;
  if (safetyDistance <= 5)
  {
    digitalWrite(buzzer, HIGH);
    digitalWrite(ledPin, HIGH);
  }
}
```



```
Else
{
  digitalWrite(buzzer, LOW);
  digitalWrite(ledPin, LOW);
}
// Prints the distance on the Serial Monitor
  Serial.print("Distance: ");
  Serial.println(distance);
}
```

RESULTS AND DISCUSSIONS

The model on testing was successful in detecting the object in front of it and giving alert in the form of the buzzer beeping and led light blinking. When the object is placed in front of the sensor for 60 seconds, the ultrasonic sensor detects the presence of the material. The sequence of happenings with reference to sensing and identifying the vehicle has been depicted in the figures 5 and 6.

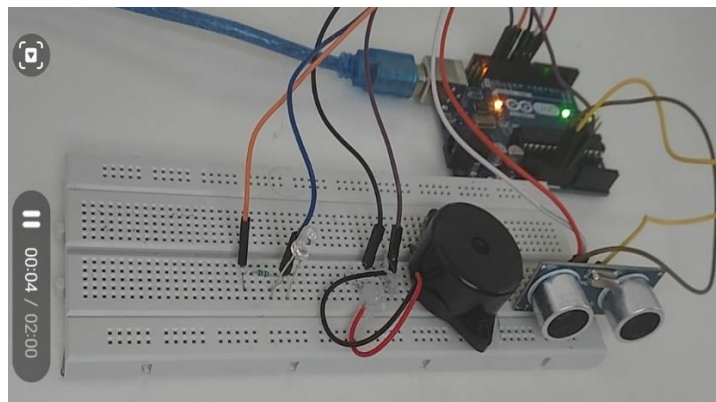


Figure 5: System set ready for vehicle detection

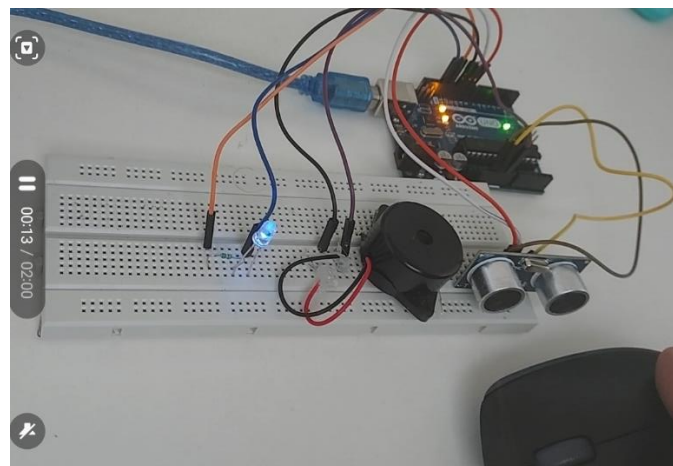


Figure 6: System recognizes invasive vehicle in restricted location

It gives out output in the form of beeping that lasts another 60 seconds until it resets. In a case where the object is moved away from the range of the Ultrasonic Sensor(50m), the timer will reset back to zero, thus avoiding an unnecessary alert. The Ultrasonic Sensor model is the very simplest version of the project. It is less efficient and less accurate. The more efficient ways of vehicular detection is by using a Magnetometer which can accurately detect vehicles better than an Ultrasonic Sensor. Artificial intelligence can also be employed for more accurate detection. The existing project only provides an alert for the surrounding that there is an invasive vehicle in the spot. With further developing the project using AI and IT, provisions can be made to send a message to the phone of a concerned individual that there is a vehicle that should be moved away immediately before it hindering the traffic.

CONCLUSION

The invasive vehicle detector using ultrasonic sensors is a simple, yet effective solution to traffic congestion in restricted areas and narrow roads. It uses noninvasive ultrasonic waves to detect vehicles and alert drivers to move their vehicles from the area. It is a simple, affordable device that can be used to reduce manual labor in such a case. Experimental results show that such method can effectively be used to identifying the invasive vehicle and therefore minimizing the inconvenience to the residents of the building located in busy business areas of the cities in developing countries. An ultrasonic sensor is the simplest sensor which can be used for this purpose. By substituting the sensor with a magnetometer, or even using artificial intelligence and machine learning, we will be able to provide higher detection accuracy.

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Smart Glove for Especially Abled People

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Abstract

According to WHO 39 million peoples are predicted as blind worldwide. Our project, the smart glove for the in particular abled human beings is an innovation which facilitates the blind and deaf human beings to navigate with speed and self-belief with the aid of using detecting the close by boundaries the usage of the assist of ultrasonic waves and notify them with buzzer sound or vibration. They most effective want to wear this tool as a band or cloth, and product does now no longer price extra than Rs.1,500.

Index Terms

Arduino, Blind, Deaf, Smart Glove, Disabled People.

INTRODUCTION

The especially abled people, especially the blind and deaf face a lot of hardship in their daily life. It has been found through surveys that over 40% of the blind population face accidents every year. One of the main reasons for these accidents is due to the lack of access and presence of any innovative solution for them. The only possible solution for them is to use a traditional white cane or to buy a trained guard dog, which usually cost over 2 to 2.5 lakhs. Our project the smart glove for the especially abled people is an innovative project designed to provide an alternative option which is better than the traditional white cane and cheaper than a guard dog.

GENERAL-DESCRIPTION

Overview of the system

The smart glove for the especially abled is a band which can be either worn on the hand using the band or around the neck using a chain and which uses ultrasonic sound waves and a buzzer to detect obstacles on the path of the especially abled and alert them of it. It is one of the first wearable innovative technology which is made to help the blind population.

PROPOSED SYSTEM

This is the first wearable technology for blind as well as deaf humans which resolves all the troubles of current technologies. The one of the predominant peculiarities of this innovation is, it's far less costly for everyone, the overall fee being much less than 1500INR. There aren't any such gadgets to be had withinside the marketplace that may be worn like a sequence and having this sort of low fee and simplicity. When used on a large scale, with enhancements withinside the prototype, it'll notably advantage the community. The system uses ultrasonic sound sensor, which uses the sound waves to calculate distance between the obstacle and the

person. When the distance is less than 1.5 meters the sensor alerts the person via the buzzer, and hence helps the person traverse quickly.

EXPERIMENTAL SETUP

The requirements of building the glove were 1 Arduino Uno, 1 9V Battery, Jumper Cables, 1 Battery Holder, 1 LED, 1 wearable elastic band, 2 100 Ω Resistors, 1 supersonic distance sensor, 1 buzzer, 1 vibration motor, 1 plated board. These materials were enough to create a much affordable device for the blinds and deaf people.

RESULTS AND DISCUSSIONS

The project as shown below in the Figure 1 worked out as intended and was found to be a better alternative for the blind population. It was further found that the device could be further improved by involving more sensors in order to cover any and all blind spots created by using only one sensor.

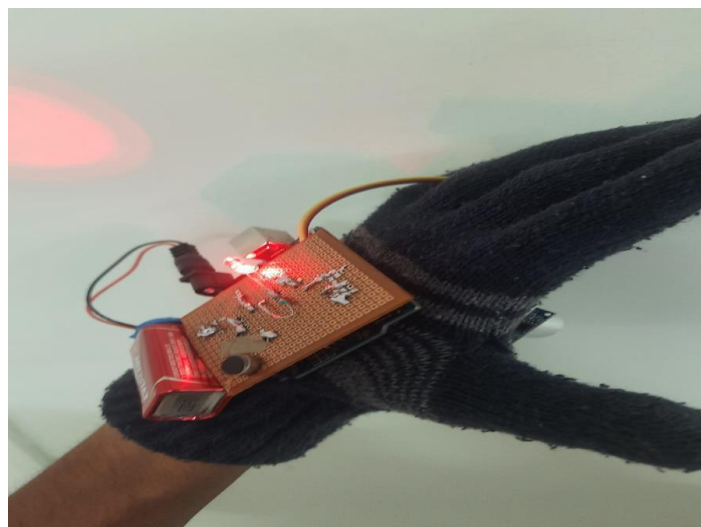


Figure 1: Smart Glove

CONCLUSION

In this paper, we discussed about the project can make the life of blind people easier, it is much affordable and easy to carry. Not only for blind, it would be also helpful for people who are blind and deaf as we have installed vibration motor which they can sense when an obstacle is detected.

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Experimental Analysis of Recycled Concrete Aggregate as a Sustainable Construction Material

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Abstract

Construction industry plays a vital role in the development of a country. However, the generation of construction and demolition has an impact on the environment. This paper highlights the properties of Recycled Concrete Aggregates (RCA) in comparison to the properties of Natural Aggregates (NA) as per the Indian standards. The utilization of recycled concrete aggregates (RCA) has a secondary raw material in construction has been practiced. The RCA has used in proportion with natural aggregate in the preparation of concrete, which helps in conserving natural resources and reducing the environmental impact. In this paper an attempt has been made to draw the conclusions based on the experimental studies carried out at the concrete technology laboratory of Presidency University, Bengaluru, regarding the efficient utilization of RCA in preparing recycled aggregate concrete (RAC).

Keywords

Recycled Concrete Aggregates (RCA), Recycled Aggregate Concrete (RAC), Natural Aggregates (NA), Natural Aggregates Concrete (NAC).

INTRODUCTION

General

Recently, the increased rate of industrialization and urbanization has led to a great global demand for concrete materials. This increasing demand for concrete has increased the consumption of coarse and fine natural aggregates, which account for around 70% of the total concrete volume in a concrete mix. Meanwhile, the rapid urbanization witnessed in recent years has also resulted in an extensive increase in the rate of demolition of old structures, prompted by the limited availability of new construction site. [Tianyu Xie Aliakbar Gholampour and Togay Ozbakkaloglu, 2018].

The use of recycled aggregates to make concrete is becoming more common, thus making it possible to reuse demolition materials and create a more sustainable construction cycle. The use of recycled fines and coarse aggregate in concrete production has been widely studied, and it has generally been observed that the quality and strength of the concrete decrease slightly as the percentage of replaced aggregate increases. [Nieto, PhD; E. Dapena, PhD; P. Alaejos,

Ph.D. ; J. Olmedo, Ph.D. ; and D. Pérez, 2018]. It has been recognized that destroyed building and construction waste volumes are large and increasing every year. The problem of waste accumulation and management exists in different countries. Most of construction wastes are used or left as a landfill material. Environmental side effect can be reduced by making more sustainable use of the construction waste.

IS: 456 or IRC: 112 do not permit use of aggregate other than those obtained from natural sources and conforming to IS: 383. The most significant factor is that recycled concrete aggregate contain not only the original aggregate, but also hydrated cement paste adhered to the surface. This paste reduces the specific gravity and increases the porosity, compared to similar virgin aggregates. [Dr. A. K. Mullick, 2015].

In India 70% of the construction industry is not aware of water management and waste recycling. All these data pointing to the importance of waste management in the construction industry. Considering this, the objectives of the study has been to ascertain the properties of M30 grade concrete with various proportion of natural aggregates (NA) and recycled concrete aggregates (RCA).

Methodology

The steps followed in the methodology adopted for the study has been mentioned as below:

- Evaluation of preliminary tests on recycled concrete aggregates and natural aggregates.
- Mix design is done as per IS 10262-2019 and IS 383-2016
- Determining the workability of fresh concrete by Slump test of all mix proportion. Casting of cubes, cylinders and beams for both recycled aggregates and to test for Compressive strength, flexural strength test of concrete.
- The methodology adopted for the study is shown in the figure 1.

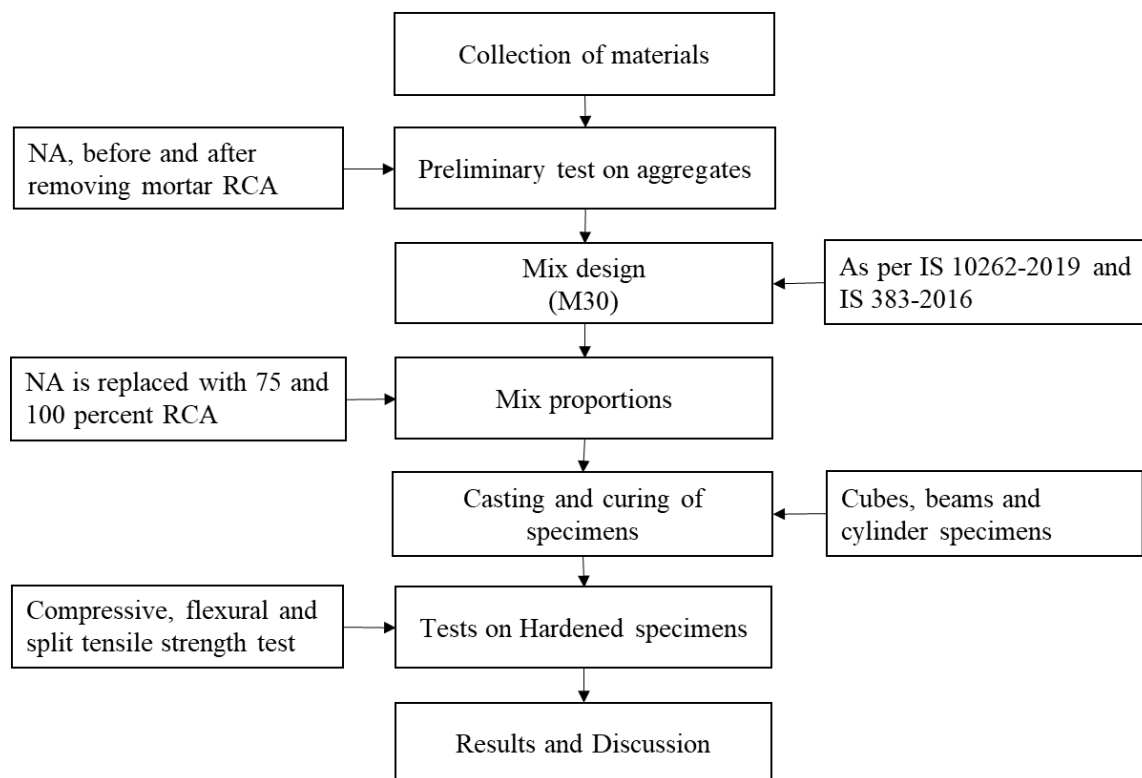


Figure 1: Methodology adopted for the study

Materials

Ordinary Portland Cement of grade 43 conforming to IS 8112:2013 was used in the Project. Clean portable water is used in the investigation as per the requirement mentioned in IS 456:2000. It is necessary to provide adequate assurance that RCA conforms to standards common to NA. The properties of RCA were tested in accordance with the relevant tests specified in IS 383:2016. Along with Recycled concrete aggregates, Natural aggregates were also tested and the results served as a basis for comparison. The recycled fine aggregates and coarse aggregates were sourced from rock crystal Kerala crushers in maranayakanahalli, Bengaluru.

Proportion of Natural aggregates with recycled concrete aggregates

RCA includes both recycled coarse aggregates and recycled fine aggregates which is used in the concrete mix, corresponding to the following ratios as shown in Table 1.

Table 1: Material quantity for mix design

Particulate	Material quantity for mix design for water cement ration 0.46
Sample 1	100% NA: 100% M-sand: Cement
Sample 2	75% RCA+25% NA: Cement
Sample 3	100% RCA: Cement

RESULTS AND DISCUSSION

The experiments have been carried out in this study using RCA, the test results are given below:

Workability

The slump cone test was conducted to check the variation in workability of concrete produced by replacing virgin aggregates by recycled aggregates at varying percentage. The workability of each concrete batch was evaluated by slump test conducted as per the standards mentioned in IS1199, 1959. As evident from the results of the slump test shown in Table 2, the workability of RACs reduced with an increase in the RCA percentage.

Table 2: Below table shows workability

Particulate	Design Slump Value 75 mm
Sample 1	65
Sample 2	60
Sample 3	59

The graphical representation of variations in the workability are shown in the figure 2.

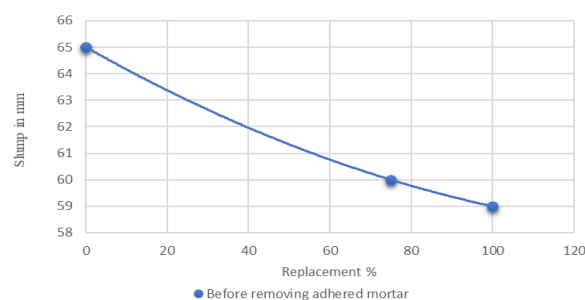


Figure 2: Graph of slump test before removing adhered mortar

Compressive Strength test

The compressive strength of concrete is the most important mechanical property of hardened concrete as it gives the overall picture of the quality of concrete. The compression test was conducted on specimens after seventh day and twenty-eight day of curing. The cubes are casted as per the proportion shown in the table 1 of size 150mm and the cubes are removed from the mould, usually this done after 24 hours and kept in water for curing.

The compressive test was conducted as per the standards mentioned in IS:516-1959 [Reprint 2006]. The results of natural aggregates compressive strength are shown in the table 3.

Table 3 Results of compressive strength test before removing adhered mortar on RCA

Particulate	7 days	28 days
Sample 1	19.8 Mpa	42.9 Mpa
Sample 2	17.3 Mpa	32.8 Mpa
Sample 3	15.0 Mpa	29.0 Mpa

The average compressive strength of various concrete mixes tested for 7 and 28 days respectively are shown in figure 3.

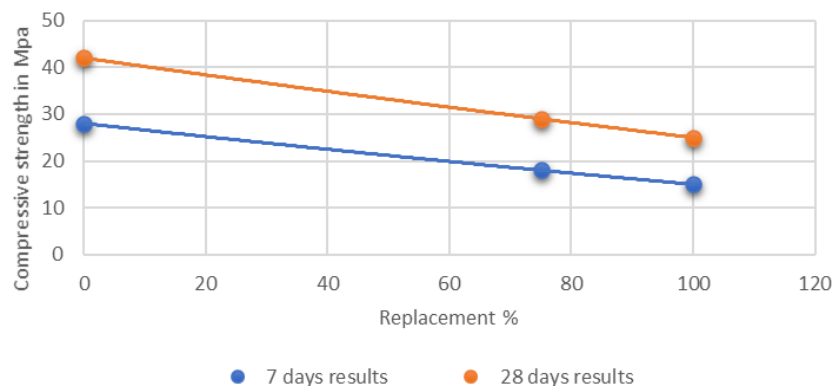


Figure 3: Graph of compressive strength of RCA

Flexural Strength test

The flexural strength of each concrete series was determined using two-point load bending test conducted according to IS:516-1959 [Reprint 2006]. It tests the capacity of the slab or unreinforced concrete beam to endure bending failure. A 100*100*500 mm beams were tested for each mix at the concrete age of 7 and 28 days. This observation can be attributed to the decrease in the strength of the aggregate mortar with an increase in the amount of recycled aggregate in the concrete, resulting in a lower mechanical strength under flexural strength as shown in the table 4.

Table 4 Results of flexural strength test before removing adhered mortar on RCA

Particulate	7 days	28 days
Sample 1	3.82 Mpa	4.16 Mpa
Sample 2	3.25 Mpa	3.51 Mpa
Sample 3	3.09 Mpa	3.19 Mpa

DISSCUSION

The comparison of Natural aggregates and recycled coarse aggregates are discussed below :

Compressive strength test

The main influence is on the strength characteristics of concrete made with RCA, which is generally lower than that made with virgin aggregate. The reason for the loss of strength is due to the aggregate already having a coat of weak mortar attached on its surface. Typical results of 28-days compressive strength of concrete with different proportions of recycled concrete aggregate, which were subjected to the number of revolutions and normal mixing are shown in Figure 4.

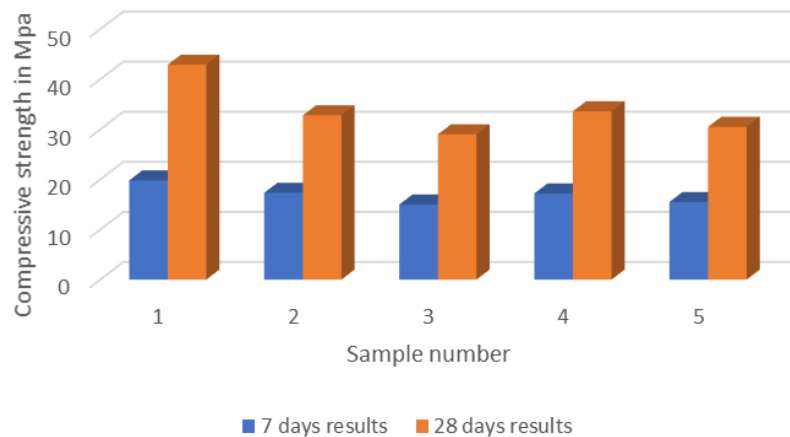


Figure 4: Comparison graph of compressive strength test

Flexural strength test

The decrements occur in flexural strength when replacement of RCA with virgin aggregates at 28 days. The variations in the results of the flexural strength tests conducted for comparison of virgin aggregates, before and after removing adhered mortar on RCA are shown in Figure 5. However, the flexural strength seemed to be less affected when without removed adhered mortar aggregates (RCA) are used. Then the flexural strength is slightly increased with after removing adhered mortar on the recycled coarse aggregates (RCA).

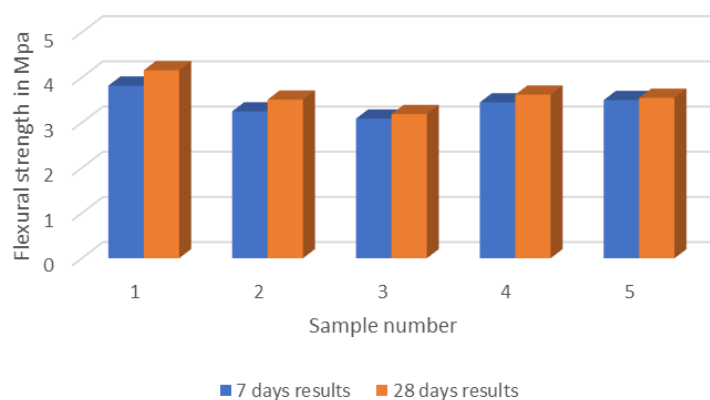


Figure 5: Comparison graph of Flexural strength test

CONCLUSION

An experimental study on the mechanical properties of concretes prepared with recycled concrete aggregates has been presented. Based on the results and discussions presented in this study on the different RCA mixes of compressive, flexural and the following specific conclusions are drawn.

- From this study we came to know that recycled concrete aggregates can be used for non-structural construction. However, the RCA does not fulfill some of the specifications given in IS:383, so it should be blended with NA of improved properties.
- As water absorption of RCA is higher, hence, we may require slightly more water in making concrete as required by Indian Standards.

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Intelligent Irrigation System to Conserve Water

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Abstract

Intelligent irrigation technology uses weather data or soil moisture data to determine the irrigation need of the landscape. Intelligent irrigation technology maximizes irrigation efficiency by reducing water waste, while maintaining plant health and quality.

Index Terms

Arduino Uno, Circuit, Jump wire, Liquid crystal display, Sensor.

INTRODUCTION

Intelligent Irrigation

Present generation has become smart using technologies. So smart technologies have become order of the day. As the technology is getting advanced everything is becoming automatic and smart in our usage. Using smart devices helps to increase the efficiency which enhances the capability and helps to minimize the cost. Similar to the gadgets what we use in our day-to-day activities at home in Irrigation system also these smart technologies can be adopted then we may term it as Smart Irrigation system. Earlier India enjoyed abundant water resources. But now population growth and overexploitation has led to a situation where there is demand for water. From the survey we can clearly see how the water percentage is reducing year by year from 1960 to present. If the rate continues it leads to water scarcity. So there is an emergency to conserve water. The reason behind this shortage of water is using traditional system of irrigation During traditional system requirement of water to plants is not monitored properly when the soil is moist enough water is still provided to plants. This excess amount of water is not absorbed by the plants and is wasted thus, to monitor the water requirement of the plants a system is needed. Implementing smart irrigation helps to decrease the loss of water caused by using traditional system.

General-description

The Indian agriculture was dependent on monsoons which does not have sufficient source of water. This automatic irrigation system was implemented to provide water to plants according to their moisture level and soil type. By using this intelligent irrigation concept, we can bring back the greenery which is going to vanish because of the rapid urbanization. It was proposed to help the farmers to get the good yield. Now we can use this concept in the cities as well as to have the environmental protection. As smart city means everything done in a smarter way this intelligent irrigation also done with the smart way using the sensors of the required type which can water the plant at a required time resulting in the healthy growth.

PROPOSED SYSTEM

The intelligent irrigation system aims at:

- To conserve water and bring down the human intervention in the agricultural practices.
- To make the soil water sensor work at providing water to the crop.
- Monitoring the status of sensors and provide signal for taking necessary action.

Experimental Setup

- Components
- Arduino Uno board
- Connectors (jumping wires)
- Moisture sensors
- Motor
- USB connectors

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.

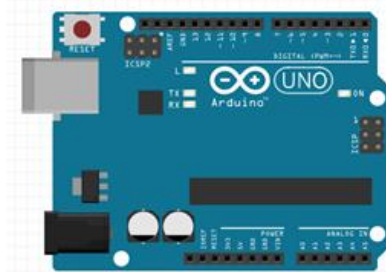


Figure 1: Microcontroller (Arduino Uno)

A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire or cable) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

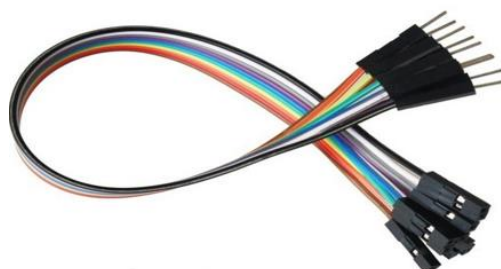


Figure 2: Jump wire

Soil moisture sensors measure the volumetric water content in the soil. The two probes of the moisture sensor are connected to LM293 comparator. This sensor uses the two probes to pass current through the soil, and then it reads that resistance to get the moisture level.

The Soil Moisture Sensor uses capacitance to measure the water content of soil (by measuring the dielectric permittivity of the soil, which is a function of the water content). The output from the sensor is an analog voltage value between 0 to 5V, which is linearly proportional to the moisture percentage of the soil.

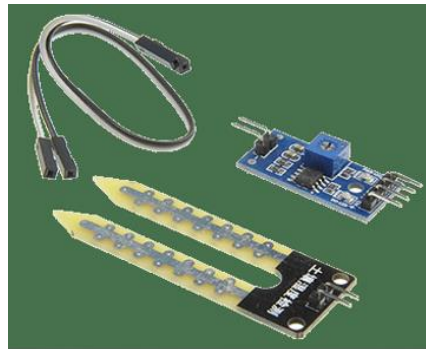


Figure 3: Soil moisture sensor

Analyze and understand all the provided review comments thoroughly. Now make the required amendments in your paper. If you are not confident about any review comment, then don't forget to get clarity about that comment. And in some cases there could be chances where your paper receives number of critical remarks. In that cases don't get disheartened and try to improvise the maximum.

Circuit Diagram:

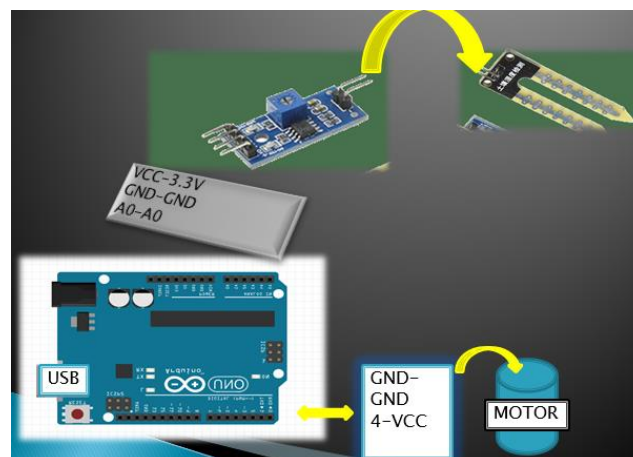


Figure 4: Connection system

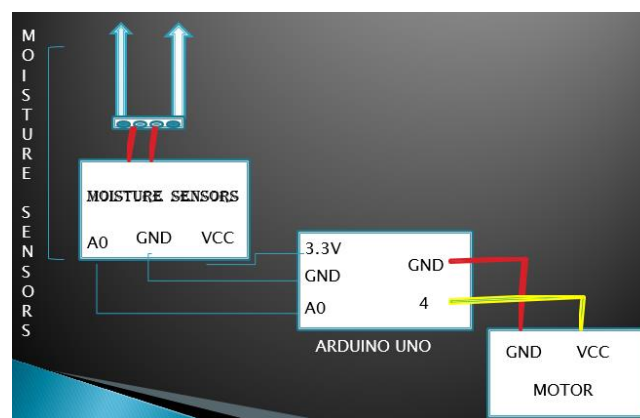


Figure 5: Circuit layout

VCC = "voltage common collector",

VCC i.e Voltage Common Collector is the operating voltage with respect to ground or 0V. In the case of Arduino Uno (the most common one used nowadays), it is 5V. It will change according to the board version you are using depending upon the microprocessor's rating GND- The GND pins are used to close the electrical circuit and provide a common logic reference level throughout your circuit. A0-The analog pins can be used identically to the digital pins, using the A0 (for analog input 0)

Coding:

```
// code starts here
```

```
int sensor_pin = A0; // Soil Sensor input at Analog PIN A0
```

```
int output_value ;
```

```
void setup() {
```

```
  // put your setup code here, to run once:
```

```
  pinMode(4,OUTPUT);
```

```
  Serial.begin(9600);
```

```
  Serial.println("Reading From the Sensor ...");
```

```
  delay(2000);
```

```
}
```

```
// put your main code here, to run repeatedly:
```

```
void loop() {
```

```
  output_value= analogRead(sensor_pin);
```

```
  output_value = map(output_value,550,10,0,100);
```

```
  Serial.print("Mositure : ");
```

```
  Serial.print(output_value);
```

```
  Serial.println("%");
```

```
  if(output_value<0)
```

```
  {
```

```
    digitalWrite(4,HIGH);
```

```
  }
```

```
  Else
```

```
  {
```

```
    digitalWrite(4,LOW);
```

```
  }
```

```
  delay(1000);
```

```
}
```

```
//Code ends here
```

Working of Automatic Irrigation System

The power supply consists of a step-down transformer, which steps down the voltage to 12VAC.> By using a bridge rectifier this AC is converted to DC, then it is regulated to 5v using a voltage regulator that is used for the operation of the microcontroller. Automatic Irrigation System comprises three main components namely a microcontroller, a motor-driver circuit and a sensor circuit. When the sensor circuit senses the condition of the soil, it compares it with the reference voltage 5v. A 555 timer does this process.

When the soil condition is less than the reference voltage, i.e., 5v, then the soil is considered as dry and instantly the 555 timer sends the logic signal 1 to the microcontroller. The microcontroller then turns on the motor driver circuit and prompts the motor to pump water to the plants. When the soil condition is greater than the reference voltage, the soil becomes dry. Then the timer sends the logic signal 0 to the microcontroller, this turns off the motor driver circuit and prompts motor to pump water to the fields Finally, the condition of the motor and soil are displayed on the LCD. It is followed by analyzing of the data by micro controller and has programmed in such a way that it sends the data to control flow of water depending upon the given priority.



Figure 6: Liquid crystal display



Figure 7: Experimental Setup

RESULTS AND DISCUSSIONS

Maximum absorption of the water by the plant is ensured by spreading the water uniformly using a servo motor. So, there is minimal wastage of water. This system also allows controlling the amount of water delivered to the plants when it is needed based on types of plants by monitoring soil moisture and temperature.



Figure 8: Working of moisture sensor

CONCLUSION

In present days especially farmers are facing major problems in watering their agriculture fields, it's because they have no proper idea about when the power is available so that they can pump water. Even after then they need to wait until the field is properly watered, which makes them to stop doing other activities. Here is an idea which helps not only farmers even for watering the gardens also, which senses the soil moisture and switches the pump automatically when the power is ON.

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Flexible Street Lamping System to Minimize Energy Consumption and Enhance the Life of Street Lamps

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Abstract

Street lamps are one of the desirable features rendered by local municipal in every town. Flexible street lamping system (FSLs) is an Adaptive Street Lamp (ASL) technique, which adapts to movement by pedestrians, cyclist and any vehicles. This FSLs is completely different from traditional technique or dimmable street lighting that dims at predetermined times. This paper benefaction on formation of adaptive street light that dims or switches off when no activity is detected and brightens when movement is detected automatically using Vibration detection and sound detection module. The ultimate intention of adaptive street light is to bring down the energy consumption and to enhance the life of street lamps.

Keywords

Flexible street lamping system (FSLs), Adaptive Street lamp (ASL), Dimmable Street lighting, Vibration detection Module, Sound detection Module.

INTRODUCTION

Approximately 304 million streetlights installed worldwide, street lighting has become a ubiquitous utility that can be found in most urban areas, Effective Street lighting can reduce both crime and traffic collisions, and encourage socio-economic activities at night. Several studies have shown that the installation of street lighting improves the perception of personal safety and security. Although the benefits of street lighting are clear, sustaining its operation has become a concerning issue to local governments, both financially and environmentally. Electric street lighting consumes 114 TWh annually, leading to the emission of 64 million tons of CO₂. As modern cities plough money into intelligent street lamping and traffic congestion monitoring systems, new practices of distributed automated technology are achievable. LED luminaires quickly dimmed and adjusted back to full power to provide the optimum level of light at the right time, even reacting to the movement of individual road users without damage to the luminaire

Streetlights being one of the major sources of energy consumption and energy wastage, it is getting essential to manage the street light energy consumption properly and efficiently. The whole world is going through energy crisis and it is a big challenge for the engineers and scientist to conserve and manage electrical energy properly and to get rid of this problem. Streetlight is a raised source of light that is commonly used along walkways and streets when the surrounding turns dark. Traditional street lamping systems in many areas with very a smaller number of pedestrians are functional most of the night times without purpose. Outcome is very large amount of energy expenditure without any significance. Sensor based adaptive

street lamping system is smarter enough to provide a secure night environment for all pedestrians with lowest level of energy consumption and longer life of lamp. and provides a safe night time environment for all road users including pedestrians with lower energy consumption and longer life of lamp or LED. This Adaptive Street lamp (ASL) technique can reduce energy consumption and maintenance costs and helps to reduce crime activities up to certain limit. And this system is able to send details about energy consumption or any fault of street light can be reported via SMS or via IOT. Figure 1 and Figure 2 are the Conceptual diagram of Adaptive street lamp (ASL) technique.



Figure 1: Conceptual diagram



Figure 2: Conceptual diagram

RELATED WORK

S. Suganya et al [1] have implemented a system about glow of streetlamp in the presence of vehicle movement. This system makes use of recent technology for light source as LED lamps. This technique is also used to maintain the transition of street lamp automatically based on intensity of the light to build a dynamic control system using the technology of Infrared detection and establishing wireless communication between street lamps and maintaining terminals by applying zigbee wireless protocol. Sei Ping Lau et al [2] provided the technique of monitoring the street light based on density of the traffic. By considering the adaptivity of the lighting system, which identifies vehicles and pedestrians. This system is beneficial for reduction of power consumption. But total system is based on wireless network, which is expensive and difficult to control.

To get benefit from WSN network in controlling of street lights, R. F. Fernandes et al [3] proposed a guideline in [3] with aid of smart grid. In this system IEEE based wireless protocols are used for larger networks but implementation of this system is not a feasible in Indian scenario. Sindhu A.M et al [4] designed a system. It gives efficient solution for amount of energy consumption which is attained by IR sensors by sensing approaching vehicles to street pole and switching ON nearby block of street lamps. When the vehicle passes by street lamps switch OFF automatically. This system is mainly based on wireless sensor network.

M. Abhishek et al [5] have proposed a design of traffic light based on control system with utilization of solar energy. They used most abundant renewable resource of energy i.e solar energy for lighting of streetlights with the help of 8052 series microcontroller and they have replaced traditional bulbs with LEDs to reduce power consumption. And by placing sensors on both sides of the road they achieved switching of the street lamps.

METHODOLOGY

Adaptive street lamp (ASL) technique comprises a model a passer-by is detected by a motion sensor; it will communicate this to neighboring streetlights, which will brighten so that people are always surrounded by a safe circle of light. In this system, movement of cars or motor cycles is detected using vibration detection, sound detection module and head light or beam interrupters, but for detecting humans PIR sensor have been used worldwide and shown best performance. Output of these multitudes of sensors at various locations goes to microcontroller and algorithm inside it will decide which streetlight to be made on and which to be made off or dim. Darlington pairs are used to control the light on/off or dimming. On/OFF can be done easily as these transistors can be configured as switch but for dimming current limiters or Pulse width modulation techniques are used.

There are two LDR in system one is for detecting whether its day or night and other is to detect the lamp is ok or faulty. The system becomes online in night/dark time only which is detected by first LDR. Now various types of sensors are there which senses either its vehicle or pedestrian, if pedestrian movement is detected then only one or two lights can be made on for longer duration, where as if car/bike is detected further down the 3-4 lights can be made ON for shorter durations as vehicle travel faster. PIR sensor is good for detecting pedestrians and vibration/sound/metal detectors are good for detecting vehicles.

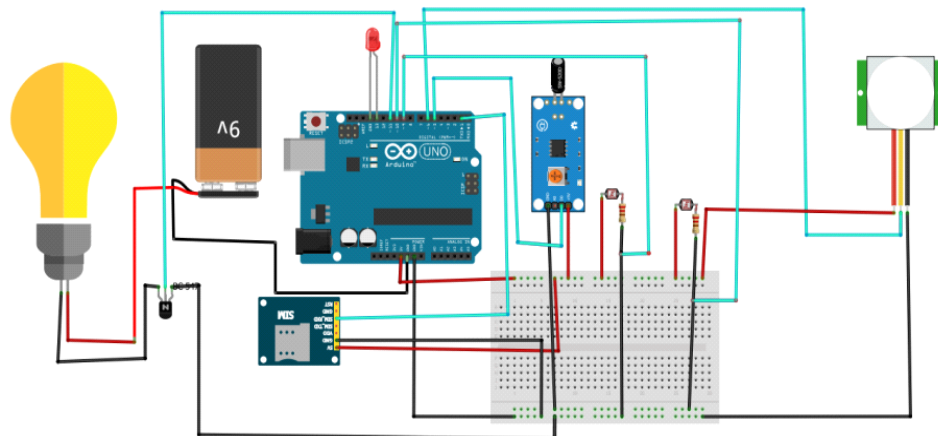


Figure 3: Circuit diagram of Adaptive Street lamp

RESULT AND DISCUSSION

Main intension of this proposed project is minimization of the effects of traditional lighting system and to find effective measures to save energy. The entire set up of designed Adaptive streetlamp (ASL) technique design is shown in the figure 4. Proposed system consists of very minimal set up with two LDR and lamp. So whole connection is an easy, simple and flexible. An external supply is given to Arduino board to flow of current. Two LDR in system help to detect whether it is day or night and to detect the lamp is functional or faulty respectively. The proposed system is functional in night/dark time which can be detected by LDR. If pedestrian is detected only one or two lights be made ON for longer duration and if vehicle movement is detected three to four lights can be made ON for shorted duration as vehicle travel faster.

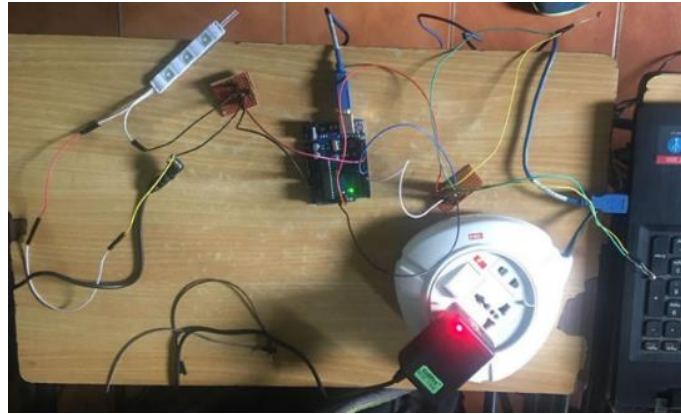


Figure 4: Adaptive streetlamp System

CONCLUSION

This system aims at the design and building of Adaptive Street Lamp (ASL) technique. System works accurately in maintaining the intensity of the street lamp based on movement of vehicles and pedestrians. This proposed technique is suitable for both rural and urban areas. In addition to this system aims at energy savings and minimizing the problem of power theft. The implementation of this technique is very much reliable and simple. Hence conceptualization of smart city initiated by Indian government can be achieved using this system by avoiding power wastage from street lights.

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Smart Adaptive Solar Panel using Arduino UNO

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Abstract

A smart IT-enabled solution to increase the effectiveness and energy output of solar panels is indisputably important in this era of enhanced information technology. Without assistance from a person, the suggested intelligent adaptable solar panel will point itself in the direction of the sun. A self-aligning Solar Panel seems to be unavoidably significant as smart metering initiatives gain pace globally. We use up-to-date quantitative and qualitative data to define the key challenges. Through this project, we want to develop a Smart Adaptive Solar Panel powered by Arduino that automatically orients itself towards sunlight based on the relative location of the sun. To build a Sun Tracking Solar Panel with Arduino, we'll use two LDRs (Light-dependent resistors) to sense light and a servo motor to rotate the solar panel in the direction of the sun. The advantage of this concept is that the solar panels will always face the sun, allowing for continuous charging and maximum energy output. The prototype is quite easy to make.

Keywords

Internet of Things (IoT), Smart Panels, LDR, Sensors.

INTRODUCTION

Renewable energy sources are being used more frequently to generate electricity as non-renewable energy sources are depleted. The use of solar panels is growing in popularity. Solar energy is collected by a solar panel, which transforms it into electrical energy and stores it in a battery. You can utilise this energy as needed or as a direct substitute for grid electricity. The Earth rotates, shifting the Sun's location in relation to the solar panel. Solar panels must be pointed continuously toward the Sun in order to operate at their highest efficiency. The only method to maximise solar energy output is through continuous orientation. Consequently, the solar panel should constantly face the Sun. It is essential to monitor a solar power plant in order to get the most out of it. Solar panel faults, such as dust and other pollutants, can lower the output of the solar panel, making it necessary to monitor the output of these power plants [1]. The cloud-based solution uses an IoT-based solar power monitoring system to give solar monitoring and verify whether there is an issue with the connection between the solar panels by reducing output. The controller that keeps track of all the solar panel's parameters is NODE-MCU ESP8266. Keep an eye on the solar panel and send the information to the Internet of Things (IoT). An alert is sent out as soon as an output drops below a predetermined threshold to inform customers that the solar panel's connections

aren't working properly or that there is dust on the panel. This enables monitoring of the solar panel to guarantee that the maximum quantity of electricity is being generated by it.

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Electricity is essential to India's development and economic expansion. India ranks fourth in terms of energy consumption, behind China, the United States, and Russia. India has a 278.7 GW installed capacity and used 1,010 kWh of total power per person in 2014–15. Despite having cheaper power rates and an increase of 5.54% over 2013–14, the per capita consumption is still modest when compared to many other nations. Around 21% of the world's population does not have access to electricity, according to the nation. India has a 64.5% electrification rate overall, while 35.5% of the population still lacks access to electricity [2]. Wireless sensor networks, sensor networks, 2G/3G/4G, GSM, GPRS, RFID, WI-FI, GPS, microcontrollers, microprocessors, and other technologies enable the IoT (Internet of Things). Three categories of enabling developments for the Internet of Things have been studied [2]. The rest of the paper is organized as follows. Section II gives a summary of the related work. Section III explains the proposed work. Section IV presents software and result discussion. Finally, Section V concludes on the necessity of a solar panel and its advantages.

RELATED WORK

For the development of system control and real-time tracking, Bluetooth smartphone interface is used. The microcontroller uses sensing circuits to process measurements of the current and voltage from the renewable source, acting as a link for data exchange with the hardware of the power conversion unit. The parameters are transmitted by USB to the computer, where the system recognises them right away. made on the system on a daily, weekly, and monthly basis [3]. The integrated system for monitoring and management has been built and is being used, according to Goto and Yoshihiro. By utilising communication technologies, the data from the feature system can be used to improve the user interface. The system can operate and manage over 200,000 telecom power plants, including inverters, rectifiers, and air conditioning plants. Over 8,000 buildings across the world have implemented this technology, which includes remote monitoring and control. Offer a course of action [8].

An intelligent system that offers real-time monitoring and defect detection for solar panels is being developed by [3]. The use of artificial neural networks using the information from string measurement devices used for continually monitoring solar power panels remotely, [4]. Describe a number of algorithms for classifying problems. The work of [5] focuses on developing a framework for automating the detection of defects in solar energy systems using thermal imaging to produce a reliable and timely alert system of potentially dangerous defects conditions.

In [5] offer a technique for leveraging wireless sensor networks to track the efficiency and output of individual photovoltaic (PV) panels (WSN). The creation of a workable fault detection strategy for photovoltaic (PV) systems with an online implementation is presented.

With the help of field data from a Canadian PV system, the methodology was designed and validated. In order to automate fault detection and diagnosis (FDD) on solar-powered Wireless Mesh Networks [6]. The research work [7] offer a straightforward technique that can be used to identify such problems. Only two additional electric power sensors are needed to complete the proposed solution for a PV plant that already exists. An innovative photovoltaic (PV) array connection called the CTCT structure is presented (complex-total-cross-tied array). We can locate the PV cells with Hot Spot in an array of CTCT-type PV cells by adding a particular number of current sensors and comparing the current.

Radio frequency (RF) transceivers, sensors, microcontrollers, and power sources make up a WSN [3]. Low cost, low power, multipurpose sensor nodes have been created as a result of recent developments in wireless sensor networking technology. Environment sensing and data processing are made possible by sensor nodes. Monitoring of various surroundings is possible because to the use of sensors for temperature, humidity, and volatile chemical detection. They can network with other sensor systems and communicate with outside users to share data. Applications for sensor networks include wireless data collecting, machine monitoring and maintenance, smart cities and infrastructure, environmental monitoring, site security, automated on-site material tracking, safety management, and many more.

PROPOSED SYSTEM

The Internet of Things has a vision in which the internet extends into the real world embracing everyday objects. The IoT allows objects to be sensed and/or controlled remotely over existing network infrastructure, creating opportunities for pure integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. This technology has many applications like Solar cities, Smart villages, Micro grids and Solar Street lights and so on. As Renewable energy grew at a rate faster than any other time in history during this period. The proposed system refers to the online display of the power usage of solar energy as a renewable energy and indicating faults in the solar panel. Figure 1 shows the setup of solar panel

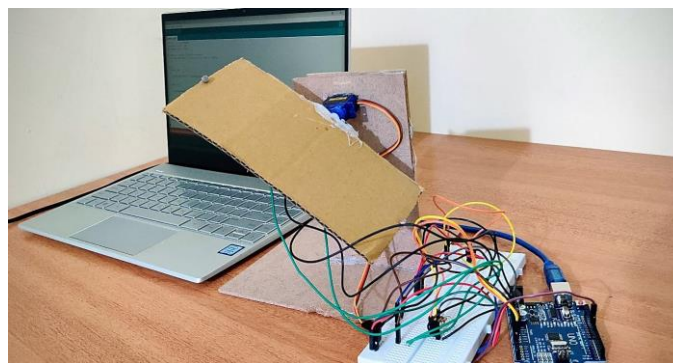


Figure 1: Solar Panel

The suggested system uses IoT to monitor solar energy. The battery's ability to store energy is aided by the solar panel. The energy in batteries is important for electrical gadgets. The Arduino is connected to a battery. To read the sensor information, a microcontroller called Arduino is used. The Arduino is connected to a voltage divider and current sensor. Circuit for Acquiring Voltage and Current an Arduino's analogue inputs may measure up to 5V. Use the resistors to guard the Arduino against short circuits and unforeseen voltage surges even when connected to a 5V circuit. The voltage being monitored is reduced using a potential divider made up of the two resistors to a level that the Arduino can read. The voltage circuit is

lowered to 5V using 10kohm and 100kohm registers. To build this circuit, a breadboard is utilized.

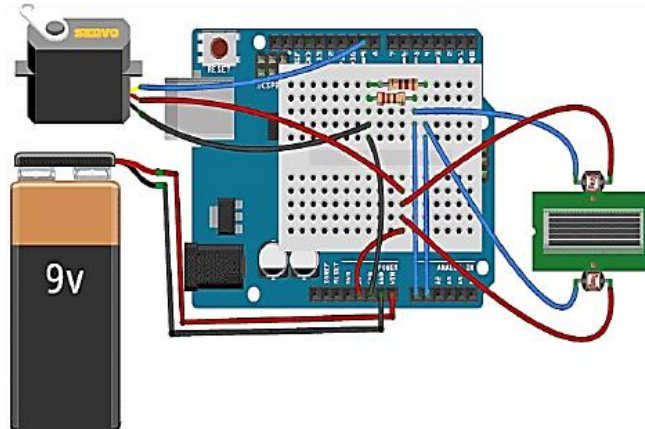


Figure 2: Complete Circuit Diagram

SOFTWARE AND RESULT DISCUSSION

Any programming language with a compiler that generates binary machine code can be used to create Arduino programmes. AVR Studio and the more recent Atmel Studio are the development environments offered by Atmel for the microcontrollers. The Arduino integrated development environment (IDE), a cross-platform Java application, is made available by the Arduino project. It came from the Wiring project and the IDE for the Processing programming language. It is intended to acquaint artists and other newcomers who are not familiar with software development with programming.

Two functions from a typical Arduino C/C++ sketch are compiled and coupled with a programme stub main () to create an executable cyclic executive programme:

1. setup(): This function can initialize settings and is called just once at the beginning of a programme.
2. loop(): a method that is used until the board turns off repeatedly.
3. The Arduino IDE uses the programme to transform the executable code into a text file in hexadecimal coding, which is loaded into the Arduino board by a loader programme in the board's firmware, after compilation and linking using the GNU toolchain, also provided with the IDE release.

```
temp_adc_val = analogRead(lm35_pin);
```

```
temp_val = (temp_adc_val * 4.88);
```

```
temp_val = (temp_val/10);
```

```
Serial.print("Temperature = ");
```

```
Serial.print(temp_val);
```

```
Serial.println(" Degree Celsius");
```

```
if(temp_val < 20){
```

```
Serial.println("As the temperature is low, it's better if you don't put out your clothes to dry. Be careful today as the panel won't pull much juice.");
```

```
Serial.println("Don't forget to take your umbrella!");
```

```

}
else{
Serial.println("As the temperature is warm enough, feel free to dry your clothes
outside.");
Serial.println("Don't forget to wear a sunscreen !");
}
}
}

```

CONCLUSION

Humanity needs renewable energy sources like solar and wind energy to survive as the traditional methods of electricity generation run out. The only drawbacks to using solar energy as a source of energy are the high cost of solar energy harvesting and the variable nature of solar energy. With the development of technology, device costs are falling quickly. Therefore, all we need is a reliable, modern monitoring system that can carry out important activities without human involvement and can give users access to data whenever and wherever they need it. IOT is the ideal method for monitoring solar systems in order to keep up with the continually changing nature of technology. Remote Solar PV installation monitoring powered by IOT would also save energy and labor.

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