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IR SENSOR SMART DOOR LOCKING SYSTEM

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Abstract
This pandemic situation we are trying to restrict the people in public places like metro stations, shopping malls, cinema hall, educational institutions etc. By checking their body temperature. For this purpose, security guard uses one Infrared Thermometer. In this project to reduce the human involvement at the entry points to check body temperature, we proposed a IR sensor based smart door locking system. In the proposed system one IR sensor is used to measure the body temperature at the entrance and the door will open automatically only when the body temperature of a person less than specified level.For Government/Public offices and educational institutions we also include one more IOT based feature in this proposed system. At the door entrances when person punch its ID card or figure and he is having body temperature more than specified limit then door is not opened and his illness report is also send it to HR or higher authorities of the organization. Python programming language is used for developing the system. All the operation is controlled by Arudino microcontroller

I. LITERATURE SURVEY

INTRODUCTION OF SMART DOOR LOCK

Security describes prosperity and property protection. Security at home and in all spots is preeminent. Outside a customary entrance that used the key can be easily opened by an unapproved individual or criminal expecting they have the right key. This will allow them to take everything huge in the house. Today correspondence progressions are ending up being more all over and new components are open to chip away at people's lives, so we use splendid doorway locks. Security in insurance, workplaces and prosperity is of head importance. We need to take incredible thought of these things to avoid pointless damage. There are various structures as of now set up to give security, among those microcontrollers considering a doorway lock system is likely the best method for giving security. An astute lock is an electromechanical key expected to perform entrance lock and lock limits when it gets such requests from an endorsed contraption that uses a distant show and a cryptographic key to work with the affirmation cycle. It in like manner sorts out some way to get to and send alerts for various noticing events and other huge events associated with contraption status. Shrewd locks can be considered to be a component of an adroit home, showing in fig1.

Fig 1.1 finger print door lock

Many shrewd locks are fitted to machine locks and truly improve the ordinary lock. As of late, shrewd lock controls have additionally showed up available. Shrewd keys, as conventional keys, need two vital parts to work: lock and key. On account of these electronic keys, the key is anything but a versatile key yet a cell phone or an extraordinary key coxcomb extraordinarily intended for this reason that makes remote the security expected to open the entryway naturally. Brilliant keys can concede or deny remote access through the portable application. Some brilliant keys incorporate an under-

lying Wi-Fi association that permits observing highlights, for example, access notices or cameras to show the individual mentioning access. A few savvy locks work with a brilliant doorbell to permit the client to see who and when the individual is at the entryway. Many savvy keys presently have Biometric highlights, like finger impression sensors. Biometrics are turning out to be progressively well known on the grounds that they offer more assurance than private catchphrases. This is on the grounds that they utilize actual elements that are unique in relation to the put away data.

Fig 1.2 fingerprint sensor

The finger impression sensor we use is an optical kind, there are two extra sorts of capacitive sensors that can be found on cell phones and ultrasonic gadgets, which are in the testing stage, and both of these choices are costly, so we will zero in on them. this is a visual type of this electronic side interest and comparative activities. Fig 1.2 the way this unique mark sensor works is that it snaps a photo of our fingers, and afterward utilizes a specific calculation to match it to the data set and show a similar outcome.Safeguard your task with biometrics this across-the-board view finger impression sensor will make adding unique mark identification and check a lot simpler. These modules are normally utilized is safes there is a strong dsp chipthat empowers picture deliveringestimation, highlights securing and search. Associate with any microcontroller or framework with a TTL sequential, and send information bundles to take photographs, print, hash and search. You can likewise enroll new fingerprints straightforwardly up to 162 fingerprints that can be put away in inside FLASH memory. There is a red LED on the focal point that enlightens the focal point of the picture so you realize it works. The Rugged Panel Mount Fingerprint Sensor with Bi-Color LED Ring even has a LED ring worked around the identification cushion, which can be set to red, blue or purple (as well as some blurring/flickering impacts) for an extraordinary client experience.The expression "security" alludes to the shielding of life and property. The security of thehouse is significant. Beside the typical way, a keyed entryway can be effectively opened by an unapproved individual or a criminal with the right key. They will actually want to take everything significant in the house therefore. These days, media transmission advances are turning out to be further developed, with more imaginative highlights to work on living souls. This task will utilize the Bluetooth ability on your telephone to open the entryway naturally, permitting you to match up your telephone straightforwardly with the lock. In the event that an approved individual is distinguished, it will naturally open. The entryway will open after a brieftime span has elapsed, and it will consequently close after that period has passed. As mentioned earlier, the purpose of this project is to address one of the security concerns of the current society. Even with the advent of technology, it has become increasingly difficult for people to find better security solutions. IoT has proven to deliver a variety of security solutions, and this paper proposes the best solution for one such issue. Various home automation systems based on Bluetooth, ZigBee, and RF modules have already been introduced. All previous systems lacked a wide range of accessibility, a secure alarm system, and a monitoring system. It is not the key used in this system, but there is a brandnew door with good mechanical design and robust lock system that maintains the original look of the door. As for the device, developed by home security frameworks, IoT takes on a critical role.The key point is to build accessible a program that can help turn a common doorbell ring into a clever framework that provides visitor data and moreover it activates cell phone login response. IoT technology is that interaction between individuals and individuals, network-tomachine communication network. Data-based application services and communication technologies are actively investigated within the data center community

. Above all, the main increase will be determined by the integration services that mix more than 2 parts for the same purpose. Convergence service influences the Internet of Things (IoT) technology, as it allowsall objects to produce intelligent service and interoperable communication over wireless orwireless networks. In addition, internet of things trading is considered to be the backbone of the industry in the long run. Internet provides simple and efficient services at any time, on

the far side of the technical and economic limitations, due to temporary and local limitations by providing the necessary services in many different fields. It also facilitates the distribution of smart terminals that include smart phones, in line with the advancement of information and communication technology. Meanwhile, the need for comfort and speed has grown within the economic sectors of modern society. The financial sector, among other fields, requires IoT technology as mentioned above. financial institutions have increased the distribution of vacant and automatic equipment to intensify anger by improving financial services, simplifying business processes, creating a system for themselves, and ultimately reducing costs. Today, technology is an important part of everyone's life. It influences a few aspects of daily life and allows for improvement social synergy, easy transportation, self-indulgence entertainment and media and helps in development tree. The development of several devices such as mobile phones as well computers have made fewer people rely on technology interact with friends, store and retrieve information as photos, videos, documents, and music. The global web is a standard interface used by several devices to create the daily life of many people.

The Internet assumed an initial segment in give speedy answers for different issues and has empowered and associated with all far-off areas has added to huge decreases in expenses and energy use. Home mechanization or brilliant home is characterized as innovation execution inside the home climate to give the opportunity and security of its occupants.

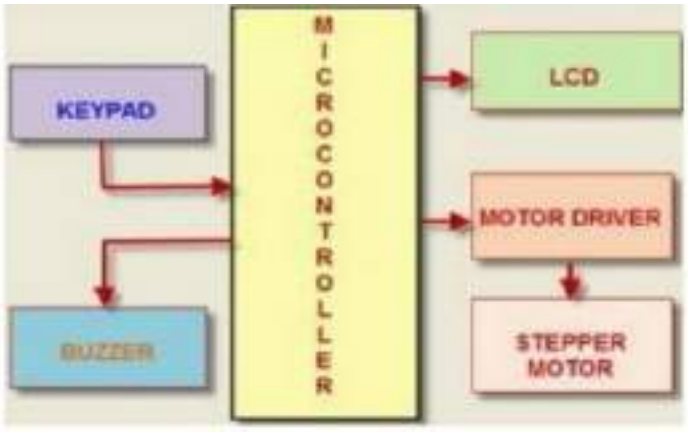

Fig 1.3 Microcontroller

1.2 PROBLEM DEFINATION

This unique Fig 1.3 impression lock ought to identify just the Bio-Metric of an individual. We can't ready to peruse the internal heat level of an individual whether to observe he is a functioning individual are not. During this pandemic this is compulsory to really take a look at the temperature of every single individual prior to going into an association. To defeat this issue, we are fostering an IR Sensor Smart Door Lock.

1.3 OBJECTIVE OF PROJECT

- In this project we are going actually take a look at the temperature of a human body before he/she go into any association.
- In this pandemic circumstance, essential examination is expected to enter any individual a specific association. Right now we as a whole are checking a physically with assistance of another individual (security).
- To lessen the human association, we had fostered this IR Sensor Smart Door LockingSystem.

1.4 ORGANISATION OF DOCUMENTATION

- art 1 incorporates the presentation about Smart entryway lock and applications. It gives the venture meaning of our undertaking and the short presentation about the work done in the task which is consider as the goal.
- Section 2 in this part we had concentrated on the references connected with ourventure.
- Section 3 gives the investigation of our task which tells programming we used to foster IR Sensor Smart Door Locking System.
- Section 4 in this part we had examined with regards to our proposed strategy and the employments of our venture.
- Section 5 shows the code and the result of the code in the wake of ordering It in a specific programming.
- Section 6 finish up the venture by giving the full data with respect to how we had treated how it should function.
- Section 7 shows the references from various papers connected with our undertaking which depends on iot

2.1 INTRODUCTION

A writing study addresses an investigation of already existing material on the subject of the report. This incorporates

1. Existing hypotheses about the subject which are acknowledged all around.
2. Books composed on the theme, both conventional and explicit.
3. Research done in the field generally in the request for most established to most recent.

2.2 EXISTING SYSTEM

- Face acknowledgment framework is extensively utilized for human ID on account of its ability to quantify the facial focuses and perceive the character in a subtle manner. The utilization of face acknowledgment frameworks can be applied to observation at home, work environments, and grounds, in like manner. The issue with existing face acknowledgment frameworks is that they either depend on the facial central issues and tourist spots or the face embeddings from Face Net for the acknowledgment interaction. In this paper, we propose a various leveled network (HN) system that utilizes pre-prepared constructions to recognize faces followed by face inserting confirmation utilizing Face Net. We have additionally planned anongoing security entryway locking framework associated with the raspberry pi according tothe proposed technique.
- The Automated entryway lock framework was recently utilized utilizing various strategies and methods. In any case, the reason for this paper is to acquaint one more simple way with accomplish a similar outcome. This cycle is fundamentally centered around the utilization of Arduino microcontroller and L293D engine driver IC as the center regions for this undertaking.
- The facial acknowledgment framework is generally utilized in human distinguishing proof on account of its capacity to quantify facial focuses and visual sharpness. The utilization of face acknowledgment frameworks can be applied to home reconnaissance, working environments, and grounds, as proper. The issue with existing face acknowledgment frameworks is that they depend on key facial elements and motions or looks from Face Net through the acknowledgment interaction. In this paper, we propose a progressive organization (HN) system that utilizes pre-prepared constructions to identify faces followed by check from facebook installing utilizing Face Net. We likewise planned an ongoing security entryway locking associated with the raspberry Pi according to the proposed strategy

2.3 DISADVANTAGES OF EXISTING SYSTEM

Because of the plan and size of the cell lodging in the old restorative offices it isn't workable for prison guards to be shipped off the finish of the cell lodging where cell evacuation controls are typically shut to decide if they are shut or not. also locked it is basically impossible to monetarily add an open or shut cell reference to existing lock frameworks. This is an issue in some high-security offices and in a few huge jails some lock frameworks expect that all cell entryways be deterred prior to locking all streets some place and numerous mobile phone lock frameworks are undermined by controller. lock framework where different entryways stay open. This issue is exacerbated by the absence of far-off pointers for the cell division entryway.In the event that the opening/shutting, locking/opening of all divisions isn't known, prison guards generally in gatherings of a few groups ought to actually examine the state of every phone. For enormous cell hinders, this might expect no less than two hours every day. Genuinesecurity issues can emerge when cell entryways are believed to be shut, or open. The security of the watchman and the security of the whole jail can be compromised with eradication again from the last cell over Gadau and a key gatekeeper key is utilized to clear different detainees. Beside the undeniable security issues that might emerge, the absence of data about the situation with cell entryways, combined with successive disappointments of lock frameworks, makes recovery authorities lose trust in lock frameworks. This can expand strains among authorities and detainees and along these lines lead to an increment in the tension on detainees, e.g., to keep on shutting.At these times, all individuals have their own stockpiling region with the assistance of locks to restrict admittance to their own things or protection, yet there are many imperfections in these locks, for example, simple admittance to helpless security and the trouble of managing the lock in one manner, which is the customary key and there could be no alternate way. The subsequent issue is the event of blunders on the human side so loss of the key is truly conceivable, and you have many keys that uncover misfortune or burglary effectively, and remember to lock the lock, and here the lock can't be locked without help from anyone else on the grounds that it is mechanical and doesn't rely upon electro mechanical. Our concern articulation for this task will be three key components. To begin with, house lock cushions are frequently tormented by actual mistakes. These mistakes incorporate the way that the lock cushions get rusted over the long haul, the lock cushion hit machine disappointment are broken parts inside causing

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INVENTORY MANAGEMENT AND ITS TOOLS–A REVIEW

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Abstract
The inventories are total present raw material, finished products and work in progress material in an industry which is meant to be delivered at demanded places. Management of inventory is a challenging task for an organization, so to run the organization eminently inventory model must be followed. The overall function of inventory management is to supply the material at required place within time limits which is very hard in complex systems. The complex system can enhance the overall cost of stockings or may empty the stock very soon, both conditions are not economical. So to run the stock management perfectly some tools or models of management can help well. The inventory management is stepped up from several decades but the scope in this field is still looking further improvements. As the inventory management needs the proper information about any process which is not possible therefore the different inventory models can be applied and the most reliable can be taken under certain parameters. These parameters or factors can affect the overall inventory directly or indirectly. This paper will review some literature based upon inventory methods which helps the industries in several ways to manage the entire inventory present in form of raw, work in progress and finished products.
Keywords: - JIT, VMI. EOQ, Inventory management, cost

I. INTRODUCTION

The inventory management is very important key factor in an industry which helps the management in proper management of stock. It is used to match the demand required by internally and externally. The inventory control and management is a challenging task which is dependent upon several factors such as nature of demand, cost, lead time etc [1]. Inventory management is a linking bridge between demand and supply. It ensures the existing stock is enough to fulfill the demand. It also reduces the extra costs related to over stockings and less stockings. In inventory control some factor are inversely and some are directly related to each other so the proper balance is necessary to run the entire system smoothly [2]. The different models of inventory are developed over decades like just in time (JIT), vendor managed inventory (VMI) and economy order quantity (EOQ) etc and the software are also developed to display the level of inventory [3][4]. The models of inventory are key tools which help in complex conditions. Every model of inventory management has its own characteristics which are applicable in different complex situations.

II. TYPES OF INVENTORY MANAGEMENT

a) Raw Material Inventory: It is inevitable factor which is required in manufacturing the final product. When the item is used in production process but not produced initially by the organization is termed as raw material, but the material which is not used in finishing the manufacturing of product but still required in production is also counted in the same category e.g. nuts and bolts etc Raw material inventories are called primary inventories

b) Work In Process: It is nothing but materials of components which has been released for production process but has not reached at the last stage of finished, these are the semi finished undergoing production process. The goods which are waiting for final acceptance test after manufacturing in the category of work in process.

c) Finished Goods: It is a stock which is ready to ship to customer against an order .These items are the final output of the company which has also passed the screening and acceptance test.

Inventories are also classified as under by a leading author [24] on Materials Management
and Purchasing.

a) Production Inventories:These areraw materials, parts and components which can be count in the firm'sproduct in the production process. These may consist of two general types:

- Special Items manufactured to company specificions.
- Standard industrial items purchased off-the-shelf.

b) MRO Inventories: Maintenance Repair and Operating supplies, which areused in the production process but do not become or even count as part of the product (e.g.lubricating oil, soap, machine repair-parts etc.).

c) In Process Inventories:Semi-finished products found at various stages in theproduction operation.

d) Finished Goods Inventories:These are completed products ready for shipment.

Another author divides Inventory into different groups as under :

- Raw materials
- Packing materials
- Loose tools

- Fuel stock
- Finished stock

e) Partly finished stock:Parts manufactured but not to be sold as completed or finishedproduct of the concern.
f) Work in progress:Materials processed to a stage in production shop that they
cannot be separated exactly in accordance with their respective specifications and
manufactured items issued from stores department
g) Unused stock:These include wastage unused, scrap or defectives which may be sold
or destroyed.

III. FACTORS OF INVENTORYMANAGEMENT

The inventory management and its models are totally dependent upon these factors:-

A. Nature Of Demand

The nature of demand is whether it is deterministic or not. Means the demand is expressed whether it is in a continuous flow or not. Some of the deterministic demand is related to "Chaos Theory" which is almost constant at its initial stages but may change after some time period [5].Levin et al. (1972) and Silver and Peterson (1985) made useful observations in this content. They stated: the display of greater quantity of the same item tends to attract more customers. It is because of a typical psychology of the customers. The customers may have the feeling of getting a wide range for their selection when a large amount is displayed or stored. Datta and Paul (1990) focused on the analysis of the inventory system which describes the demand rate as a power function dependent on the level of on hand inventory and constant holding cost. Deterministic model of perishable inventory with stock dependent demand and non- linear holding cost was developed by Giri and Chaudhury (1998).

B. Cost

The costs are those which are related to store, purchase and to deliver the material. Some of them are fixed and others are variable.Deterministic model of perishable inventory with stock dependent demand and non-linear holding cost was developed by Giri and Chaudhury (1998). They were of the opinion that increase in the holding cost increases total inventory cost. Roy (2008) developed an economic order quantity model for deteriorating items in which deterioration rate and holding cost are considered as linearly increasing function of time, selling price is dependent on demand rate and shortages are completely backlogged.
Shortage cost is the penalty cost per unit due to divergence of sale in stock out situation. Bose, Goswami and Chaudhuri (1995) proposed an EOQ model for deteriorating items with linear time dependent demand rate, shortages under inflation and time discounting.

C. Products

The organizations which handle or produce different products need complex inventory models or combined inventory models.

D. Production Rate

The production rate also plays a vital role in inventory management. It has also a huge impact on cost management [7].Khouja and Meraj (1995) extended the EPLS model with variable production rate and imperfect production. Mandal and Maiti (1999) worked on the inventory of damageable items with variable replenishment rate and stock dependent demand

E. Holding or Stocking Cost

It is the cost which displays the cost of keeping the products in stock. It is related to demand and production directly.

IV. IMPORTANCE OF INVENTORY MANAGEMENT IN INDIAN CONTEXT

Inventory Management has gained importance in India due to following reasons

- Late industrialization
- To conserve valuable foreign exchange
- To Release surplus capital for productive purpose
- To increase competitiveness in foreign markets by reducing costs
- Seller's market
- Inflationary hoarding of stocks
- Strict import procedure
- Excessive dependence on foreign collaboration
- Inadequate storage facilities and higher cost of storage
- Use of scientific techniques at low ebb
- Mechanisation

As defined in the concept of Inventory Management, application of different policies,techniques, system and actual practices to different functions of Inventory Managementof CTMI can be explained

V. INVENTORY MODELS

There are different models which can be adopted in different situations; some of the classical models are reviewed below;

A. Economy Order Quantity (EOQ) Model

It is one of oldest and greatest classical models. The EOQ model has huge impact on supply chain manage-

ment [8]. It helps inventory management to minimize the holding and ordering costs. This model can also tell when to start the sale cycle again. This model is applied when the demand is constant and stock is filled annually. The cost is kept fixed for each order and each order contain its holding cost. The parameters of EOQ are total demand per year, purchase cost per item, fixed cost per order and the storage cost annually. Mathematically the EOQ model depends upon these variables which can be expressed as;

Here, Q is order quantity, D is annual demand, K is fixed cost per order and h is holding cost of order annually [9]. In addition the EOQ model is concerned with quantity discounts all units and incremental [10]. The EOQ model is very helpful tool to calculate the total amount of the inventory which has to be in stock. There is another extension of imperfect quality product sales. These are the products which has some compromised quality assurance. These products are sold at huge discounts at the end of the circle [11].

B. Just In Time (JIT)

Just in time manufacturing system also known as just in time production was first developed by an eminent Japanese automobile manufacturer Toyota in 1960 [12] therefore it is also named as Toyota production system (TPS). The major role of just in time is reduce the time consumed in manufacturing and time taken for response from the vendors and customers. There are two main objectives of just in time manufacturing, first is to make the process smooth and second is to satisfy the customer by reducing the overall cost of product by reduction in various steps. It also reduces the waiting time by adopting the pull system, in which every next stage is in waiting [13]. It is very well growing tool for an industry because studies has shown it can save 97% of cycle time, setup times 50% and lead times by 60% with the help of Kanban system, visual management, employee empowering etc. techniques of JIT [14]. There are some potential risks which should be carefully taken under consideration before applying this technique, some of which are minimum order policies, non standard work [15]. The Toyota production system also reduces wastages and help in well maintained MRP [16]. The JIT system makes the system simpler and reduces part movement, defected parts, time wastage, transportation wastage, inventory waste, overproduction waste and processing waste. If the JIT runs efficiently then it can reach zero inventories easily.

C. Vendor Managed Inventory(VMI)

For streamline flow of inventory vendor managed inventory model is taken under action. It is a smooth delivery agreement between suppliers and their customers. It is the most reliable model of inventory for small scale industries or businesses. In VMI the demand is asked from lower level supply chain member to higher supply chain members [17]. This technique also reduced the total inventory cost because the inventory is only get recycled full after it reaches zero. The VMI model can change the inventory management of both supplier and buyer. This is temporary effect because at the early stages the sale and purchase quantities remains stable but these may alter as the market interests. Therefore it has huge impact on supply chain management [18]. The contraction of supply chain can also be seen in vendor managed inventory because of changing scenario of the market. The five coordinates of supply chain contraction between VMI and retailer managed inventory (VMI) are buyback, quantity flexibility, quantity discount, sales rebate and revenue sharing [19]. The exchange of information also reduces the "bullwhip effect" on supplier [20]. This effect also known as forester effect in which the accuracy of supply chain decreases along its length from origin because it becomes more chaotic and unpredictable at far distances [21].

D. Economic Production Quantity(EPQ) Model

The Economic Production Quantity Model (EPQ) was developed by E.W. Taft (1918). EPQ model, in fact, is an extension of EOQ model. There is, of course, difference between these two models. Whereas EPQ model assumes that the company will produce its own products or the products are going to be supplied to the company while they are being produced by other company.On the other hand, EOQ model says that the order quantity is received immediately and completely after being ordered. This means that the products are produced by another company, and as and when the orders are placed these are shipped to the ordering company immediately.An Economic Production Quantity Model was developed for deteriorating items with constant production and stock dependent consumption rate by Mandal and Phaujdar (1989). Production policy for ameliorating/deteriorating items with ramp type demand was derived by Goyal, Singh and Dem (2013). Sarkar and Moon (2011) developed an EPQ Model with inflation in an imperfect production system.Giri and Bardhan (2015) established a vendor buyer JELS model with stock dependent demand and consigned in-

ventory under buyer's space constraint. They derived integrated vendor buyer model to find optimal delivery batch size and number of shipments and suggested coordination mechanism between the vendor and buyer in an arbitrary ratio

E. Volume Flexible Manufacturing System

Market mechanism has been transformed considerably in view of the advancement in the technology and quick communication. As the emerging market trends, the organizations try to attract customers by storing and displaying the items in large quantity as also in influential manner. All of us observe this in big malls and stores. A careful and attractive storage and display of items in large quantity and in different varieties influences and motivates the customers to purchase more. This activity of purchasing more results in more demand. Dem and Singh (2013) developed a production model for ameliorating items with quality consideration.

VI. CONCLUSION

The inventory control management via different models is complex task. To make it simple the extensions can be studied. The EOQ model can be applied where the holding and ordering costs are higher for long time. If the time taken for a cycle is very much then the just in time (JIT) technique is reliable which also concentrates on higher customer satisfaction. The wastage can also be reduced with JIT model. To reduce the variation in supply chain management the vendor managed inventory model can be employed because it reduces the uncertainties in the chain.

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ETHICS AND ENGINEERING: A STUDY OF ARTIFICIAL INTELLIGENCE

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Abstract
The hot topics among academics and IT researchers include artificial intelligence and challenges linked to it. The goal of the researchers is to gather and repurpose the previously existing, constantly expanding information via various social media platforms. The abundance of data has increased study into its processing, analysis, and application. The emphasis is on using computers to handle data more effectively because they are far faster and better at it than people. This increasing enthusiasm for research, academia, business, and open source has produced innovations and advancements that have the potential to bring about significant change. However, the prospect of building intelligent robots presents a few moral questions regarding the machines' own moral standing as well as how to make sure they don't damage people or other morally significant entities. As a result, in contemporary culture, ethics and law are closely connected, and many legal judgments are based on how various ethical concerns are interpreted. These problems take on a new dimension thanks to artificial intelligence. Artificial intelligence-based systems are evolving toward more autonomy in terms of the complexity of the tasks they can do, the potential influence they may have on the world, and the decreasing capacity of humans to comprehend, forecast, and manage their operation. Most people don't realize how automated these systems really are; they may learn from their own mistakes and take actions that go beyond what their designers had in mind. There are several moral and legal issues with this. A feeble attempt has been made to critically assess the ethical concerns surrounding artificial intelligence and thinking machines throughout the world in this article.
Key Words: Artificial Intelligence; Thinking Machines; Ethical Issues; Science and Technology.

Introduction:

Although AI algorithms have beaten humans in many specific domains such as chess, there is nearly universal agreement among modern AI professionals that AI falls short of human capabilities in some critical sense. It has been suggested by some that as soon as AI researchers figure out how to do something, that capability ceases to be regarded as intelligent. It is debatable whether human intelligence is truly general—we are certainly better at some things. When human engineers construct a nuclear reactor, they imagine the exact events that may occur inside of it (such as valves failing, computers malfunctioning, or cores becoming hotter) and design the reactor to make these occurrences unlikely to be disastrous. The toaster-paradigm, the realm of locally preprogrammed, particularly envisioned behavior, is broken down even by task-specific AI algorithms. The programmers would have had to manually preprogram a database containing moves for every potential chess position that one may face since the machines can only behave exactly what they are instructed. To serve the ultimate goal of feeding oneself, modern people actually perform millions of things. Few of these pursuits were "envisioned by Nature" in the sense that they represented challenges from our ancestors to which we were specifically equipped. However, our evolved brain has become sufficiently potent to be substantially more widely applicable; to allow us to predict the results of millions of varied acts across domains and to influence the ultimate outcomes. Despite the fact that none of our predecessors faced a problem comparable to vacuum, humans have traveled across space and left footprints on the Moon. Designing a system that would function securely in thousands of situations, including circumstances not precisely envisioned by either the creators or the users, including contexts that no human has yet encountered, is a qualitatively different task from domain-specific AI. There may not be a compact local description of all the ways that people get their daily bread in this situation, nor is there a local definition of good behavior—a simple specification over the actions themselves. One must describe appropriate behavior in such a manner that they may not hurt humans in order to create an AI that behaves safely while functioning in various domains, with numerous repercussions, including those the engineers never expressly envisioned. This is projecting the far-reaching effects of activities, making it non-local. As a result, this specification can only be achieved as a design attribute and be successful if the system explicitly extrapolates the effects of its behavior. From the standpoint of public relations, this may not seem like a desirable situation, but it's diffi-

cult to see how a general intelligence functioning on unanticipated issues across domains with preferences over distant repercussions could be guaranteed to behave ethically in any other way. However, we couldn't foresee which precise answer the mind would find. By looking at the cognitive design, we might be able to confirm that the mind was actually looking for alternatives that we would categorize as ethical. Respecting such a verification necessitates a means of separating sincere guarantees from wishful thinking and irrational optimism (a technique that won't claim the AI is safe until the AI is truly safe). Keep in mind that artificial intelligence research has historically struggled with unrealistic expectations. It will need an AGI that thinks like a human engineer concerned with ethics, not simply a basic product of ethical engineering, to develop a trustworthy AGI that can be verified. This will require new techniques and a different style of thinking from checking power plant software for faults. As a result, the field of AI ethics, particularly as it relates to AGI, is likely to be fundamentally different from the field of noncognitive technology ethics in the following ways:

1. Even if the programmers follow all the rules, the local, specific behavior of the AI might not be predictable apart from its safety.
2. Verifying the safety of the system becomes more difficult because we must verify what the system is trying to do rather than being able to verify the system's safe behavior in all operating contexts.
3. Ethical cognition itself must be taken as a subject matter of engineering.

Superintelligence can be developed to be useful, and depending on its technical prowess, it may be able to quickly solve a number of current issues that have eluded our human-level intelligence. One of the several "existential risks" listed by Bostrom (2002) is superintelligence: a risk "where an adverse outcome would either annihilate Earth-originating intelligent life or permanently and drastically curtail its potential." On the other hand, a successful conclusion for superintelligence may protect and advance intelligent life that originated on Earth. It is crucial to stress that there are significant potential hazards and advantages associated with having better minds. Various cognitive biases, such as the "good-story bias" put out by Bostrom (2002), may make it difficult to reason about the likelihood of global catastrophes (Yudkowsky 2008b). Consider the possibility that our perceptions of what future situations are "plausible and realistic" are influenced by the world around us.

Although Asimov's Three Laws of Robotics (Asimov 1942) are occasionally used as a guide for developing moral AI, they serve as little more than a story device than Asimov's "positronic brain." Asimov wouldn't have had any tales if he had shown the Three Laws as successfully operating. Thinking of "AIs" as a species with set traits and wondering if they would be nice or evil is a mistake. Since all people share a similar brain architecture, the phrase "Artificial Intelligence" alludes to a broad design area that is probably far greater than the space of human brains. Asking, "Will AIs be good or evil?" as though attempting to choose a concept for a movie narrative may be a sort of good-story bias. "Exactly which AI design are you talking about?" should be the response. Can one have influence over an artificial intelligence's early programming to affect how the world will be affected later?

How can you create an AI that, when it operates, becomes more ethical than you is the ultimate machine ethics dilemma. It is no longer comparable to asking our own philosophers to develop superethics. However, we must be able to clearly state the query if not the solution. Machine ethics must dedicate itself to attaining human-superior (not simply human-equivalent) niceness if robots are to be put in a position of becoming stronger, quicker, more trustworthy, or smarter than humans.

Legal constraints involved in AI across the globe:

In the case of robots in particular, the legal issues are significantly more severe. Predictability is essential to current legal techniques, and a system that learns from information it gets from the outside world may behave in ways that its developers could not have foreseen. Furthermore, such systems may run independently of their designers or operators, making it more difficult to assign blame. These traits raise issues with predictability and the capacity for independent action while absolving oneself of accountability.

Several possibilities exist for regulation, including regulation based on already-established norms and standards. Artificial intelligence-based technology, for instance, may be governed as either property or as goods subject to copyright. However, issues occur when we consider that such technologies have the capacity to behave independently of their designers, owners, or proprietors. Since animals are likewise capable of autonomous action, it is conceivable to apply the laws that govern a certain type of ownership in this regard.

Although they are somewhat constrained, proposals on

how the legislation on animals should be applied have been offered. First off, it is improper to apply laws based on analogy inside the confines of criminal law. Second, it is reasonable to assume that domestic dogs, for whom these regulations were initially established, will not injure people ordinarily. Since the laws controlling the keeping of wild animals are more strict, there have been requests for comparable laws to be applied in more advanced legal systems. However, the issue here is how to distinguish between the many aspects of artificial intelligence that were previously described. Furthermore, strict regulations may potentially delay the adoption of artificial intelligence technology because of the unanticipated dangers of creator and inventor liability.

Another common approach is to use the same standards to govern how legal companies conduct their business. Robots can be accorded a legal status equivalent to that of a legal entity since they are artificially created subjects of the law. Anybody can be given rights if the law is sufficiently forgiving. Additionally, it may limit rights. For instance, historically speaking, slaves essentially had no rights and were seen as property. It is also possible to witness the converse scenario, in which rights are granted to things even when they don't explicitly show that they can do anything. Even today, both in wealthy and developing nations, there are instances of strange items that are acknowledged as legal entities. In a similar vein, robots can be held accountable for their activities without requiring them to have free will or intentionality.

The analogy of legal entities, however, presents difficulties since swift and efficient administration of justice depends on the existence of legal entities. But despite the fact that it is hard to pinpoint who they are, the activities of legal entities may always be traced back to those of a single individual or group of people. In other words, businesses and other comparable entities are accountable for the deeds committed by their agents or workers. The actions of artificial intelligence-based systems will not necessarily be traced back to the actions of an individual, and legal norms on the sources of increased danger can be applied to artificial intelligence-based systems. The challenge is identifying which artificial intelligence systems can be deemed criminally responsible.

The formulation and promotion of a strategy for the sustainable growth of the smart robot industry is how the law hopes to improve living conditions and advance the economy. The government develops a fundamental strategy to guarantee the accomplishment of these objectives every five years. Similar to this, in 2018 President Emmanuel Macron unveiled France's new national artificial intelligence plan, which calls for spending 1.5 billion Euros over the following five years to assist the field's research and innovation. The plan is based on the suggestions included in the report written under the direction of French mathematician and National Assembly delegate Cédric Villani. The decision was taken to focus the approach on four distinct industries: security, transportation, healthcare, and the environment and environmental protection. The justification for this is to concentrate the potential of artificial intelligence's comparative advantages and competences on industries where businesses may play a significant global role, as well as because these technologies are crucial for the general good.

Seven important recommendations are made, one of which is particularly pertinent to the goals of this article: making artificial intelligence more approachable. It's accurate to say that the algorithms utilized in artificial intelligence are specific and, frequently, trade secrets. Algorithms can, however, be biased. For instance, during the self-learning process, they may absorb and accept societal prejudices or those that are imparted to them by developers and base their judgments on them. This has been done before in the law. Based on data from an algorithm that forecasted the risk of repeat offenses, a defendant in the United States was given a hefty jail term. The parameters used to assess the likelihood of repeat offenses were a trade secret, thus they were not revealed in the defendant's appeal against the employment of an algorithm in the sentencing procedure. The French approach suggests establishing an ethics advisory group, specifying the ethical duty of people involved in artificial intelligence research, and constructing transparent algorithms that can be evaluated and confirmed.

The situation with the European Union is the same. The first step toward regulating artificial intelligence in the European Union was the formulation of the resolution on the Civil Law Rules on Robotics. In 2015, a working group was created in the European Union to address legal issues relating to the advancement of robots and artificial intelligence. The resolution does not have legal force, but it does make certain recommendations to the European Commission about potential measures in the field of artificial intelligence, both in terms of civil law and in terms of the moral implications of robotics.

A "smart robot" is one that has autonomy through the use of sensors and/or connectivity with the environ-

ment, has at least a minimal amount of physical support, adapts its behavior and actions to the environment, and cannot be said to have "life" in the biological sense. It is suggested to "introduce a system for registering advanced robots that would be managed by an EU Agency for Robotics and Artificial Intelligence." Both strict responsibility (no fault necessary) and risk-management approaches (liability of a person who was competent to minimize the risks) are presented as solutions for culpability for damage brought on by robots. The resolution states that liability "shall be commensurate to the actual level of instructions issued to the robot and to its level of autonomy. A mandatory insurance program for robot users and a compensation fund to pay out compensation in the event that no insurance policy covered the risk might supplement liability rules. A Code of Ethical behavior for Robotics Engineers and a Code for Research Ethics Committees are proposed in the resolution as two standards of behavior for handling moral dilemmas. The first code suggests the following four standards for robotics engineering ethics: Robots should be beneficent (act in humans' best interests), non-malevolent (do no damage to people), autonomous (human connection with robots should be voluntary), and just (fairly divide the advantages of robotics).

Artificial intelligence (AI) and the technology that uses it, machine learning (ML), provide the biggest ethical problem. The Hanson Robotics robot Sophia has helped bring this topic much more into the public's notice. Sophia was recently awarded citizenship in Saudi Arabia, a development that pushed AI and ML and the difficult ethical issues they raise into the public eye. Sophia became well-known and was invited to appear on discussion programs all around the world. She is frequently asked if she believes that robots will wipe out mankind. The ML applications that are less obvious are more significant, though. Sophia and other glorified chatbox robots like her are not going to end the world, but we should be worried about the plethora of new, tough ethical questions that AI and ML are now posing globally. States will be more eager to invest in other facets of this technology, which will unfortunately be riskier and more morally dubious. States are primarily interested in applying AI and ML in three areas: military, intelligence, and judicial systems (including law enforcement and court systems). The machines create their own models on which to act or judge by definition. Because governments will only be able to defend judgments made using these algorithms' advice to a limited extent, transparency is a critical challenge. This may make transparency less significant in democracies. This may allow people in charge to disregard requests for openness, which might be problematic for reformers or democratic campaigners. In countries like China, where transparency isn't even acknowledged, AI is already being used in law enforcement. Artificial intelligence is used with facial recognition technology to more precisely measure and define face traits, enabling security cameras to recognize jaywalkers. AI will already be used in China to foresee terrorism and societal upheaval. However, these phrases have extremely varied meanings in other nations. Even if certain definitions of terrorism and civil unrest may be morally dubious with or without AI and ML, these technologies will help states act on these definitions more effectively regardless of how morally dubious they may be. Courts in the United States are increasingly relying on risk assessment algorithms to identify criminal danger. Because there is no national or international regulation of this type of technology, countries will continue to equip their police forces and criminal justice systems with AI and ML-powered technologies without adequately addressing ethical concerns.

The ethical ramifications of AI and ML technology will likely only be discussed once it has been militarized and weaponized, similar to the scenario with nuclear power. The attraction is clear given that fewer soldiers are needed (resulting in fewer losses), efficiency increases (lowering long-term costs), and conflicts are easier to win. Although other countries, like as the United States, currently prohibit completely autonomous weapons, the risk still exists. Artificial intelligence is the future, according to Russian President Vladimir Putin. Whoever assumes control of this arena will also assume control of the whole planet. Russia has already made investments in the creation of a missile that is AI-powered. The concern is that a country would let a weapon like this to both identify something as a target and to fire at it without requiring human consent, even though it is unlikely to happen anytime soon.

The introduction of ethical standards along with global interventions into the current research and investment landscape are required to counteract and thwart the escalating arms race between the US, China, and Russia if we are to overcome the difficulties posed by machine learning technology. The best chance we currently have of controlling this issue before it permeates nearly every aspect of our lives, short of temporarily halting all public-private investments in and contracts utilizing machine learning technologies, is to create an

international organization akin to the IAEA to develop recommendations for applying human rights laws to machine learning technology, monitor nations infringing on human rights with machine learning technology, a. Instead of taking financing from institutions like the CIA for its research, the creation of an organization with a sizable budget devoted to machine learning technology would encourage private sector activities towards constructive uses. If states agree to only conduct machine learning technology research that has been deemed peaceful by this organization and to abide by certain civic obligations, it may eventually lead to a treaty similar to the Nuclear Non-Proliferation Treaty, which would prevent the kind of AI theater that Saudi Arabia has already engaged in. In the past, it has taken a crisis or large-scale catastrophe to establish these types of agreements and organizations. We have the chance for prevention using ML. Given how much they stand to gain from a world in which AI is unregulated, persuading the U.S., Russia, and China to support these solutions would be another issue, but it is obvious that the implications will be severe if they don't.

Ethics and Artificial Intelligence

The moral obligations we have in our interactions with modern AI systems are all based on our duties to other creatures, such our fellow humans, and not on any obligations to the systems themselves. While it is generally agreed that modern AI systems lack moral status, it is not obvious exactly what characteristics moral status is based on. Sentience and sapience (or personhood) are two qualities that are frequently put up as being crucially connected to moral standing, either independently or in combination. These can be loosely described as follows:

Sentience is the ability to have remarkable experiences or qualities, such as the ability to experience pain and suffering. Sapience is a group of abilities linked to higher intellect, including self-awareness and the ability to reason- a flexible agent One widely held belief is that while many animals possess qualia and hence some moral standing, only humans possess sapience, elevating them to a higher moral standing than other non-human creatures. This perspective must, of course, deal with the existence of borderline cases, such as, on the one hand, infants or people with severe mental retardation, who are sometimes regrettably referred to as "marginal humans," who do not meet the requirements for sapience, and, on the other hand, some non-human animals, like great apes, who may have at least some of the traits of sapience. People who label themselves "marginal humans" contest their moral position. Others have suggested additional criteria that an item may meet in order to qualify as a bearer of moral status, such as belonging to a species that typically possesses sentience or sapience or being in a proper relationship to a creature that has moral status on its own (cf. Warren 1997). But for now, let's concentrate on the sentience and sapience standards. According to this representation of moral status, an AI system will have some moral standing if it is capable of experiencing qualia, including the ability to experience pain. A sentient AI system is more like a live animal than a stuffed toy or a wind-up doll, even if it lacks language and other higher cognitive abilities. Unless there are enough compelling moral justifications, it is unethical to cause suffering to a mouse. Any sentient AI system would have the same limitations. An AI system would have complete moral status, equal to that of humans, if it possessed consciousness as well as sapience of a type comparable to that of a normal adult human. Even if it lacks language and other higher cognitive abilities, a sentient AI system is more like a real animal than a stuffed toy or a wind-up doll. Inflicting pain on a mouse is immoral unless there are compelling moral justifications for doing so. Any sentient AI system would follow the same rules. An artificial intelligence system would have full moral status and be on par with humans if it has sapience that is comparable to that of a normal adult human. The Substrate NonDiscrimination Principle does not suggest that a digital computer could be aware or that it could act similarly to a person. Of course, a substance's moral significance might depend on how it affects functionality or sentience. But if we hold these things constant, it doesn't matter morally if a being is comprised of silicon or carbon, or whether its brain employs neurotransmitters or semi-conductors. Another premise that might be put out is that the moral standing of AI systems is not fundamentally affected by the fact that they are artificial, i.e., the result of intentional design. This might be stated as follows:

The principle of ontogeny non-discrimination states that two creatures have the same moral standing if they share the same functioning and awareness experience and only differ in how they came into being. Though in certain areas, especially in the past, the notion that one's moral standing depends on one's lineage or caste has been influential, this theory is now largely recognized in the human instance. We don't think that the moral standing of the offspring is necessarily affected

by causal factors like family planning, assisted birth, in vitro fertilization, gamete selection, intentional enhancement of maternal nutrition, etc., which introduce a deliberate choice and design element in the creation of human persons. Most people agree that if a human clone were to be born, it would have the same moral position as any other human newborn, including those who reject human reproductive cloning for ethical or religious grounds. This justification applies to the situation involving wholly constructed cognitive systems under the Principle of Ontogeny NonDiscrimination. Of course, it is conceivable for the conditions of creation to have an impact on the offspring that changes its moral standing. For instance, if a technique was carried out during conception or gestation that resulted in the development of a human child without a brain, this knowledge about ontogeny would be important to our evaluation of the moral standing of the offspring. However, the anencephalic infant would have the same moral standing as other anencephalic children of a similar kind, even those that were the result of completely natural processes. The qualitative difference between the two—the fact that one has a mind while the other does not—underlies the moral status difference between an anencephalic kid and a typical youngster. The Principle of Ontogeny Non-Discrimination does not apply since the two offspring do not have the same functioning and conscious experience. Although the Principle of Ontogeny Non-Discrimination claims that a being's ontogeny has no fundamental impact on its moral standing, it does not exclude the possibility that ontogenetic information may influence the obligations that different moral agents have toward the concerned being. Parents owe their children specific obligations that they do not owe to other children and that they would not owe even if another kid existed who was qualitatively similar to their own. The claim that the owners or creators of an AI system with moral status may have unique obligations to their artificial mind that they do not have to another artificial mind is also consistent with the Principle of Ontogeny Non-Discrimination, even if the minds in question are qualitatively similar and share the same moral standing. Many problems regarding how we should treat artificial minds may be resolved by applying the same moral standards that we use to evaluate our obligations in more familiar circumstances, providing the concepts of non-discrimination with regard to substrate and ontogeny are recognized. We should treat an artificial mind the same way we would treat a natural human mind in a similar circumstance, inasmuch as moral responsibilities derive from moral status concerns. The issue of creating an ethics for the treatment of artificial minds is made easier by this. Even if we adopt this position, we will still need to address a number of fresh ethical issues that the aforementioned principles do not address. Because artificial minds have the potential to differ greatly from those of regular humans or animals, new ethical issues might develop. We must take into account how these innovative qualities will impact artificial brains' moral standing and what it would entail to respect the moral standing of such unusual minds.

Conclusion

The move of AI algorithms toward more humanlike reasoning portends expected challenges, despite the fact that contemporary AI gives us few ethical problems that are not already present in the design of autos or power plants. AI algorithms may perform social functions, introducing new design criteria like predictability and openness. As a result, new types of safety assurance and the engineering of artificial ethical concerns may be necessary when sufficiently general AI algorithms no longer operate in predictable situations. AIs having sufficiently developed mental states, or the correct kind of states, will have moral standing, and some may even be considered to be persons—although they may be substantially different from those who already exist and maybe subject to other laws. Finally, the possibility of AIs possessing superhuman intelligence and strength forces us to face the very difficult task of developing an algorithm that produces superethical conduct. These problems may seem far-reaching, but it seems certain that we will face them, and there are plenty of ideas for current study areas in them.

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IOT BASED WHEELED ROBOTIC ARM

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Abstract
TNow a day, Robotic arm becomes an integral part of our automation industries. Robotic arm will reduce the human effort by picking and placing the object. In this project, we utilize IOT based technology to control the robotic arm. IOT is one of the emerging technology through which we can control any device by using internet. IOT based robotic arm can move by giving specific commands and it is equipped with servo motors which are controlled with the help of microcontroller. We also provide a login ID and a password to improve its security. Apart from this, we also tried to solve the degree of freedom of the arm.
Robo-DK software is used for simulation purpose. We can monitor and control robotic arm through BLYNK mobile application. All the programming has been done in python language. In this pandemic situation the proposed IOT based robotic arm can be a better solution for patient care monitoring. We can send the arm near to patient for check his temperature, pulse rate, oxygen level and also save data for future purpose.
Key Words: Robotic arm, Pick and Place the objects, ROBODK,Security

INTRODUCTION

In recent years, robotic arm research has progressed from mechanical control robotic arms to potentiometer control robotic arms to switch control robotic arms to joystick control robotic arms with accelerator and flex sensor control, to name a few. In this project, the EMG sensor is employed to drive the artificial robotic arm. The robotic arm is controlled by the flex sensor's bending; as the flex sensor bends, its resistance changes, the current changes, and the robotic arm is controlled by this fluctuation. Here, fig 1 represents the robotic arm. An Electromyography (EMG) sensor is utilized to record and monitor muscle activity in the human arm in this investigation. Electromyography is a diagnostic and monitoring tools used in machine.

Fig 1: ROBOTIC ARM

The sign created by muscle compression in the muscle is estimated by the electromyography muscle sensor. As the muscle is moved or the fingers are bowed, the muscle signals change and the EMG muscle sensor perceives this variety and change and conveys the message to the microcontroller. The ATMEGA 328 microcontroller chip was used in this task. This microcontroller peruses the EMG sensor's feedback sign and afterward controls the servo engine as per the EMG sensor's orders. As the name
says, this is a remote moving automated arm that can be controlled from a distance from a significant stretch. A robot is a machine intended to execute at least one assignment consequently with speed and accuracy. We want robots since robots are frequently less expensive to use over people, furthermore it is more straightforward to do a few positions utilizing robots and some of the time the main conceivable method for achieving a few assignments! Robots can investigate inside fuel tanks, inside volcanoes, venture to every part of the outer layer of blemishes or different places excessively risky for people to go where outrageous temperatures or tainted climate exists. Advanced mechanics is an interdisciplinary part of designing and science that incorporates mechanical designing, electrical designing, software engineering, and others. Advanced mechanics manages the plans, development, activity and utilization of robots, as well as PC frameworks for their control tactile input, and data handling. Automated framework has

been broadly utilized in assembling, military and medical procedure since the robot can perform many benefits and utilized as the countermeasure for some work that can't be lead by the human fantastically.

Robots are utilized in various fields like modern, military, space investigation and clinical applications. Here, fig2 represents the sample pick and place robotic arm. These robots could be named controller robots and help out different pieces of computerized or semi-robotized hardware to accomplish undertakings, for example, stacking, dumping, splash painting, welding, and collecting. By and large robots are planned, assembled and controlled through a PC or a controlling gadget which utilizes a particular program or calculation. Projects and robots are planned such that when the program changes, the conduct of the robot changes appropriately bringing about an entirely adaptable assignment accomplishing robot. Robots are classified by their age, knowledge, underlying, capacities, application and functional abilities.

Fig 2: Sample pick n place arm.

The term robot comes from the Czech word robota, generally translated as “forced labor.” This describes the majority of robots fairly well. Most robots in the world are designed for heavy, repetitive manufacturing work. They handle tasks that are difficult, dangerous or boring to human beings.

For instance, the mechanical arm is oftentimes utilized in assembling jobs. A normal mechanical arm is comprised of seven metal fragments, joined by six joints. The PC controls the robot by turning individual stepper engines associated with each joint (a few bigger arms use hydrodynamics or pneumatics).Unlike common engines, step engines move in precise augmentations. This permits the PC to move the arm definitively, playing out a similar development again and again. The robot utilizes movement sensors to ensure it moves the perfect sum.

Your arm's responsibility is to move your hand from one spot to another. Likewise, the mechanical arm's responsibility is to move an end effector from one spot to another. You can equip mechanical arms with a wide range of end effectors, which are fit to a specific application. One normal end effector is an improved on variant of the hand, which can handle and convey various articles. Mechanical hands regularly have implicit strain sensors that let the PC know how hard the robot is grasping a specific item. This holds the robot back from dropping or breaking whatever it's conveying. Opposite end endeavors incorporate blowtorches, penetrates and splash painters

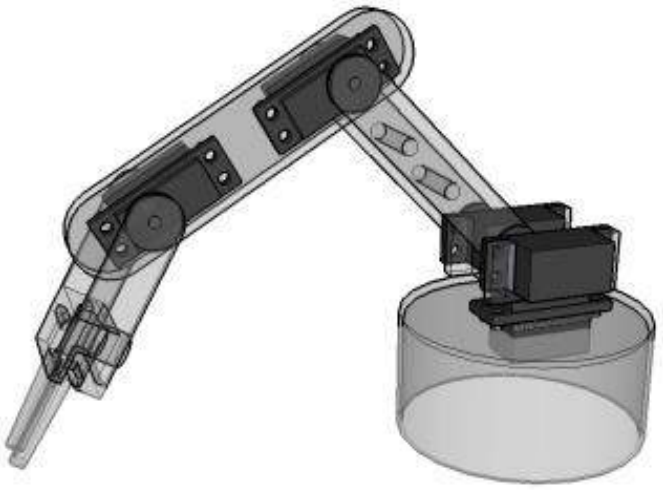

Fig 3:Robotic arm in medical purpose

A sequential robot can be depicted as a chain of connections that are moved by joints which are activated by motors. The fig 3 represents the robotic arm which can be used for medical purpose. An end-effector, likewise called a robot hand, can be appended to the furthest limit of the chain. As other mechanical systems, robot arms are regularly ordered as far as the quantity of levels of opportunity is equivalent to the quantity of joints that moves the connections of the automated arm. At least six levels of opportunity are expected to empower the robot hand to come to an arbitrary pose (position and orientation)in three dimensional space. Additional levels of opportunity permit to change the arrangement of some connection on the arm(e.g., elbow up/down), while keeping the robot hand in a similar posture. Opposite kinematics is the numerical cycle to work out the design of an arm, ordinarily as far as joint angles, given an ideal posture of the robot hand in three layered space.

Software Requirement specification:

Robo DK is a software we used to create the robotic

arm and control the commands given to the arm and also
provide a login ID and a password for the security reasons. The BLYNK application is a mobile phone application which is used to connect the Arduino with the mobile phone. Using the BLYNK application we can command to the robotic arm to make the robot to work. Fig 4 represents block diagram of the proposed robotic arm of our project. The things we needed to control the robotic arm by BLYNK is by the internet connection to both the mobile and the robotic arm. In this application we can arrange the control panel and access and control the controls as we wish.

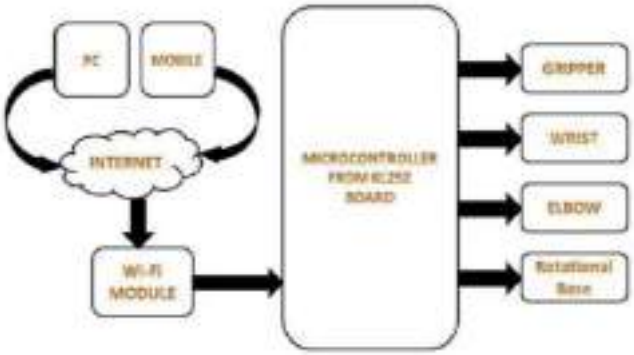

Fig 4: Block diagram of proposed arm
Here, the Arduino microcontroller is used to control the whole robotic arm. The Arduino microcontroller we use is ATmega328 micro controller.In the arduinomicrocontroller there is a chip where we need to upload all the programs to control the robotic arm. Also there will be a port to connect it with the computer by that port we can upload all the programs we needed. Then there is a port which is used to connect to the internet, it can be either connect by wifi module or by an internet connected computer. The Arduino microcontroller is directly connected to the arms and the wheels of the robotic arm.

Fig 5: Blynk Application in Smartphone.

Motor Drivers are the IC used to control the Motors used in a component. The Motor Driver used here is the L293D. The motor driver is used to control the rotation motion of the DC motor. It is fixed to the DC motor in the robotic arm. We use three DC motors in the robot. For each DC motors we use separate motor drivers. There is three wires present in the servo motors which are used to power supply and to the control of the signals to the servo motors. The servo motor is the motor used to make the rotation motion accuracy of the servo motor is very high than compare to the DC motar. Here we use three DC gear motors. A gear motor is a motor designed with an integral and gear reducer parts. The end shield of the drive end of motor is designed to give dual functions. The side which faces the motor gives the rotor bearing and a sealing through where the integral rotor shaft pin passes. On the other side of the end shield, it gives multiple bearing supports for gearing itself, and also a sealing and fastening provision for the gear housing. This is the process happening in the DC gear motor. Power supply has very important role in electronic system thus its design will be having a major part in each of the applications. Proper choice of power supply is needed to avoid the mal-operation which results to discontinues power supply and fluctuated load. The power supply circuit operates by using the built filters, voltage regulators, and the rectifiers. The power supply used here is the DC supply which we give individual supply to each of the components in the robotic arm. There are many distinct sorts of robots; they are employed in a variety of locations and for a variety of purposes. Fig 3.2 represents the Blynk application which is operated by smartphone. Despite their wide range of applications and forms, all robots share three essential structural similarities: All robots have a mechanical structure, such as a frame, form, or shape, that is designed to do a certain purpose. Caterpillar tracks, for example, might be used by a robot intended to travel through thick dirt or mud. The mechanical part is mostly the creator's response to performing the prescribed goal while also coping with the physics of the surrounding world. Function comes first, then form. Computer programming code is present in all robots. A program is how a robot decides when or how to do something. In the caterpillar track example, a robot that needs to move across a muddy road may have the correct mechanical construction, and receive the correct amount of power from its battery, but would not go anywhere without a program telling it to move.

SIMULATION:

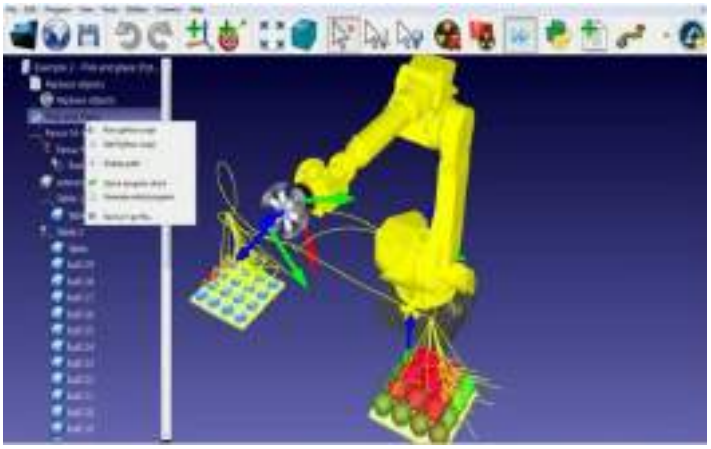

Fig 6: Designed robotic arm.

Output Screens and Result analysis:

The robotic arm is picking and placing the things for the given weight and is also monitored using the RO-BODK software. Robotic arm is programmed using the software and is represented in fig 7.

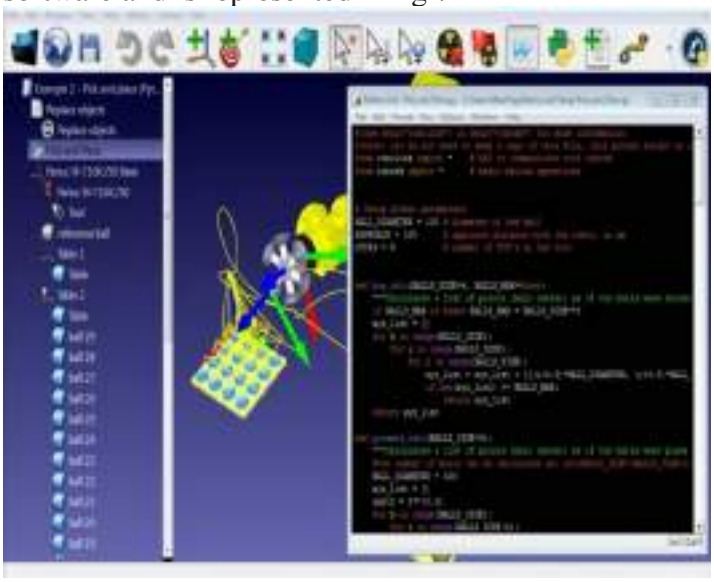

Fig 7: Programmed Robotic arm.

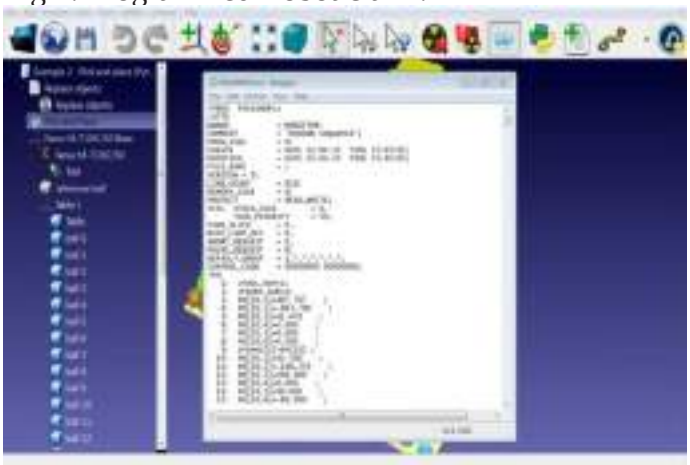

Fig 8: Simulated result of Robotic arm.

Fig 9: Configuration of Robotic arm.

Conclusion :

The conclusion for this project is the robotic arm can lift and move the heavy objects. It can easily move to anywhere. It helps in increasing productivity, safety, efficiency, and quality of products. The arm achieved more accuracy than the humans. Now, it is easy to monitor and control things using the BLYNK mobile application. The robotic arm is highly secured with the password. Robotic arm is used to do repetitive actions or jobs and also used in factories, medical appliances. In this project we were

able to control the Robotic arm not only using the wired controls but with the help of Internet of Things which is the growing technology in recent times we successfully controlled the robotic arm using the IOT interface. This can be useful to various industrial applications where machines need to be controlled from distant places. This project not only responds to the controls sent but also records the movements and can perform the same tasks repeatedly reducing human efforts. The robotic arm can be controlled by the IoT using the mobile phone from anywhere in the world. Even if we lost our mobile we can control our robotic arm with the help of another mobile phone, what we needed is the installation of the blynk application. Also there will be no privacy lose due to the usage of the login id and password we created on the cloud. We can control our robotic arm with any mobile phones which have blynk application with our login details. In future, this can be used for the space explorations. In the medical field, we can do minor surgeries from far distance through IoT. Detection and diffusion of suspicious objects like mine bombs can also be done

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REVIEW PAPER STUDY ON SINKHOLE ATTACKS IN WIRELESS AD HOC NETWORKS

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Abstract
The Mobile Ad hoc Network is a modern wireless base communication system is most important and popularly used communication. The Major attack faced by this network is sinkhole attack which can heavily attract the resources available in the network. It has to be prevented to make the energy of the network is available for all resources. Different kinds of attack that can be introduced in wireless network. So security is an essential requirement in mobile ad hoc network (MANETs). There arevarious type of attacks that can be introduced in wireless network. In this paper we studies sinkhole attack and different routing protocol. Sinkhole attack is a type of attack were compromised node tries to attract network traffic by advertise its fake routing update. One of the impacts of sinkhole attack is that, it can be used to launch other attacks like selective forwarding attack, acknowledge spoofing attack and drops or altered routing information.

I. INTRODUCTION

Manet is often called a mobile adhoc network. It is collection of various Wireless nodes that enter and leave over time. Each node acts as a route node which forward data packet. Manet does not have any centralizedadministration. Each node work as router to forward data packet. Manet is one of fastest emerging technology,small and more powerful wireless device due to commencement of economical. MANET is basically used in military service.

Types of attack

Passive attack

Active attack

Passive attack:- In passive attack ,attacker can exchange the data without alerting in network .in this attack detection is very difficult since the operation of network does not get affected itself. There is only one solution of this problem to use powerful encryption mechanism. Through encrypt data or useful information can be coded and decoded. Attacker can get useful information from data overhead.

Active attack:-In active attack attacker can try to destroy or exchange the information by disrupting the normal function in the network. Active attack can be external and internal.

External attack: External attacks are carried out by nodes which are not a part of a network.

External attacks, in which the attacker aims to cause the congestion which propagates fake routing information or providing services from, disturb nodes.

Internal attack:- Internal attack, attack are on a different nodes that is not a part of a network. Attacker wants to gain the normal access to the network and network activitiesare participate the either by any malicious node to get the access to the network as a new node, or by directly compromising a running node and using it as a basis to conduct its malicious behaviors.

Various routing protocol are involved in MANET (Mobile adhoc Network).Proactive,ReactiveandHybrid are three type of routing protocol

Routing protocolsTable-Driven routing protocols (Proactive)

Proactive protocol:- Proactive protocol is a distributed shortest path protocol.it maintain the route between every hosted pairs at all times proactive is based on the periodic updated high routing overhead.

On Demand routing protocols (Reactive)

Reactive protocol:-This protocol don't maintain the routing information if there is no communication in a network. If anynodes want to send any information or any data packet to another node then reactive protocol search a route in on demand protocol and established a connection to transmit and receive the data packets. The route discovery usually occurs by flooding the RRP (route request packets) throughout the network.

HYBRID ROUTING PROTOCOLS (Proactive and Reactive)

Hybrid routing protocols is a combination of reactive and proactive routing protocols. It was proposed to reduce to the control overhead of proactive routing protocols andlatency is decrease caused by route discovery inreactive routing protocols. Hybrid routing protocols are temporarily Ordered Routing Algorithm and Zone routing protocol and

Sinkhole attack: - Sinkhole attack whole traffic is misrouting though a compromised node. Through sinkhole attack routing algorithm compromised a node which especially alterativeto asurrounding nodes using fake routing information and alter through data passing.A sinkhole node tries to attack to the data to it from all

the neighboring nodes. It generates fake data routing information that the nodes in local network know itself on the specific way to anodes. Through this, sinkhole node triesto draw all network traffic fromitself. After that it alters the data packet or drops the packet silently. Sinkhole attack decreases the network's life time through boosting energy consumption finally destroy the network by increases network overhead.

In sinkhole attack a malicious node can read all packets by falsely claiming a new route to the destination using variouskind of denial of service. Sink Hole Attack the node can drop thedata whichcoming from the source todestination. So it will difficult to know data is read by whose node.

Attacks on MANET:

Tampering: - In tampering a sensor node by may be damage by attacker , change the all node or part its hardware part or even electronically interrogate the nodes to gain access to sensitive information, such as shared cryptographic keys and how higher communication layers can be access.

Selectiveforwarding: - In such type of attack data can be include itself in a data flow path rather then drop the data packets like a black hole attack.

SybilAttack: - .In a Sybil attack the multiple identies can be shown in a network. These identies can confuse the multiple locations in geographic at once.

Jamming: - A sensor node interferes with the radio frequencies. A few jamming nodes can put to considerable amount of the nodes out of order.

Spoofed, altered orreplayed routing information: - Spoofed is a direct attack. By spoofing, altering or replaying routing information the attacker can complicate the network and attracting or repelling traffic, and create routing loops generating false error messages, shortening or extending source routes or partitioning the network

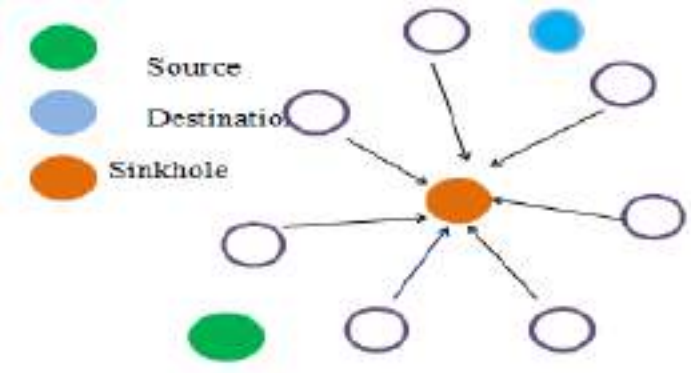
Hello flood attacks: - In many routing protocols, nodes can broadcast hello messages in a network to show their presence to their neighbors nodes. In such type of attack nodes can be send and receive the messages in a particular range. In a network an attacker can be known as a high powered antenna that can convince every node in the network that it is their neighbor.

Dynamic Source Routing Protocol

Manet routing protocol can be classified into 'table-driven routing' and 'on-demand routing' protocols. The wired network routing protocols is extension of Table-driven routing protocols. Dynamic Source Routing Protocol keeps the global routing information in each router, in form of table. The table is updated each time to maintain the correct information of network status. They can get the route to destination swiftly, to maintain the route table. Dynamic Source Routing Protocol should keep the whole information and exchange routing information constantly to update the table.

Dynamic Source Routing Protocol when a path is required by a node in on-demand routing protocols to execute the path-finding process. Dynamic source routing protocols are designed to restrict the bandwidth consumed in adhoc wireless networks by control packet. On the other hand, Dynamic source routing protocol (DSR) is a representative on- demand protocol DSR protocol consists of route maintenance phase and route discovery phase. Mobile nodes get route information by initiating route discovery itself and route request by overhearing the route records to other route discovery processes. If new route is entered then update the cache, they keep the route cache which contains source route. When a route path is broken, route error message is sent to the source node and reestablish the route in route.

Packet delivery ratio is decrease when sinkhole is present. Packets which are not delivered to the destination may be forwarded by the sinkhole node to another node in the network or may be dropped. This can cause fluctuations in the delivery ratio as the sinkhole may forward packet or selectively drop. Throughput is the total number of packets received by the destination node over time of period. It has been observed that throughput decreases with time. The reason is more packets has access by sinkhole on the network and sinkhole attack will not allow the packets to reach to the destination and hence the throughput decreases. The numbers of packets sent by the source node to that of the number of packets received by the destination node is the difference of a packet drop. Sink hole behavior is to reroute or drop any packets it receives. As a result, packet drop increases in the presence of sinkhole attacks.



Conclusion:

In this paper, we have inspected different kind of routing protocol in MANETs. In mobile ad hoc network, Sinkhole attack is one of possible attack in mobile ad hoc network. Therefore we require strong mechanism which can efficiently detect & helps to prevent adhoc network from sinkholeattack. Thus we have studied various routing attacks, their causes & sinkhole detection techniques available in MANET. As future work, we tried to find out all parameter indicators of sinkhole attack in MANETs. Wewill study different routing protocol in Manet.

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MATHEMATICAL MODEL FOR AN ASYNCHRONOUS MOTOR IMPLEMENTED IN MATLAB

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Abstract
AC asynchronous motors are the most frequent motors used in industrial motion control systems as well as in main powered domestic appliances. AC asynchronous motors provide several advantages, including a simple and durable construction, low cost, low maintenance, and direct connection to an AC power source. On the market, there are many different types of AC asynchronous motors. Diverse motors are suitable for various applications. Like other motors, an AC asynchronous motor contains a stator that is fixed on the outside and a rotor that spins within, separated by a precisely designed air gap. Almost all electric motors use magnetic field rotation to spin their rotors. Asynchronous motors are the most commonly utilized electromechanical machinery in industrial applications. There have been several research on their control, as well as a variety of approaches for achieving high-performance speed drivers. The properties of asynchronous motors alter with time and under different operating situations. Even though much research has gone into developing artificial neural network techniques to estimate the speed of an asynchronous motor and some of the parameters such as flux and torque, there hasn't been much work done on asynchronous motor speed estimation using artificial neural networks.
The main purpose of this paper is to build a speed estimator for an asynchronous motor using a feed-forward artificial neural network. A mathematical model for the asynchronous motor is developed and implemented in Matlab. A speed estimator is then developed using a feed-forward neural network and coupled to the asynchronous motor to estimate its speed. After that, simulations are done to see how well the proposed speed estimator performed.
Keywords: Space Vector Modulation PWM (SVPWM), Artificial Neural Networks (ANN), magnet Permanent magnet Synchronous Motor(PMSM).

I. INTRODUCTION

An AC induction motor, like other motors, contains an additional exterior permanent part called an inner stator and a rotor that rotates with a properly built air gap. Almost all electric motors use magnetic field rotation to rotate their rotors. The 3-phase motor for AC induction is the only kind in which the magnetic field rotates spontaneously in the stator due to the supply arrangement. DC motors rely on rotating magnetic fields, which can be switched mechanically or electrically.[1] A single-phase AC induction motor requires additional electrical components to generate this spinning magnetic field. Two sets of electromagnets are formed inside each motor. The AC supply connected to an AC induction motor's stator windings is utilized to create a series of electromagnets. According to the law of Lenz, an alternate power source voltage (EMF) is induced on the rotor (much like the voltage is produced in the secondary transformer). The magnetic fields of such electro-magnets interact, causing twisting or torque. The motor spins in the torque direction as a result of this. Induction Motor Speed, the stator magnet field revolves synchronously at speed (NS) where:
NS = the Stator Speed Synchronous magnetic field in RPM
P = The pole number on the stator
f = the supply frequency in Hertz
Due to the induced voltage, the magnetic field formed in the rotor alternates in nature. To maximize the relative speed, the rotor begins to travel in the same direction as the stator flux and tries to keep up with the spinning flux. However, the rotor is unable to "catch" the stator's field. The stator's field follows. [2] The rotor has a lower field speed than the stator. This is referred to as the base speed (Nb). The slip is the name for the NS-NB gap. The amount of slides is determined by the load. A load increase might cause rotor slip to be delayed or increased. A rotor's slip will be sped up or reduced as the load is reduced.

2. Artificial Neural Networks (ANN)

A taxonomy of ANN schemes and how ANNs are trained based on their learning. The classification

is based on a method of information data management in which they are given the unknown input X. The goal is to identify the weight distribution in the vicinity of a fresh X observation. Figure 1 depicts the basic network concept. They can have different architectures and are built up of numerous layers of neuronal organization. Even the preparation should be supervised or supervised by you.[3]

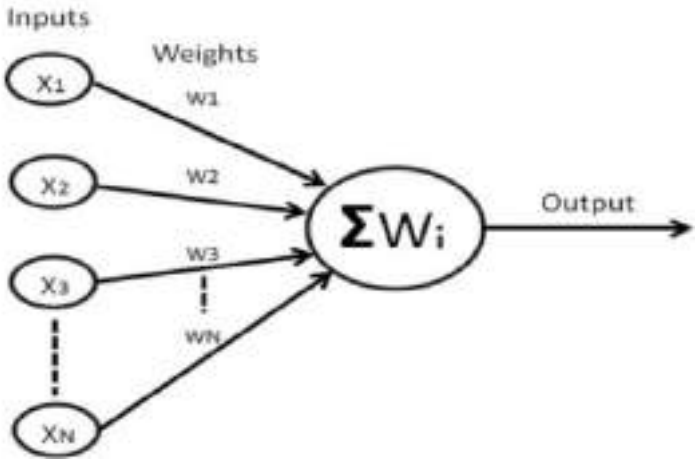

Fig.1Speed Estimation using ANN

The capacity of ANNs to approximate nonlinear functions is the reason for their appeal. They're frequently utilized to address problems that are classified as black-box. The design technique presupposes that we are familiar with input and output signals, but not with the mathematical description of the process taking place inside the black box. Many attempts have been made to tackle various estimate challenges that occur in black-box drives.[4] When it comes to mechanical speed, using ANN as a function f1 approximation, which is defined as follows, is a fairly simple choice.

$$\omega_r^{(k)} = f_1\left(u_{-1}^{(k)}, i_{-1}^{(k)}, u_{-2}^{(k-1)}, i_{f1}^{(k-1)}, \mathrm{K}\right)$$

To be practical, the length of the tapped delay lines (TDLs) and the number of delayed signals must be limited. A single delayed signal, for example, was hypothesized and partially proven to be sufficient. This relationship can be function-like even for zero-length TDL in some AC motor control systems.

2.1 Perceptron model for ANN

NNs have different ideas about what they are. To begin, the sensor is the most basic. It can tell if an input belongs to one of two categories and has two different activation functions (AFs). A hard limiter, a logic threshold (ramp), a linear one (sigmoid), and (the most common) a logistic characteristic of Sigmoidal are commonly included in its list of AFs. The mathematical model is as follows:

$$y = \phi\left(\sum_{i=1}^{N} w_i x_i - b\right) \qquad X_1, X_2, \mathrm{K}\, X_N$$

Inputs are provided by device signals, the appropriate weights, b is the neuronal bias, and is the AF. Figure below

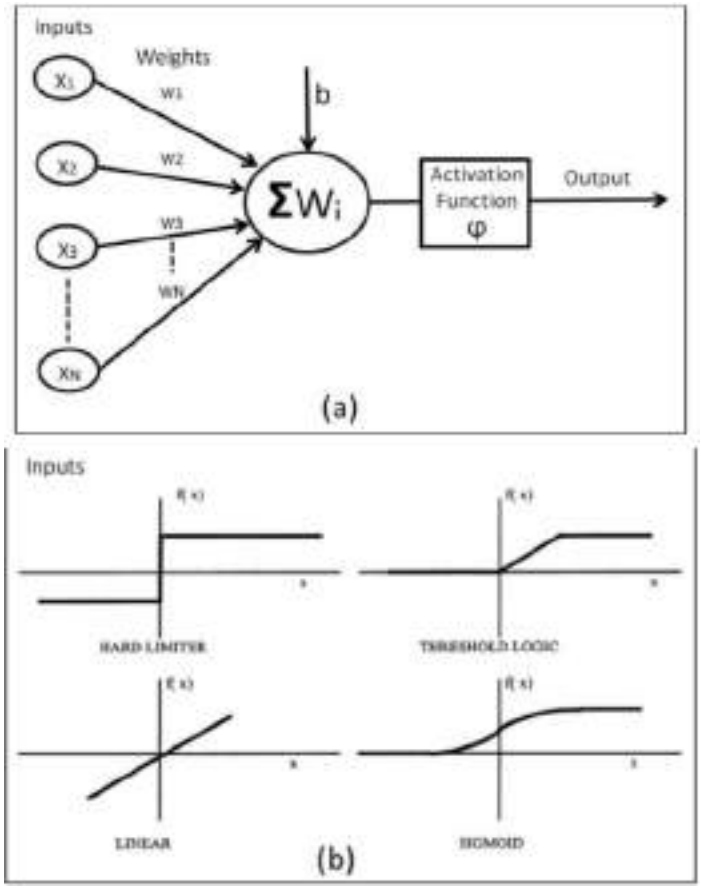

Fig.2 A perceptron and its activation functions, (a) and (b) respectively

3. Research Methodology

A mathematical model for an asynchronous motor has been devised and implemented in Matlab. Then, using a feed-forward neural network, a speed estimator is- created and coupled to the asynchronous motor to estimate its speed. After that, simulations to anticipate the suggested efficiency speed estimation run.[5]

3.1 Speed Estimation using Neural Network

For predicted induction motor pace difficulties, there are numerous model-based solutions. Their effectiveness is largely determined by the accuracy with which parameters are identified. Open-loop observ-

ers (calculators) and closed-loop observers are the two main types of observers. Due to the inclusion of a correction loop, the former are usually quite sensitive to parameter fluctuations, whilst the latter is more resistant. They can also be categorized based on the methods utilized during the design process. With ANN as an adaptive model, there is a class of MRAS-like estimators. ANN training techniques are used to derive an adaptability rule (e.g. error backpropagation method).[6] L.Ben- Brahim and R. Kurosawa are undoubtedly the most well-known and frequently mentioned. The adaptive model is built in the form of a linear neuron The calculated speed is proportional to one of the weights.

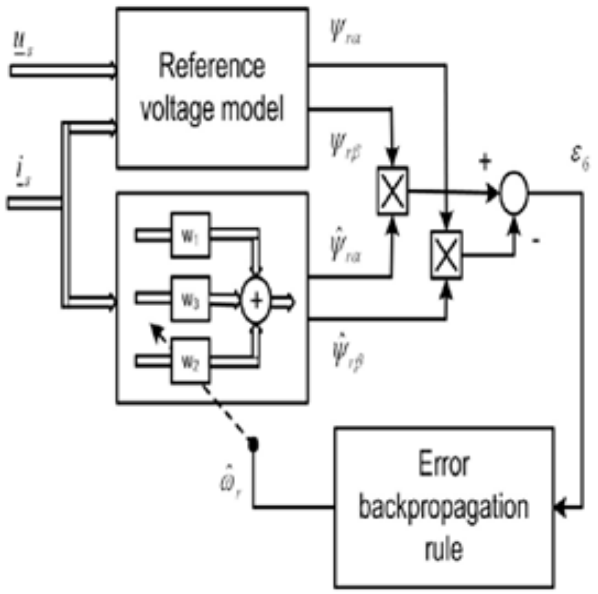

Fig. 3 . ADALINE-based MRAS speed estimator

4. Results

In general, ANNs are utilized to solve a wide range of black-box estimate issues. Only the input and output signals are known in black-box estimation issues and their mathematical relationship is unknown. Real-world estimate problems, on the other hand, are typically Gray-box estimation problems, which may be characterized using some type of mathematical description. Because an asynchronous motor's rotor speed does not have a unique function and incorporates numerator and denominator functions, ANN cannot be used to estimate its speed directly. So far, we've created six-speed signals by changing voltages and currents in the job at hand. The entire framework and Simulink software are implemented in MATLAB. For speed estimate, a feed-forward ANN was utilized.[7]

The Simulink model's block diagram is shown in Figure4.

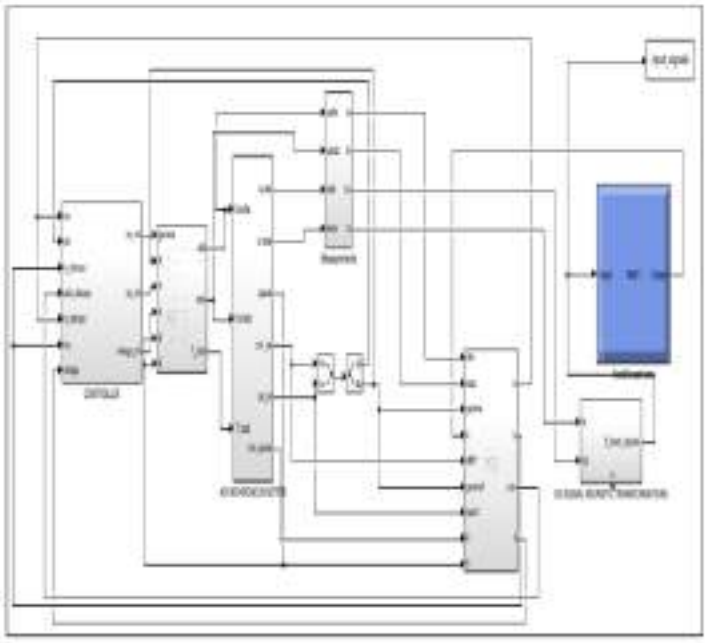

Figure 4. Block Diagram of Model Implemented in Simulink

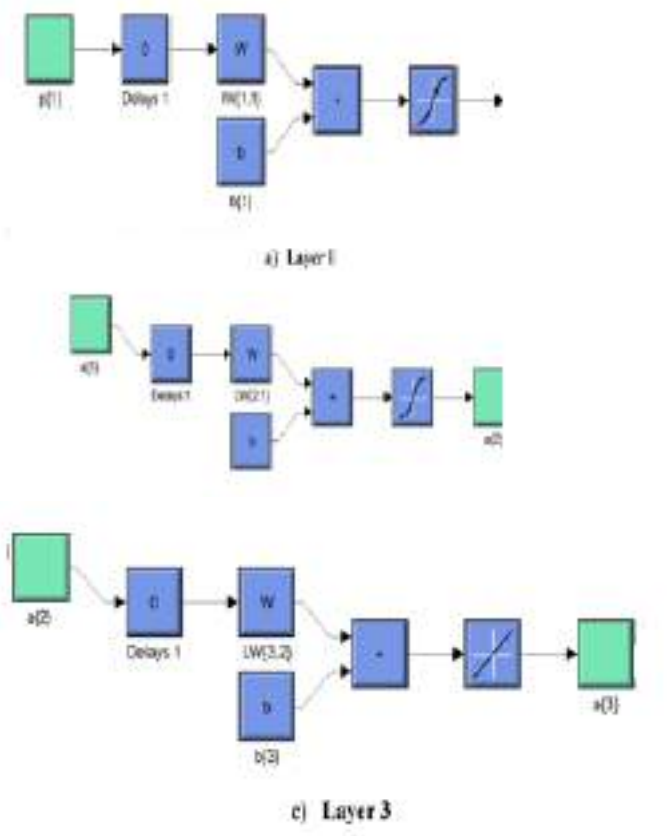

Fig.5 The feedforward Network of neural nets is made up of 3 layers. Layers 1 and 2 use the Sigmoid function and Layer 3 uses the linear function

5.Conclusion & Future Scope

Asynchronous motors are widely employed in power and a variety of industrial applications. The characteristics of an asynchronous motor change with time and under different operating conditions. Despite extensive research, the speed of an asynchronous motor has been determined. Although ANN has been used to predict some parameters such as flux and torque, little work has been done on the speed estimation of asynchronous motors. In this paper,[8] the usage of a feed-forward ANN to approximate the speed of an asynchronous motor was investigated. As previously discussed, ANNs are well-known for their use in the estimation of nonlinear equations. The use of artificial neural networks (ANN) to tackle a wide range of black-box estimate issues is prevalent.

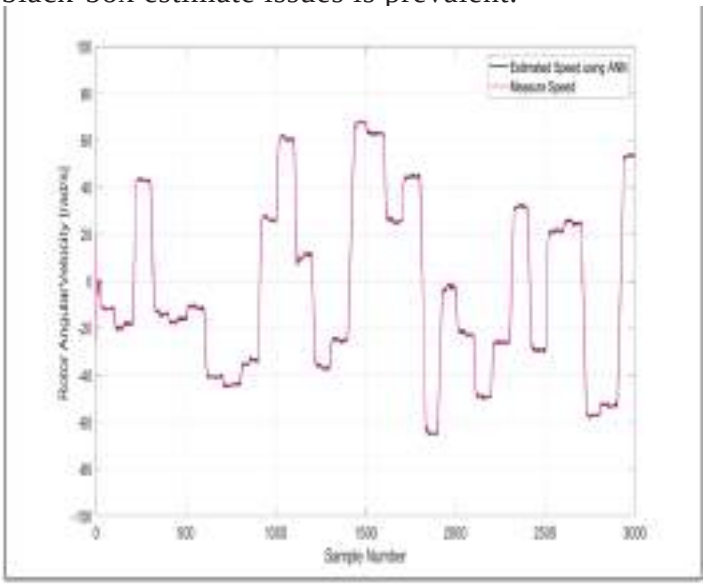

Fig.6 Measured and Expected Speed of Asynchronous Motor

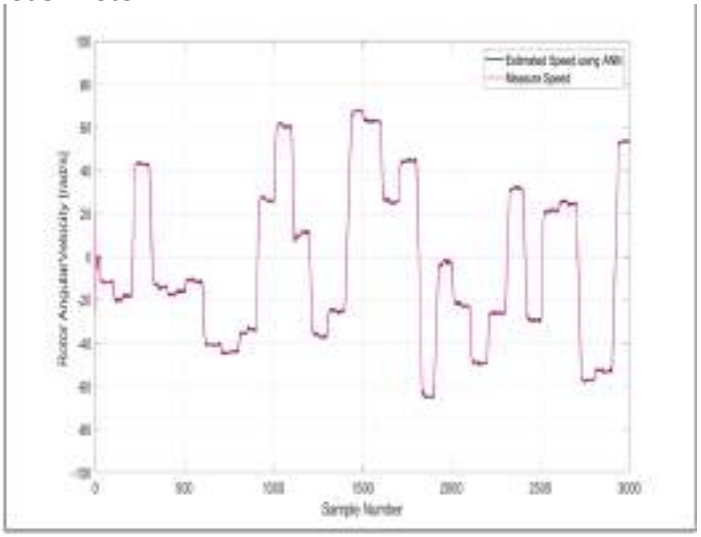

Fig.7 Variation of Torque of Asynchronous Motor

Only the input and output signals, as well as their mathematical relationship, are known in black-box estimation problems.

Real-world estimate problems, on the other hand, are typically Gray-box estimation problems, which may be characterized using some type of mathematical description.[9] Because an asynchronous motor's rotor speed does not have a unique function and incorporates numerator and denominator functions, ANN cannot be used to estimate its speed directly. The feedforward ANN was employed in this study. However, in the future, backpropagation ANN or a deep neural network can be used to estimate motor properties.

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DEVELOP AND SIMULATE AN AERODYNAMIC CAR BODY FOR THE SUZUKI Alto 800 THAT HAS A LOWER DRAG COEFFICIENT

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Abstract
This paper describes the redesigning and CFD analysis of a Maruti Suzuki alto 800 car. The focus of the study is to investigate the aerodynamics characteristics of a Maruti Suzuki alto 800 without using any aerodynamic devices. The aerodynamics study of Maruti Suzuki alto 800 is made to reduce the drag force. The study was performed using the CFD package. This is a study to design and simulate an aerodynamic urban concept exterior body for Maruti Suzuki alto 800 to attain low coefficient of drag and to help the vehicle attain less fuel consumption. The main goal of this study is to enhance the stability of the vehicle and reduce the drag. With this the resistance of air to the vehicle gets reduced. The CFD analysis is done on full scale model. The aerodynamic study is conducted in the Solid Works Flow Simulation 2016 software to perform a turbulent stimulation of the air flow on the Alto 800. The results are graphically shown with co–efficient of drag, drag force, pressure contour & velocity contour.

I. INTRODUCTION

The force on an object that resists its motion through a fluid is called drag. When the fluid is a gas like air, it is called aerodynamic drag (or air resistance). When the fluid is a liquid like water it is called hydrodynamic drag. Drag is a complicated phenomenon and explaining it from a theory based entirely on fundamental principles is exceptionally difficult. Fluids are characterized by their ability to flow. In semi-technical language, a fluid is any material that can't resist a shear force for any appreciable length of time. This makes them hard to hold but easy to pour, stir, mix, and spread. As a result, fluids have no definite shape but take on the shape of their container. Fluids are unusual in that they yield their space relatively easy to other material things at least when compared to solids. Fluids may not be solid, but they are most certainly material. The essential property of being material is to have both mass and volume. Material things resist changes in their velocity and no two material things may occupy the same space at the same time. The portion of the drag force that is due to the inertia of the fluid is the resistance to change that the fluid has to being pushed aside so that something else can occupy its space is called the pressure drag.

$Cd = FD / 0.5 \rho v2 A$ (1.2)

Where FD = Drag force
CD = Drag coefficient
ρ = fluid density
A = frontal area
v = Velocity

Lift is normally of little importance in passenger cars as their speed is usually too low to produce much lift. It was noticed early on that something strange happened at high speeds: the car seemed to be lifting off the ground. Lift can be serious, particularly in racing cars. It has a serious effect on the control and handling of the car.

Lift occurs because the airflow over the top of a car is faster than across the bottom. This occurs to some degree in all cars. As the speed increases, the pressure decreases, according to Bernoulli's theorem. The top of the car therefore has a lower pressure than the bottom, and the result is a lifting force.

The amount of lift generated by an object depends on a number of factors, including the density of the air, the velocity between the object and the air, the viscosity and compressibility of the air, the surface area over which the air flows, the shape of the body, and the body's inclination to the flow, also called the angle of attack.

The area of drag is one factor to determine the aerodynamic efficiency of a body. In the design of a vehicle, the total shape of the exterior body is considered such as the front and cross-sectional areas. The computation for coefficient of drag is as follows:

$CL = FL / 0.5 \rho V2 A$ (1.3)

Where FL = lift force
CL = Lift coefficient
ρ = fluid density
A = frontal area
v = Velocity

Sneh Hetawal et al. (2014) have presented the design and CFD analysis of a Formula SAE car. The study has focused on investigate the aerodynamics characteristics of a SAE race car. The aerodynamics

study of the SAE car has made to reduce the drag force. The study has performed using the CFD package. The study revealed that enhance the stability of the vehicle and reduce the drag.

R. B. Sharma et al. (2014) has explored an effective numerical model based on the Computational Fluid Dynamics (CFD) approach to obtain the flow structure around a passenger car with Spoiler & VGs together. The experimental work of the test vehicle and grid system is constructed by ANSYS-14.0. FLUENT which is the CFD solver & employed in the paper. Rexca Anak Jamit (2014) have investigated a simulation result of an evaluation of the aerodynamic performance of a moving car with a wind turbine system. Sedan type cars were modeled using the SolidWork software and simulation was done by ANSYS FLUENT software. Three car models with different wind turbine system positions (in front of the front bumper, on top of the hood and on top of the roof) plus one model without the wind turbine system were simulated. Julianous Ketihus (2014) has found aerodynamic has an important element that needs to be considered in designation of a race car to achieve the top speed instead of depending only on the engine horsepower. In development of race car, engineer's goal was to provide enough downforce, and minimum aerodynamic drag. The innovative of aerodynamic design affects the speed of a race car, means the more aerodynamic of the car, the faster the speed of the vehicle and vice versa. However, there was two enemies or constrains that may affect speed in race car aerodynamics which is excess in drag force and lack of downforce. The drag was the resultant force in the direction of the upstream velocity; it opposes the forward motion of the vehicle. Excess in drag (wind resistance) reducing the effectiveness of the time and requires more horsepower for the engine to achieve top speed. Lack of downforce can reduce the traction and road grip.

Reaz Hasan et al. (2015) has claimed that automotive industry has aimed to develop the aerodynamics of car bodies. This may be for a variety of beneficial reasons such as to increase speed or fuel efficiency by reducing drag. However, recently there has been a greater amount of focus on wind noise produced while driving. Designers in this industry seek a combination of both simplicity of approach and overall effectiveness. This combined with the growing availability of commercial CFD (Computational Fluid Dynamics) packages has likely to lead to an increase in the use of RANS (Reynolds Averaged Navier-Stokes) based CFD methods. This was due to these methods often being simpler than other CFD methods, having lower time and computing requirements.

AERODYNAMICS THEORY

Bernoulli's Theorem

Bernoulli's theorem implies that if the fluid flows horizontally so that no change in gravitational potential energy occurs, then a decrease in fluid pressure is associated with an increase in fluid velocity. If the fluid is flowing through a horizontal pipe of varying cross-sectional area, for example, the fluid speeds up in constricted areas so that the pressure the fluid exerts is least where the cross section is smallest. This phenomenon is sometimes called the Venturi Effect (Figure 1), after the Italian scientist G.B. Venturi (1746–1822), who first noted the effects of constricted channels on fluid flow.

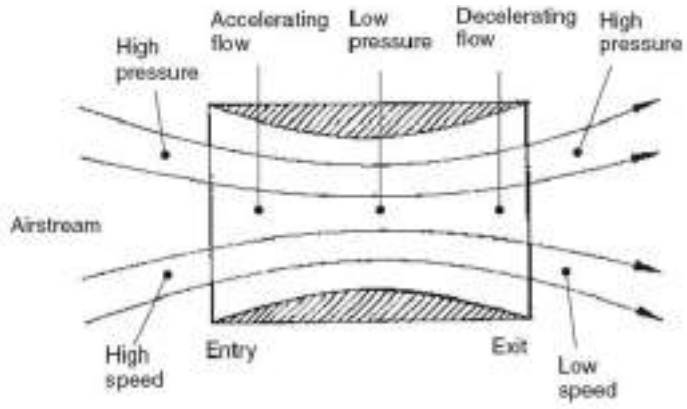

Figure 1 Venturi effect.

Bernoulli's principle can be applied to various types of fluid flow, resulting in what is loosely denoted as Bernoulli's equation (Eq. 1.1). In fact, there are different forms of the Bernoulli's equation for different types of flow. The simple form of Bernoulli's principle is valid for incompressible flows (most liquid flows) and also for compressible flows (gases) moving at low Mach numbers. More advanced forms may in some cases be applied to compressible flows at higher Mach numbers.

$P + 1/2\ \rho v2 = \text{constant}$ (1.1)

Where the P, ρ, v is pressure, density and velocity, respectively.

Bernoulli's principle is equivalent to the principle of conservation of energy. This states that in a steady flow the sum of all forms of mechanical energy in a fluid along a streamline is the same at all points on that streamline. This requires that the sum of kinetic

energy and potential energy remain constant. If the fluid is flowing out of a reservoir the sum of all forms of energy is the same on all streamlines because in a reservoir the energy per unit mass (the sum of pressure and gravitational potential ρgh) is the same everywhere.

Fluid particles are subject only to pressure and their own weight. If a fluid is flowing horizontally and along a section of a streamline, where the speed increases it can only be because the fluid on that section has moved from a region of higher pressure to a region of lower pressure; and if its speed decreases, it can only be because it has moved from a region of lower pressure to a region of higher pressure. Consequently, within a fluid flowing horizontally, the highest speed occurs where the pressure is lowest, and the lowest speed occurs where the pressure is highest.

AERODYNAMIC ANALYSIS OF MARUTI SUZUKI ALTO 800

The following is a CFD simulation of Maruti Suzuki Alto 800 without add-on aerodynamic devices as shown in the Figure 2. The geometry is created in Solid Works 2016 according to the dimensions showed in the chapter three. The modeling is based on the general parameter but might not be as accurate as it was. In addition, missing of some parameters makes this model only able to introduce the basic outcomes of vehicles. After sketching the exterior body of Maruti Suzuki Alto 800 in Solid Works 2016 the same material selected was considered and input to the sketch as used for Maruti Suzuki 800. The exterior body is simulated in Solid Works flow simulation to determine the aerodynamic characteristics.

Figure 2: Flow simulation of Alto 800

The simulation is using air with the following properties which are as it is same as used in simulation of Maruti Suzuki 800: temperature of 293.2 K, density of 1 kg/m3 and pressure of 101325 Pa as shown in Figure 3. Simulation will be run in different parameters where the inlet velocity of air used are 30,35, & 37.5 m/s in X- direction.

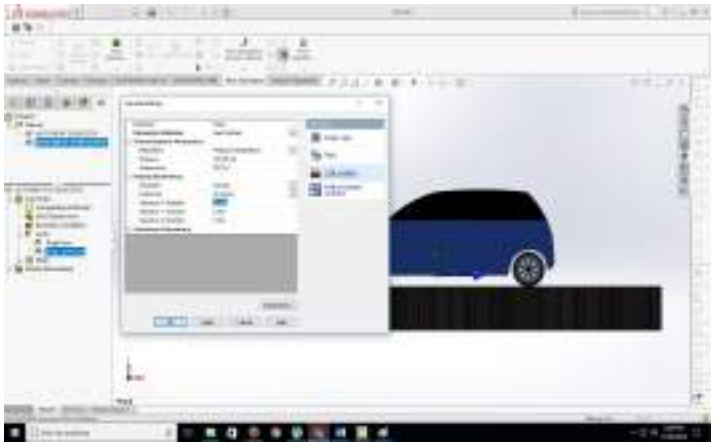

Figure 3: Properties of air

4.4.1 Flow Simulation of ALTO 800 at 30 m/s Wind Speed (First Trail)

For the first trail, we used the ground clearance equals to 160 mm. The red color indicates high dynamic pressure area that also presents the high-speed airflow. According to Bernoulli's effect, compared to the low velocity underneath of the vehicle, it generates the lift. Figure 4 shows that the blue section represents the low pressure on the top of vehicle. The pressure difference between the top and underneath of the vehicle generates lift. From the simulation, it yields drag coefficient equal to 0.25 and generates 464.48 N drag force at a speed of 30 m/s without any add-on devices. As we can see from Figure 4, the total pressure at the area in front of the windshield is high, which generates the drag and the downward force.

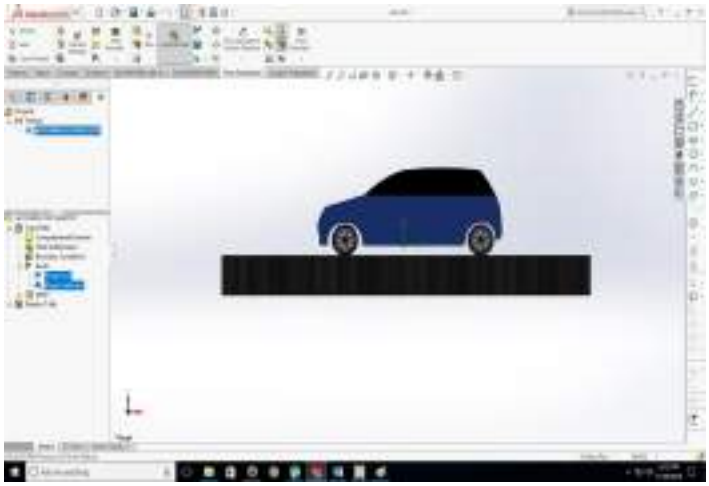

Figure 4: Airflow velocity at 30 m/s

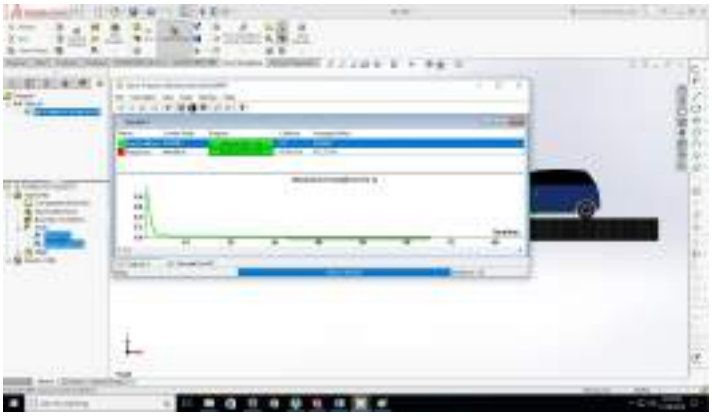

Figure 5: Results of airflow velocity at 30 m/s

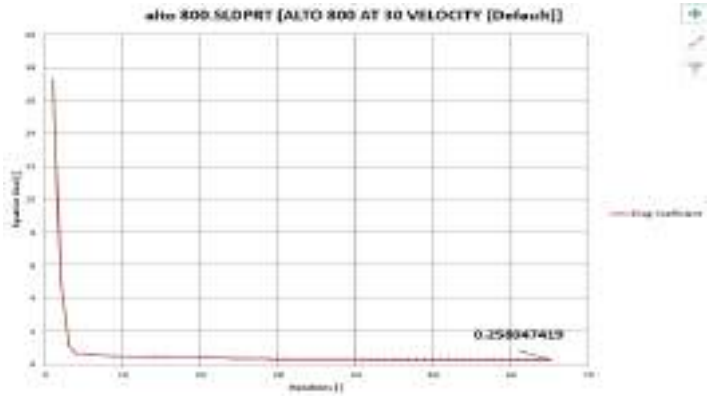

Figure 6: Drag coefficient of Alto 800

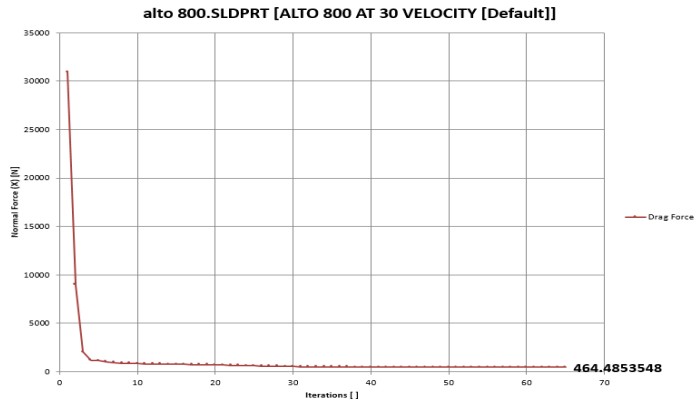

Figure 7: Drag Force of Alto 800

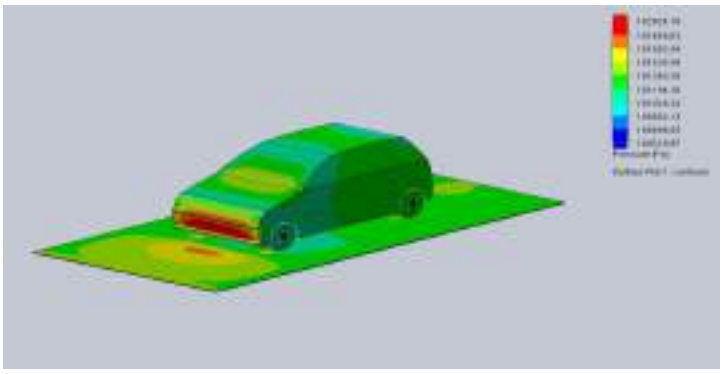

Figure 8: Pressure contour on surface of car at 30 m/s wind speed

Figure 9: Pressure path lines on surface of car

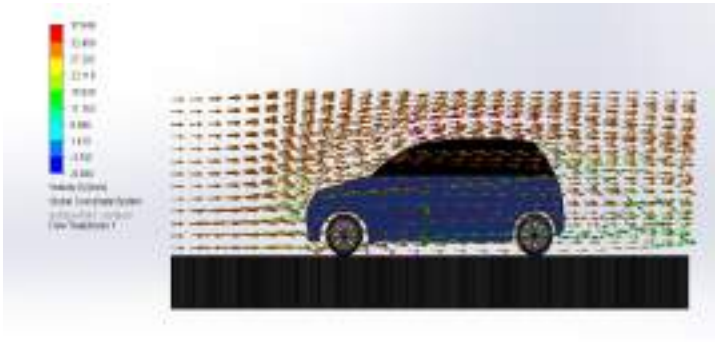

Figure 10: Velocity path lines on surface of car

4.4.2 Flow Simulation of ALTO 800 at 35 m/s Wind Speed (Second Trail)

For the second trail, we used the same ground clearance equals to 160 mm. From the simulation, it yields drag coefficient equal to 0.25 and generates 634.05 N drag force at a speed of 35 m/s without any add-on devices. As we can see from Figure 11, the total pressure at the area in front of the windshield is higher than previous trail, which generates the drag and the downward force.

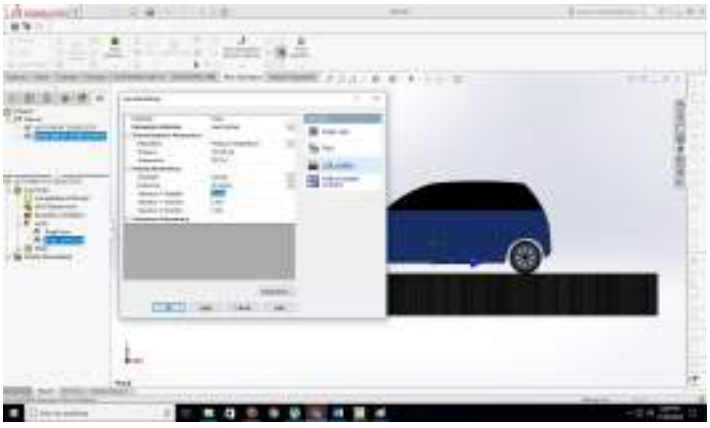

Figure 11: Airflow velocity at 35 m/s

Figure 12: Results of airflow velocity at 35 m/s

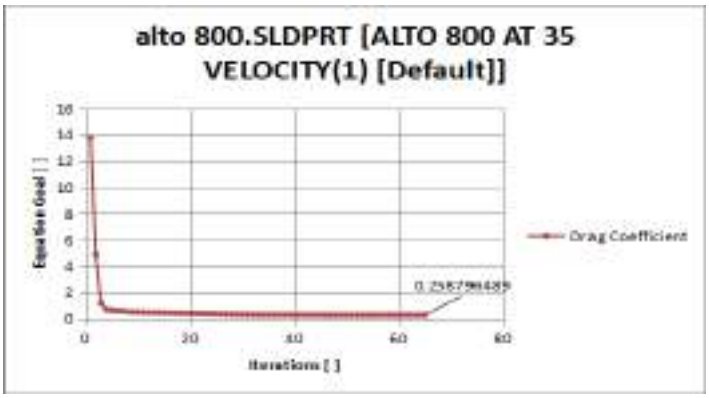

Figure 13: Drag coefficient of Alto 800

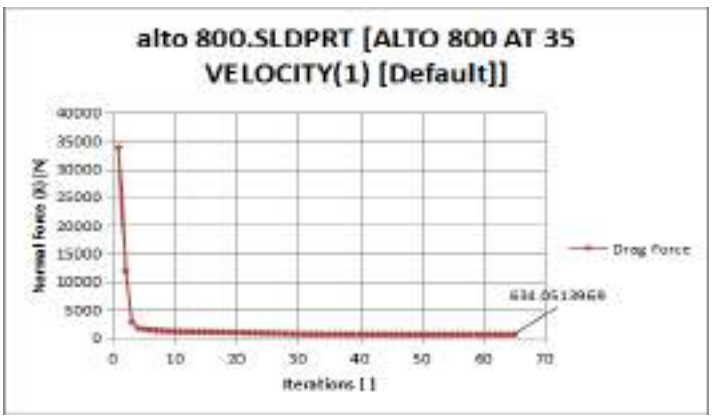

Figure 15: Drag Force of Alto 800

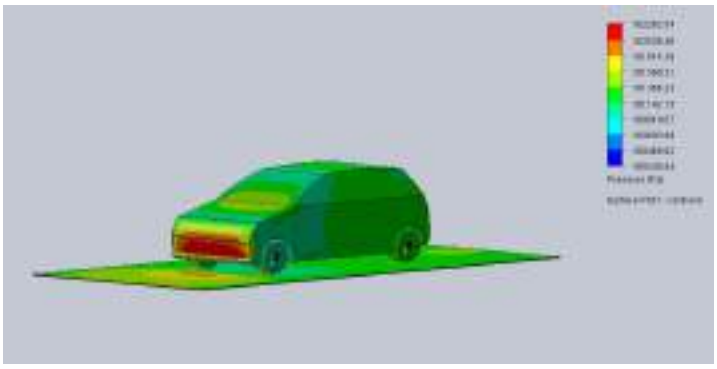

Figure 16: Pressure contour on surface of car at 35 m/s wind speed

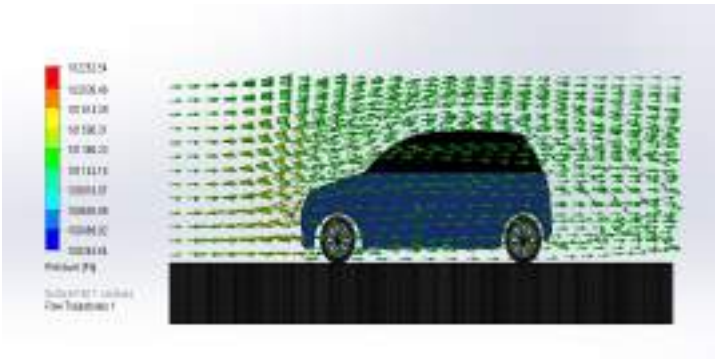

Figure 17: Pressure path lines on surface of car

Figure 18: Velocity path lines on surface of car

4.4.3 Flow Simulation of ALTO 800 at 37.5 m/s Wind Speed (Third Trail)

For the third trail, we used the same ground clearance equals to 160 mm. From the simulation, it yields drag coefficient equal to 0.25 and generates 729.11 N drag force at a speed of 37.5 m/s without any add-on devices. As we can see from Figure 19, the total pressure at the area in front of the windshield is higher than previous trail, which generates the drag and the downward force.

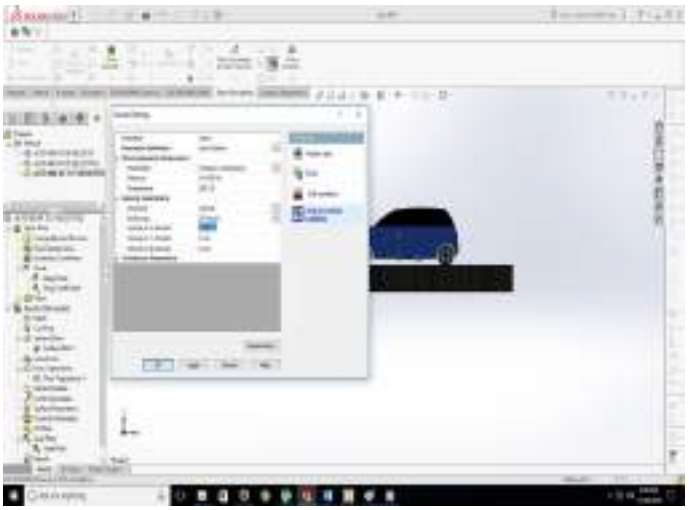

Figure 19: Airflow velocity at 37.5 m/s

Figure 20: Results of airflow velocity at 37.5 m/s

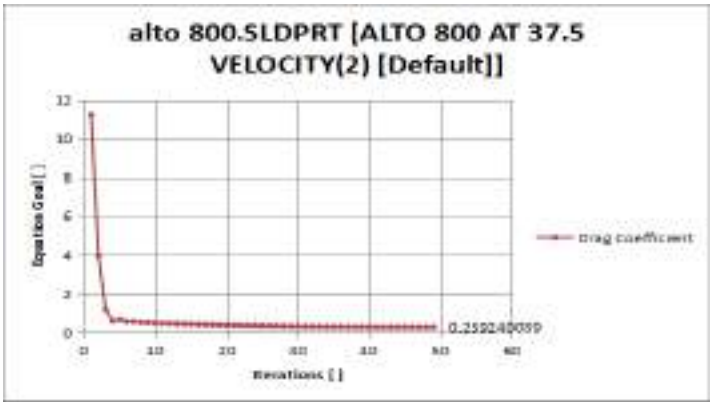

Figure 21: Drag coefficient of Alto 800

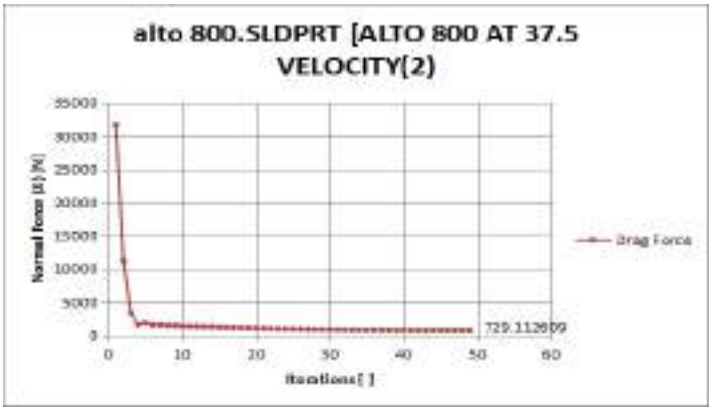

Figure 22: Drag Force of Alto 800

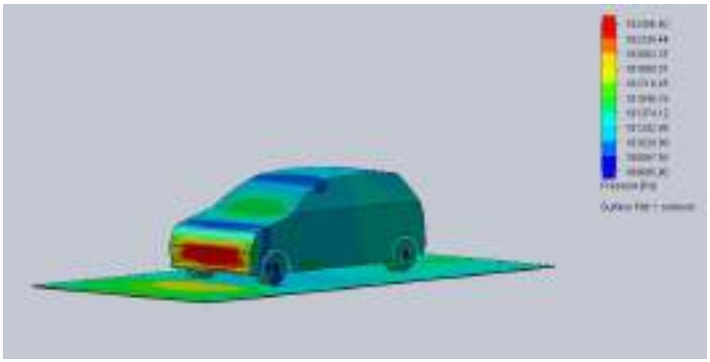

Figure 4.68: Pressure contour on surface of car at 37.5 m/s wind speed

Figure 23: Pressure path lines on surface of car

6.1 Conclusions

The shape of an object affects the numerical value of the coefficient of drag. The frontal area of the vehicle body is the reference in the simulation of the coefficient of drag. Minimizing frontal area and ground clearance is the key in reducing drag coefficient.

Meanwhile drag force is also reduced with minimized ground clearance and frontal area of the design. Although drag coefficient is determined by an object shape, drag force can still change depending on the numerical value of the velocity. From the data results, it is clear that increasing velocity will yield increasing value of the drag force.

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