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ADMIXTURE OF CONSTITUENTS IN MEDICINAL PLANTS USING EMISSION-SPECTROMETRY TECHNIQUE

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ABSTRACT

The knowledge of medicinal plant medicine in India it is originated from villagers, elders, farmers, healers and tribalism for health care system. Nowadays, increased scientific interest and consumer demand, have promoted the development of herbal and Ayurvedic drug products as dietary supplements. Here the elements are very essentialistic correlations of medicinal plants and human body which play an important role in the treatment of different diseases. Hence it is essential to study the essential elements in medicinal plants for maintaining the life processes in plants and of animals including human beings. The present profile Apocynaceae family plants such as *Catharanthus roseus*, *Calotropis gigantean*, *Plumeria rubra* and *Nerium indicum* leaves parts collected from different places of Gulbarga Kalaburagi district of Hyderabad- Karnataka commonly used as medicine in the traditional health care system for the treatment of various ailments. The Preparation of the sample is done by adopting a standard procedure and estimated the macro and micro nutrients using ICP-AES Techniques. The obtained concentrations of 12 Essential elements such as Mg, Al, Si, S, Cl, K, Ca Cr, Mn, Fe, Cu and Zn are within the permissible limits of WHO in all studied medicinal plants. The present investigation shows the variations of Mg, Al, Si, K, Ca and Mn were found in high concentrations while compare to S, Cl, Cr, Fe, Cu, and Zn, these are good nutrients elements for the study of Chemical constituents and Photochemical activity of the present medicinal plants. The medicinal usages of these herbs were discussed in the light of above results for treatment of different diseases.

KEYWORDS: Medicinal plants, Elements, Karnataka, WHO/FAO limits, ICP-AES technique.

INTRODUCTION

The environment factors like temperature, soil moisture, soil nutrients, light, air pollutants, humidity, soil structure and pH are affecting directly or indirectly on all living things and medicinal plants. According to the WHO the activity of macro and micro Nutrients were play an important role in medicinal plants growth. Further, according to the WHO "5-80%" of world population relies on traditional medicine for primary health care by plant materials. So, in India, the Herbal or Ayurvedic medicine is one of the oldest medical systems, its collections, processing and preparation medicinal plant drug products which will contribute a major part of each year in the national economy growth.[1,2,3,4] Present study area considered is Hyderabad Karnataka region which is situated in the north-east part of the Karnataka state and falls within the geographical region of north maidan. In this study 4 same family herbal (Jedi buttie), Ayurvedic medicinal plants *Catharanthus roseus*, *Calotropis gigantean*, *Plumeria rubra* and *Nerium indicum* are used as many diseases herbal and Ayurvedic medicines to cure different diseases like' cancer, diabetic, inflamentary, arises through imbalance in vata, pita, kapha kamale, dog bait etc. These medicinal plant parts were collected from different places of Kalaburagi district situated in northern part of Karnataka between 76°.04' and 77°.42 east longitudes, and 17°.12' and 17°.46' north latitude, covering an area of 10,951 km² and the predominantly it is soil type is black.[5,6] The method of characteristics study of macro and micro Nutrients is carried out by the most widely and commonly used technique of elemental analysis, providing acceptable levels of precision and accuracy, viz., Inductively coupled plasma atomic emission spectrometry (ICP-AES).[7,8,9] The estimation and study of permissible limits and quality control of trace, Heavy and Toxic elemental concentrations in medicinal plants is given by WHO/FAO.[10,11,12] It is an Emission spectrophotometric technique for measuring quantities of chemical elements present in samples, by determining wavelengths are emitted by sample and by determining

their intensities intern which gives qualitative and quantitative elemental analysis of medicinal plants.[13,14]

MATERIALS AND METHODS

Catharanthus roseus (CR), Caltrop's gigantean (CG), Plumeria rubra (PR), and Nerium indicum (NI) these four plants were collected in the Kalaburagi taluk of Kalaburagi District, Karnataka, India. The collected 4 same family medicinal plant leaves samples were washed with distilled water and made to dry at room temperature in air control laboratory. The dried leaves of the plants were mechanically powdered using mixer grinder and finally sheaved with mesh of size 355µm to get a fine power and then stored in an airtight container. 1 mg of fine powder taken for solution preparation added 1 ml of nitric acid and kept for 20 minutes to diffuse solution becomes clear. The prepared solution added with 20 ml distilled water and kept for 5 minutes for dilution. Finally 3 ml solution was taken from 20 ml prepared solution for analysis of macro and micro Nutrients.

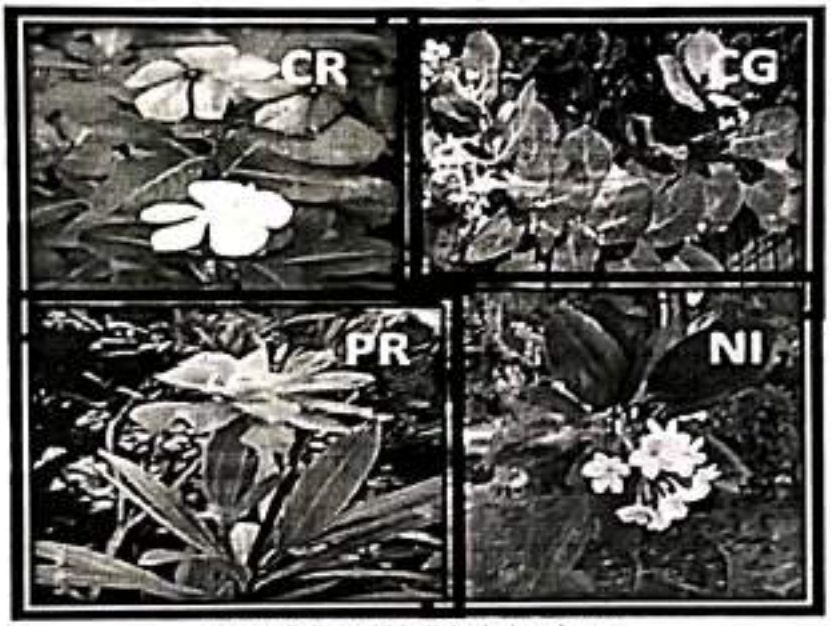

Fig. 1: Collected Medicinal plant Images.

Fig. 2: ICP-AES Instrument.

The figure 1 is the images of collected medicinal plants namely *Catharanthus roseus (CR), Caltrop's gigantean (CG), Plumeria rubra (PR), and Nerium indicum (NI)* and the instrument used for analysis is shown in figure 2.

The SPECTRO Analytical Instrument of Inductively Coupled Plasma - Atomic Emission Spectrometry (ICP-AES) is an emission spectrophotometer, works on the principle that excited electrons emit energy at a given wavelength as they return to ground state after excitation by high temperature Argon Plasma. The fundamental characteristic of this process is that each element emits energy at specific wavelengths peculiar to its atomic character. The energy transfer of the electrons when they fall back to ground state is unique characteristic of each element, as it depends upon the electronic configuration of the orbital. The energy transfer is inversely proportional to the wavelength of electromagnetic radiation. $E = hc/\lambda$ (where h is Planck's constant, c the velocity of light and λ is wavelength), and hence the wavelength of emitted light is also unique in nature. Although each element emits energy at multiple wavelengths in the ICP-AES technique it is most common to select a single wavelength (or a very few) for a given element. The intensity of the energy emitted at the chosen wavelength is proportional to the amount (concentration) of that element in the sample being analysed. Thus, by determining which wavelengths were emitted by a sample and also by determining their respective intensities, the analyst can qualitatively and quantitatively find the elements from the given sample relative to a reference standard. The wavelengths used in AES ranges from the upper part of the vacuum ultraviolet (160 nm) to the limit of visible light (800 nm). Hence in principal ICP-AES which analyze the samples from atomic number range from Magnesium (Z=11) to Lead (Z=82). As such this instrument suits the needs of micro, macro and trace elemental analysis of medicinal plants of this region which covers the all atomic energy range including the supplements and cacogenic elements.

RESULTS AND DISCUSSION

Table 1 show Macro and Micro Nutrient concentrations, determined through ICP-AES of the 4 same family medicinal plant samples. The first column gives the element name with increasing atomic number and second to fifth columns gives the elemental concentrations of the four medicinal plants. From the table 1 it is observed that the variation of macro elemental concentrations is higher than micro elemental concentrations. Analysis of the present data revealed that Ca found [illegible] concentration compared with all other medicinal plants. The descending order of the concentration of the Macro and Micro Nutrient in the medicinal plants studied is Ca> K> Mg> Si>Al> Cr> Mn> Zn> Cu> Fe>S, >Cl. The content of the Ca recorded in the medicinal plants were in the range of (9 mg/l to 24 mg/l), the highest concentration of the Ca was found in *Plumeria rubra (PR)*. The concentration of the K recorded in the present study ranged from (6 mg/l to 19 mg/l) with *Plumeria rubra (PR)* containing the highest concentration. Similarly, Mg is also found to be with appreciable amount in the range of (3 mg/L to 6 mg/L) in the medicinal plants and the highest concentration found in *Plumeria rubra (PR)*. Al was recorded to be present in varying concentrations in all the medicinal plants samples in the range of (0.9 mg/L to 3 mg/L) with the highest concentration recorded again in *Plumeria rubra (PR)*. In the present study, Micro Nutrients (Cr> Mn> Zn> Cu> Fe>S>Cl) were also detected in the selected four medicinal plants with varying concentration in the ranges of (0.01 mg/L to 2 mg/L). From the experimental concentrations of different element, it can be seen that *Nerium indicum(NI)* contains maximum concentration of Macro Nutrients like Mg, Al, Si, K, Ca and the Micro Nutrients like S, Cl, Cr, Mn, Fe, Cu, Zn compare to other three medicinal plants which are shown in below figure 3. The macro nutrients are found in higher concentration in *Plumeria rubra (PR)* while comparing all other plants shown in figures 3. According to the world health organization (WHO) the elemental permissible limits are very essential for consumption of these types of medicinal plant drugs. The observed concentrations of elements are found to be within the permissible limits of WHO which are shown in last column of the Table 1. From the table 1, it is shown that the supplementary elements like Copper and Zinc alternatively increasing and decreasing takes place in studied same family medicinal plants but the Iron found to be decreasing in elemental concentrations. These supplementary elements intermediate to the biological process of human body which is human system, brain, muscle, growth of blood cells etc.

Table 1: Concentrations of Elements in studied Medicinal plants (ppm).

Code no	GCar1	GCag2	GPlr3	GNei4	WHO Limits
Mg	3.91	3.75	5.14	4.16	35
Al	1.21	0.95	1.38	2.54	12.6
Si	8.36	7.13	8.74	6.23	1
S	0.15	0.21	0.19	0.14	1
Cl	0.09	0.05	0.06	0.04	1
K	8.47	17.43	18.19	6.57	70.01
Ca	18.5	17.47	23.38	16.73	36.61
Cr	0.75	0.34	1.43	1.24	2
Mn	0.08	0.25	1.23	1.65	2
Fe	0.09	0.08	0.09	0.01	20
Cu	0.06	0.08	0.11	0.87	3
Zn	0.45	0.44	0.71	0.17	27.4

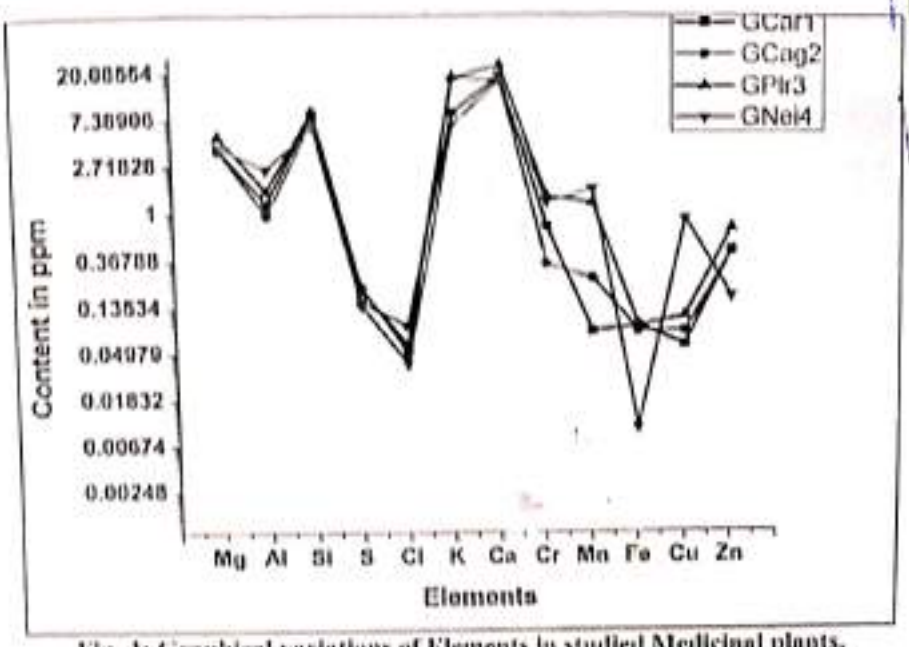

Fig. 3: Graphical variations of Elements in studied Medicinal plants.

From figures 3 it is shown that the significant variations of elemental compositions in analysed medicinal plants, here macro elements found in higher concentrations as compare to micro elements in all studied medicinal plants material. From the figures it is clear that the nine elements are estimated within the range 0.01 to 10 mg/l. in Nerium Indicum medicinal plants except three medicinal plants. Mmaximum concentrations of macro nutrients were detected in *Catharanthus roseus (CR), Caltrop's gigantean (CG) and Plumeria rubra (PR)* as shown in figure 3 but the highest concentrations of micro nutrients are determined only in Nerium Indicum medicinal plants. Hence from this study one can decide that if a patient has deficiencies of kind of elements in his/her metabolism activities then it is advisable from such research work that it may be recommend for consumption of such medicinal plants for treatment to overcome the deficiencies. From this study it is also noticed that elemental content and biological activity depends on physical variation of environment and geography of the collected sample region.

CONCLUSIONS

The Atomic Emission Spectrometry is a good analytical technique for physical and chemical research of the different natural samples. From this present study concluded that the concentrations of various macro and micro nutrients in the medicinal plants of same family depend on the composition of the soil, water and environment. The concentrations of Elements like Mg, Al, Si, K, and Ca are higher than the S, Cl, Cr, Mn, Fe, Cu, and Zn. The data or concentrations of elements in analyzed medicinal plants are shown under the permissible limits as per the recommendation of FAO/EDA/WHO etc. Using these data the Ayurvedic doctor/medicinal practitioner may recommend the consumption of the medicinal plant in the form of pills/pellets/tablets/juice type so that the patient can overcome the deficiencies of particular kind element/s and he/she will attain the normal activity over a period of time. The studied medicinal plants have many medicinal properties like bitter, acrid, analgesic, aphrodisiac, anticancer, stomachic, febrifuge, diuretic astringent, emetic, expectorant, cardio tonic, etc. Present studied data it is useful to the new researchers, medicinal practioners to prepare new healthy drugs which helps and promote the society.

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Impacts of floods and Chemical contamination effect on Public Health

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Abstract:

Floods are the most common hazard to cause calamities and have led to widespread injurie and impermanence throughout the world. The impact of floods on the social community is related directly to the situation and topog- raphy of the area, as well as human demographics and characteristics of the built environment. Health outcomes were categorized into short- and long-term and were found to depend on the flood characteristics and people's vulnerability After floods, it was found there is an increased risk of disease outbreaks such as Hepatitis E, abdominal disease and leptospirosis, particularly in areas with poor sanitisation and displaced populations. Mental distress in survivors can also aggravate their physical illness. There is a need for effective guidelines to reduce and prevent flood-related indisposition and humanity. Such steps are contingent upon the improved understanding of potential health impacts of floods.

Keywords: flood; health; disease; Chemical, wounds and injuries; death

Introduction

Flood risk is usually defined as the combination of the probability of occurrence of events and the potential consequences on people, environment and anthropic structures. According to this definition, risk can be modelled by three components: hazard, exposure and vulnerability. Evaluating possible adverse consequences on the environment of flood-exposed EPHs requires the identification on one hand of the vulnerability. the environment and of the characteristics of the source of pollution .The transferred patients' situations were largely grave issues from protracted medical circumstances namely; acute exacerbation of chronic obstructive airway disease, acute coronary syndrome, sepsis, heart failure, among others. This paper will ponder on the long-term impact of floods on human's health as the effects could meaningfully contribute to the global burden of disease.

A number of investigators have revealed that human activities contribute largely to natural menace like the one under context It is knowledge wide and truthful that natural hazard such as floods are not caused by natural measures only but also by human event the flood on the inexperienced rainfall within short interval and illegitimate exploitation of natural vegetation such as sorting happenings. The flood prompted acute mortalities, wounds and left many residents to illnesses. Great and surprizing floods such as the one underneath context, topic the elderly, who are in need of support relating evaporating

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and admittance to medicinal services, and who perhaps, vacillate to abandon their houses, at bigger risk of damage and death.

The flood patients' circumstances were largely dangerous issues from expanded medical situations namely; acute exacerbation of continuing obstructive airway disease, grave coronary pattern, sepsis, heart miscarriage, Some of them assistants such as , discussed that floods may be directly responsible for long term mortality such as increase in diarrheal deaths in emerging nations or indirectly, distressing health, food and financial settings, irritating dearth, starvation and no communicable illnesses. Literature review Flooding is the most general kind of regular adversity worldwide, and has so become an important point of anxiety within the advanced and emergent countries.

Suggestions of flood on sustainable development

Floods may be responsible for severe variations in environmental sanitation and individual health. The chemicals over the flooded scenes can be blowout by the action of flood with mutual features of reduction potable water supply and conditions of living or apartment of abode. The shocking consequence of flood on the situation and poor diet, infrastructure, overcrowded, accommodations and unhealthy conditions perhaps give rise to the risk of transmittable ailments. Some investigators discovered coincided that adulterations such as bacterial eczema and fungoid skin infections, urticarial and scabies are said to be entered by floods. Evolving states are standard to suffer severe pressures of infections mainly inhabitants that are breathing in floods-prone areas and ageing and children are the high ranked on susceptibility than any other class within the range of the flooded places

In another development of floods and heavy rainfall are associated to improved digestive sicknesses namely; arrive virus infection and bacillary dysentery. Floods can be viewed as a implementer or booster to the quick or fast spread of some silent killing health irregular it.

They also to wounded severe threats of toxicities particularly residents that are residing in floods-prone areas and ageing and children are the high ranked on liability than any other class within the variety of the flooded positions. As water turbidity increases, the elderly and children increase their chances of contacting intestinal tract infection. For it is a common practice to see children using flooded water as playground without the understanding or evidence that they are wide their inability of infections

Chemicals risks during a flood

Floods and other disasters often cause hazardous chemicals (fuel, destructive elements, industrial and land chemicals) to spill out of busses, manufacturing facilities, organic storage places, fuel supplies and other sources. They may also bury or move chemicals and chemical containers. These can pose health hazards to the general public, alternative service workers and clean-up workers.

Chemical rolls resulting from environmental difficulties can cause critical and long-term risks for and effects in individuals.

During a flood The main biological health hazards during a overflow include Injuries from chemical explosions burning or blistering and severe damage to skin, eyes or respiratory tract from release of corrosive chemicals intoxication and acute poisoning, mostly from inhalation of evaporated highly toxic chemicals such as fuel compounds, solvents, burning products, and so on.

Health Consequences of Floods

The health significances of floods may be categorized broadly as direct or indirect. Direct costs are those resulting from direct exposure to the water and the flooded environment, and include dying, injuries from vestiges, chemical contamination, and hypothermia. Indirect consequences are those related with hazards related with the injury done by the water to the normal and built environment and include transferable illnesses, malnutrition, poverty-related sicknesses, and diseases associated with displaced populations.

The health consequences of flooding may be described in terms of time as immediate, medium-term, and long-term.Injuries Flood-related wounds may occur as individuals challenge to escape from danger or as a result of the collapse of buildings or other structures. Orthopaedic injuries and fractures may be caused by fast difficult water containing remains. Injuries also transpire when people reoccurrence to their swamped homes and productions and begin to clean up Falls from standings, sprains, strains, and wounds may occur as individuals repair homes or use chainsaws to clean up fallen trees and other debris.

Electrical Injuries Electrical injuries may occur with flooding. Standing water anywhere close to electrical lines, circuits, or equipment embodies a potential electrical danger. Additionally, rescue boats may come into contact with overhead power lines Chemical Contamination Flooding can cause nutrient runoff from agriculture, and thus, cause algal blooms, which alter the coastal ecologies and threaten human health.

Floodwaters may result in the spread of chemicals. Industrial sites may become flooded, unleashing chemicals and other contaminants into the floodwaters. Floods also can lead to release of hazardous materials causing fires and/or explosions, toxic gas emissions, spills, damage to equipment, damage to pipes and connections, short circuits and/or power failures, punctured tanks and dishes, and structural mutilation to buildings and facilities in refineries, etc.

Respiratory Illness Respiratory problems account for a significant proportion of morbidity associated with floods. Mold is a particular hazard for persons with impaired host defences or mold allergies. Microbial growth can cause potentially harmful inhalation exposures for persons entering or cleaning affected structures.

Mental Health Problems Mental health problems are a common squeal of floods. Major life stressors, such as disasters, increase susceptibility not only to physical illness, but also to poor mental health. People who have knowledgeable a flood have been shown to have a fourfold higher risk of psychological distress than do those not exposed to flood, and Mental health problems may derive from physical health problems or from individual losses, social disturbance, and economic hardship.

Mercury is considered by WHO as one of the top ten chemicals of major public health concern, with potentially toxic effects on the nervous, digestive and immune systems, and is a hazard to the development of the child in utero typhoid fever;

• Increased possibility of using contaminated water for food handling and preparation;

• Population displacement forcing people to have fewer food choices and use more unsafe food handling practices;

•Contaminated fruit and vegetables;

• Poor sanitation, including lack of safe water and toilet facilities;

• Impairment of the cold chain and proper heat-treatment of foods because of problems with the power supply. Avoid communicable disease epidemics by counselling people to follow the five keys to safer food:

• Diseases linked to poor water, hygiene and nutrition sanctuary

• Keep hands and utensils clean

• Keep food at a safe disease

•Separate raw and boiled food

• Cook food systematically

• Death from myocardial infarction or stroke Transferable disease

Health care and public health professionals should undertake a number of specific activities

1. Ensure decontamination of people in contact with hazardous chemicals;

2. Provide health care services to all affected people, taking into account the chance of acute poisoning by hazardous chemicals, and bearing in mind that the most defenceless population groups for children, the elderly, hospital patients and rescue workers, who may be exposed to high levels .

3. Selection and storage of natural samples is suggested for approaching analysis and assessment;

4. Conduct a quick threat calculation of the exposed and support in certification of places where hazardous elements are stored to permit operation of events to avoid subjects and trips;

5. The public Communicate about chemical hazards

After a flood: cleaning up Nonetheless the absolute volume of water during a flood which might dilute organic spills, chemical pollution can be high in certain areas and precautions should be taken when cleaning up after flooding.

(1) Significance areas for public health.
(2) Chemical dangers for flood clean-up work/workers.
(3) Sampling transactions.
(4) Residents returning to their homes.
(5) Management of recognised biological corruption of everyday goods.
(6) Guidance for public health consultants on chemical risks resulting from flooding for residents returning to their homes.
(7) physically injured same time and producing them to be banished,

People returning to their homes may knowledge despair though cleaning up, making keeps and selling with disturbing activities like assurance claims. Flooding versions for a very large proportion of all natural disasters worldwide and is expected to increase in the future.

The health impacts of a particular flood event are context specific, and are very different between developed and developing countries .The countries while motor vehicle-related injuries are more major in developed countries. Overall, it I hard to assess the duration of signs and disease, and the attribution of cause, and there is a quite weak scientific evidence base to assess the health impacts of flooding.

Most flood-related indisposition and mortality are avoidable through education, good floodplain management, and prediction-warning systems. This study sought to identify and categorize the health significances of floods in a way that may aid the development of, justification, inhibition and response approaches.

Discussion

Floods differ greatly in their character and their impact, as does the exposure of the populations they affect. The health imports of floods depend upon the exposure of the environment and the local populace. Improved adversity organisation, approval justification and provision has supported to a decrease in flood-related deaths. The health impacts of a particular flood event are context specific, and are very different between developed and rising countries. The health significances of floods.. Areas at extreme risk are low-lying, near water, and located downstream from a dam. The health impacts of floods depend upon various factors, including the characteristics of the flood exposure, decorations of exposure, and primary predisposition of the residents

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Impacts of Flood Effect on Public Health and Environmental

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Abstract

The concept of "flood" is formulated with regard to human health and environmental impacts. flood that occurred at the end of that year. Heavy rains fell beginning vast flooding in most areas of Kerala , Karnataka to great destruction of livelihood of local societies. Natural hazard such as floods are not only caused by ordinary progressions but also by social activities. The flood recorded severe fatalities, injuries and exposed many susceptible to diseases. This paper study through considered the long-term impact of floods on human's health as the special effects could meaningfully contribute to the universal burden of disease. Also, its outcomes are persistent hence need to be adequately realized and addressed through environmental. This study revealed susceptibility to flood tending disorders as spiritual suffering in the fighters is liable for a quota of all physical diseases.

keywords; **flood, , health; environmental, disease, death**

Introduction

Recent extreme flooding in the United States, Mississippi River basin, 1993, Flint River basin, 1994, Sacramento and San Joaquin River Basins, 1997, and the Red River basin, 1997, has demonstrated the limitations of current flood protection measures and heightened interest in non-structural flood controlFlood sare defined as Tropical rivers share features with both river groupings. In steamy and large low incline systems, rainwater is the dominant impetus for flooding and complex floodplain interactions are typical for both types of river.All floods are unique in that the regions affected have different social, demographic, economic, and population health characteristics. Yet, many similarities exist, and knowledge of the causes of death and types of injuries and illnesses from floods is essential to help to guarantee that health and substitute medicinal relief is well-managed.1 The aim of the impacts of floods on the health of the human community and to propose a renewed framework for future analysis and evaluation. The specific research ideas are: (a) to pronounce reasons of floods and their individual impacts on health outcomes; (b) to define the aspects that influence human health as a effect of floods; (c) to describe the health impacts of floods; and (d) to develop a theoretical context to aid in the administration and estimation of flood health management

Causes and Types of Floods

The nature and consequences of floods vary according to the cause of the flood and the nature of the natural and human environment. Floods may be caused by a range of factors or combinations of those factors. A summary classification of the causes of floods in

Different types of floods have different impacts on the human public, and therefore, different health effects. Precipitation

Precipitation

, including rain, snow, hail, etc. can have both immediate and longer-term effects. Heavy rainfall can cause localized flash flooding or downstream inundation. Snow falls cause immediate effects associated with hypothermia, ice-associated injuries, and infrastructure or building failures. Delayed floods may result from the melting of snow and ice. Hail can cause immediate injury to people and block drainage systems precipitating building inundation. Global warming increases the overall temperature of the oceans, which in turn increases torrential downpours, tropical storms, and hurricanes/cyclones[4]

Rising water levels,

both fresh water and sea water, may occur suddenly or gradually. Sudden rises of sea water are caused by tsunamis, storm surges, or by breaches in sea defences. Longer-term increases in sea levels are anticipated with global warming, melting of polar ice caps, and thermal expansion of sea masses.[4]Rising fresh water may occur as a result of planned or unplanned damming of water drainage or by release of subterranean water sources to the surface.

Release of Stored Water

Floods may be caused by release of stored water associated with failure of retaining walls or structures or by the displacement of stored water as may occur with landslides into the water. For example, the landslide in the Vajont Dam in 1963, during which rocks, mud, earth, and uprooted trees tumbled into the lake resulting in the overflow of the dam, thus flooding nearby villages.[5]

Failure of Natural Drainage

Floods also may be caused or exacerbated by failure of natural drainage. Reduced absorption of water occurs when the natural landscape is replaced with non-absorbent infrastructure, e.g., urban expansion or the replacement of wetlands. Reduced drainage may be associated with poorly planned or inadequate drainage systems in new constructions or drainage systems which become blocked with debris or trash.[6]the timing of the flood also may affect its impact. Heavy rain in coastal areas at high tide may have a greater impact because of the difficulty for the water to clear to sea.

Factors Affecting the Health Conclusion

Apart from the quantity of water, there are many other factors that affect the severity and scale of floods, and thus, their impacts on human health.

- Flood Type
- Geography
- Demography
- Community Infrastructure

Immediate Health Effects

Drowning

The leading cause of death from floods is drowning, and most of these deaths are due to flash flooding rather than the slower riverine flooding.Drowning often occurs as a result of individuals under-estimating the power of the current or depth of the water during late evacuation, attempted salvage, or inappropriate conduct. Many flood deaths can be attributed to motor vehicles and are caused by driving on flooded roads or causeways, or from the trauma associated with crashes occurring on wet roadways. More than 57% of all flood fatalities in the United States are associated with motor vehiclesDrowning also occurs

when people are swept away from their home or campsite while attempting to cross a bridge, rafting or sailing in storm water drains, or during evacuation or rescue. Injuries

Flood-

Related injuries may occur as individuals attempt to escape from danger or as a result of the collapse of buildings or other structures. Orthopaedic injuries and lacerations may be caused by fast moving water containing debris.Injuries also occur when people return to their flooded homes and businesses and begin to clean and electrical power cables). Falls from ladders, sprains, strains, and wounds may occur as individuals repair homes or use chainsaws to clean up fallen trees and other debris

Electrical Injuries

Electrical injuries may occur with flooding. Standing water anywhere close to electrical lines, circuits, or equipment represents a potential electrical hazard. Additionally, rescue boats may come into contact with overhead

power lines. Burns and Explosions

Burns and explosions may be caused as floodwaters disrupt propane and natural gas lines, tanks, power lines, and chemical storage tanks. Oil and other flammable, non-polar, low density liquids may allow fires to spread along the surface of floodwaters.

Hypothermia

Hypothermia with or without submersion occurs in some floods and may occur in any season.13 Ice dam breakage elevates the risk, but water does not have to be ice cold for hypothermia to occur. Most flood water is well below human core body temperature

Disruption of Health Services

Floods can have a significant impact on the provision of health services. Potential damage to health facilities from the flood may require displacement of patients and staff. Flooding may impair access to health resources or the ability of health personnel to provide their services. A flood can limit access to primary health care, and result in changes in the demand for services .

Water Contamination Contact with floodwaters without drowning, by itself, does not pose a serious health risk. However, floodwaters may contaminate the local water and food supply and damage the sewage system resulting in contamination and increase the potential for communicable diseases. Contaminated water sources result in waterborne disease transmission, including Escherichia coli, Shigella, Salmonella, and hepatitis A virus. Faecal contamination of livestock and crops also may lead to the spread of infectious diseases. The flood or irrigation with contaminated water represents a risk to farm and other outdoor workers.

Chemical Contamination Flooding can cause nutrient runoff from agriculture, and thus, cause algal band threaten human health.[11] Floodwaters may result in the spread of chemicals. Industrial sites may become flooded, unleashing chemicals and other contaminants into the floodwaters. Floods also can lead to release of hazardous materials causing fires and/or explosions, toxic gas emissions, spills, damage to equipment, damage to pipes and connections, short circuits and/or power failures, punctured tanks and vessels, and structural damage to buildings and facilities in refineries, etc.[12]

Breathing Infection

Breathing problems account for a significant proportion of morbidity associated with floods. Mould is a particular hazard for persons with impaired host defences or mould allergies. Microbial growth can cause potentially harmful inhalation exposures for persons entering or cleaning affected structures

Physical Displacement

Physical displacement commonly occurs during periods of flooding. Displaced domesticated animals, rats, insects, snakes, and reptiles often result in an increased incidence of bites.[15,16] Diseases transmitted by rodents also may increase during substantial rainfall and flooding because of different patterns of contact.[17,18] Finally, diseases among sick animals may spread to the human population, such as rabies, tuberculosis, and avian influenza

Effects on people exposed to flood water comprise:

- heart spells and other acute outcomes of cardiovascular disease; drowning from walking or driving through flood water wounds from: o contact with debris and flooded objects in flood water; o falling into hidden manholes; o trying to move properties during floods: o building breakdown and damage; o electrocution;
- Diarrhoeal, vector- and rodent-borne diseases breathing, skin and eye contagions;
- chemical poisoning contamination, including carbon monoxide poisoning from generators used for pumping and dehumidifying;
- Pressure, and short and longer-term mental health syndromes, including the impacts of translation;
- Negative health effects linked with overcrowding.

Dead bodies

- Protect the handlers of dead bodies. Basic hygiene is essential:
- use of handbags, personal defensive clothes and apparatus;
- washing of hands with a disinfectant soap and water after handling dead bodies, and avoiding wiping face or mouth with hands;
- regularly cleaning and disinfecting of all equipment, clothes and vehicles used in transportation and storage of dead bodies;
- ensuring availability of first aid and provision of therapeutic services in case of injury, and taking necessary deterrent measures to address exposure to environmental hazards (for example, vaccinating employees against tetanus
- Organize long-term storage for unidentified bodies. Burial in individual graves is a means for long-term storage of dead bodies. In situations where a local cemetery is not accessible, liaise with the local authority to ensure adequate siting, away from drinking-water sources) of the burial place
- Provide mental health support. The psychological trauma of losing loved ones and witnessing death on a large scale is the greatest concern. Anyone involved in handling dead bodies should be aware of the stress and trauma of family members, and should provide support to the greatest extent possible

Toxic snake bites

Snake bites during floods are common. Bites by venomous snakes can cause severe consequences. Victims of snake bites may suffer any or all of the following:

- local envenoming, confined to the part of the body that has been bitten – these effects may be incapacitating, sometimes permanently;
- systemic envenoming, involving organs and tissues away from the part of the body that has been bitten – these effects may be life-threatening and debilitating, sometimes permanently;
- effects of anxiety prompted by the terrifying experience of being bitten and by exaggerated beliefs about the potency and speed of action of snake venoms – these symptoms can be misleading for medical personnel

Food safety during or after flood events

Food can become contaminated at any point before its consumption, including during preparation if not properly handled, prepared and stored. Food safety is particularly important for infants, pregnant women and elderly people, who are most susceptible to foodborne disease.

Food safety concerns include:

Increased risk of outbreaks of foodborne disease, including diarrhoea, dysentery, hepatitis A and typhoid fever;

Increased likelihood of using contaminated water for food handling and preparation; population displacement forcing people to have fewer food choices and use more risky food handling practices; contaminated fruit and vegetables; poor sanitation, including lack of safe water and toilet facilities;

Impairment of the cold chain and proper heat-treatment of foods because of problems with the electricity supply.

Vector-borne diseases during or after flood events

Ensure sustainable vector control to prevent transmission. Use a combination of top-down and bottom-up approaches that integrate chemical, mechanical and biological vector control methods and personal protection methods, with the active participation of communities and involvement of relevant sectors and agencies.

Prevent outbreaks. Plans for hospitalization, emergency vector control, advocacy, community mobilization, logistics, and monitoring and evaluation in the case of increased risk or presence of vector-borne diseases are advisable

Disease surveillance during and after flood events

During and after a flood event: assess the needs of the affected population; match available resources to those needs; prevent exacerbation of adverse effects;

protect the population from further health effects by implementing disease control strategies where appropriate and well defined;

monitor and evaluate the effectiveness of emergency health plans and activities; improve contingency planning from the experience gained.

SHRUBBERY AND GEOMORPHIC PROPERTIES

Vegetation plays several diverse roles during extreme events. Vegetation usually mollifies damage by dissipating energy of the flow, and by stabilizing banks and steep slopes against the erosive forces of overland flow (Shroba et al., 1979). In the most extreme events, like the Big Thompson River flood of 1976, vegetation cannot withstand the power of the floodwaters and is broken or uprooted. Ironically, the same vegetation instrumental in weakening the flood then becomes destructive debris capable of inflicting more damage to inundated structures than the floodwater itself (Soule, 1979). Geomorphologic effects of extreme events are closely tied to vegetation dynamics in a number of ways. Through geomorphic change, extreme events reset the successional state ofplant communities. In high-gradient systems, many shade intolerant tree species rely on geomorphic processes to

open canopy space and clear moist areas of land to serve as seedling establishment sites (Friedman et al., 1996; Scott et al., 1997). Scott et al. (1997) found that 72 percent of cottonwood tree establishment occurred within two years after a flooding event that exceeded a 9.3-year return period).

EFFECTS OF FLOOD ORGANIZER ARRANGEMENTS

Human nature pushes mankind to confront and attack natural challenges. There is a greater, but often unwarranted, confidence associated with constructing an impressive, visible defence. As man constructs flood control levees and develops settlements in the natural flood plain, a dangerous and often unwinnable game of hydrologic roulette begins. Structural flood controls, as is typical of engineering projects, maintain a specified degree of protection. Once operational conditions exceed this limit, the constructed protection is not designed to withstand the onslaught of floodwaters. It is a probabilistic reality that the level of protection will eventually be exceeded. At this point, cities that have developed dangerously close to rivers under the limited security of structural flood control are jeopardized and extreme economic losses are experienced.

ANTHROPOGENIC CONTRIBUTIONS TO ENVIRONMENTAL EFFECT

Today, anthropogenic influences are recognized to extend beyond the realm of flood control structures. In many instances, man creates hazards that rival the most dangerous and bizarre of natural flood conditions. Often man's influences on natural systems are long-term and go unrecognized until conditions gradually deteriorate to critical levels. Examples of this include the transport of chemicals in floodwaters, creation or aggravation of extreme events, and dangers associated with social works that are not related to aquatic systems. Water quality is of key importance to man and nature. Flooding tends to reduce water quality by introducing large amounts of eroded materials. By transforming low lying areas to farm lands, man has removed much of the floodplain vegetation and wetland areas that act as natural stilling ponds, sediment intercepts, hydraulic sponges, and erosion protection. Compounding the problem, large quantities of chemicals are flushed into the surface water by overland flows

Conclusions

Reported flood-related impacts on human health are dominant and complex. Floods continue to impact communities unequally and in different ways, with effects ranging from short to longer term. The risk for disease outbreaks increases with population transformation and poor hygiene. Emotional distress in survivors is well documented and accounts for a share of all bodily illness. Contaminants also have reduced the risks associated with disruption during major floods. Long-term mental health problems have been identified more clearly as a problem and responses must be more corresponding. Ultimately, it is the responsibility. The health impacts of a precise flood event are context specific, and are very different between established and developing countries consequences of floods in a way that may aid the development of avoidance, justification, and response strategies.The health consequences of floods depend upon the vulnerability of the environment

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Android App Controlled 2-KW Single Phase AC Power Controller for Heating Element Applications

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Abstract— **In today's competitive world, semiconductor and general manufacturing industries need a reliable, flexible, and precise way to control electric heating process. These applications require precise control, ease-of-use, and excellent reliability. Android App the world's most popular mobile platform which is tool for creating application that look great and take advantage of hardware capabilities. The advantage of android is that it is an open source operating system is used in terms of mobile application that is smart phone which will act as a remote controller. Sliding the slider of the App a serial data is transmitted by the smart phone. This serial data will be received by remotely placed Bluetooth of the control circuit which in turn fed to the R_x pin of the Microcontroller. The proposed system uses phase angle control technique to vary the voltage which is fed to heating element. Silicon-Controlled Rectifier (SCR) power controllers are ideal devices for this purpose. These controllers consist of thyristor and a control circuit and can switch electrical loads within milliseconds, billions of times. SCR power controllers are more reliable and cost-efficient than other controllers such as variable transformers, contactors or other mechanical devices. They also offer a finer degree of control and need less maintenance. The unit is designed for 2-KW heating element.**

Keywords— **Bluetooth module, Microcontroller, ZCD Circuit, Firing circuit, Heating element, SCR**

I. INTRODUCTION

The proposed system uses the Android App based mobile to communicate with the controller for obtaining the desired level of voltage. Many electrical devices, especially in industrial applications, require different voltage or current levels to operate. Instead of producing these current and voltage levels specifically for each device, it is much more efficient to adjust the value of a constant source to the desired current and voltage levels by means of a voltage controller. Bluetooth is a wireless technology is becoming a popular standard in the communication arena, and it is one of the fastest growing fields in the wireless technologies. It is convenient, easy to use and has the bandwidth to meet most of today's demands for mobile and personal communications. Bluetooth technology handles the wireless part of the communication channel: it transmits and receives data wirelessly between these devices. It delivers the received data and receives the data to be transmitted to and from a host system.

Single-phase AC voltage controllers, which has an important place in rapidly developing power electronics circuit topologies, provide power flow by adjusting the effective value of the output voltage between the effective value of the input voltage and zero.

A semiconductor switch/switches is placed between the AC input source and the load, capable of switching at high frequency, this switch can be Silicon-Controlled Rectifier (SCR). The proposed system uses phase angle control technique to vary the voltage which is fed to heating element. SCR power controllers are ideal devices for this purpose because of the following reasons.

a) Infinite resolution - SCRs can control the main parameters-voltage, current or power-from zero to 100 percent with almost infinite resolution, allowing for accurate, stepless control of the process.
b) Reliability with minimal maintenance - As solid-state devices, SCR power controllers are inherently wear-free, so they require little maintenance and have a high mean-time-to-failure rate.
c) High efficiency - At 99.5 percent efficiency, SCR power controllers offer a distinct advantage over alternative devices such as IGBT-based power supplies and converters.
d) Very fast response. SCR power controllers- as there are no moving parts in the device - this can switch power on and off extremely fast.

e) Selectable parameters. An SCR power controller can control several electrical parameters: load power, RMS of load voltage and RMS of load current. Also, it can limit current or voltage.

II. Block Diagram Description

This proposed system is mainly based on Mobile phone communication with the Microcontroller through Bluetooth. Android based mobile with the supporting software installed in it is used to communicate with the micro-controller.

The Block Diagram of proposed system is as shown in the Fig. 1. It consists of Bluetooth module HC-05, Microcontroller Atmega328, ZCD (Zero Crossing Detector), Pulse amplifier and isolating transformer, Anti-parallel SCR etc.

The system uses the phase angle control technique to control flow of AC power from AC mains to the heating element. This technique provides variable average AC voltage across heating element by varying phase angle of firing a SCR. The unit uses anti-parallel SCR TYN616 to control AC voltage across load. A ZCD circuit is necessary to provide synchronised firing pulses to SCR. This ZCD circuit uses a full wave rectified low ac voltage, a switching transistor BC547 and an opto-coupler PC817 is used to provide 100Hz ZCD pulses to the Microcontroller ATmega328. These ZCD pulses are used to determine the firing angle time duration for the positive and negative cycle of AC mains voltage.

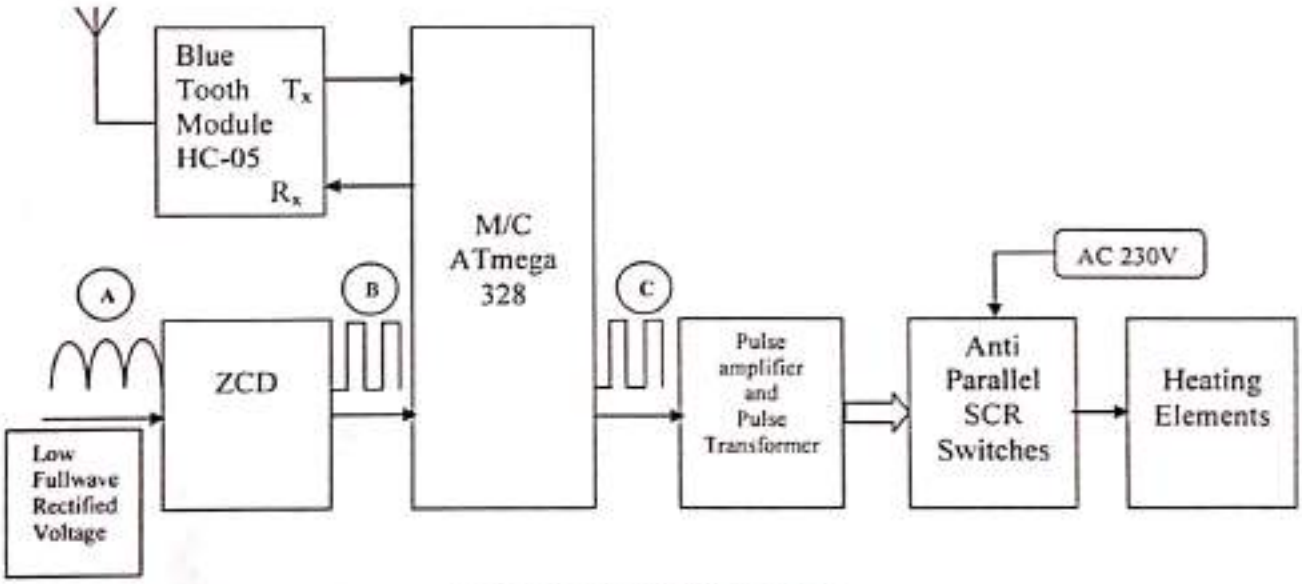

Fig. 1 Block Diagram of Experimental Setup

The proposed system is a wireless unit uses an Android App named AC dimmer which has to be installed in smart phone. After installing App and pairing with the Bluetooth module HC-05 of the control circuit, sliding the slider of the App a serial data has been transmitted by the smart phone. This serial data will be received by remotely placed Bluetooth of the control circuit which in-turn fed to the R_x pin of the Microcontroller ATmega 328, which read and map the data value to a delay time between 1ms and 10 ms on receiving each ZCD pulse. So, depending upon the position of the App slider one can change the firing angle at any angle in between 18 to 180 degree hence AC power delivered to the heating element can be varied from minimum to maximum power. The experimental setup consisting of Mobile, Hardware and 2-KW

Heater is as shown in Fig. 2. along with test waveforms in Fig. 3. The output fired pulses from Microcontroller are given to pulse amplifier to boost the power level of the firing pulses and fed to pulse transformer (1:1:1) for voltage isolation to avoid electric shock. Finally outputs of the pulse transformer are

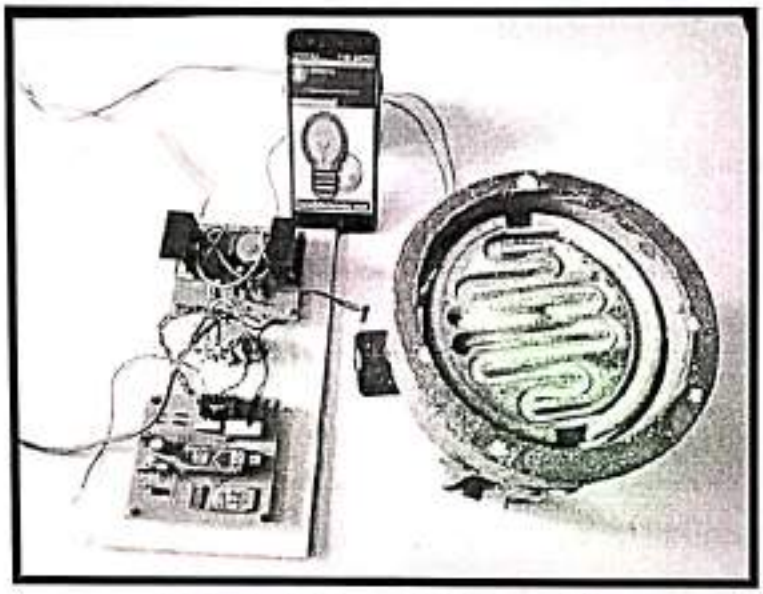

Fig. 2 Experimental Setup – Mobile, Hardware and Heater

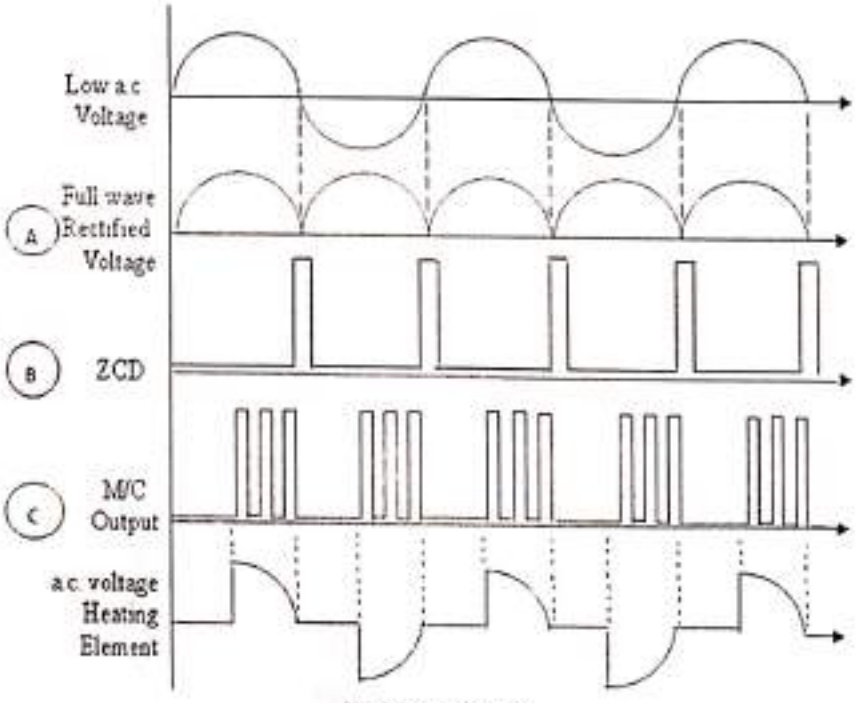

Fig. 3 Test waveforms

rectified and fed to corresponding gate of SCR TYN616. A series inductor 100µh along with snubber (R=100 Ω/5w and C = 0.1µF/600V) circuit are also incorporated to protect the power switching SCR from voltage and current transients.

III. Conclusion

The objective of a proposed system has been achieved and has been tested with a 2 KW electric heating element and is working satisfactorily by sliding the slider of the Android App. The firing angle of the SCR increased or decreased by an angle of 18^0. The implemented unit finds many domestic and industrial applications such as light dimmer, speed control of mixer and grinders, speed control of industrial drilling machines, induction motors and furnace.

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Solar Powered BLDC Motor Drive for Irrigation Water Pump

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Abstract

The Brushless DC motors are widely used in many industrial and traction applications because of their high efficiency, high torque, low maintenance, less noise and low volume. The BLDC motor can act as an alternative for traditional motors like Brushed DC motor, induction motor, switched reluctance motors etc. The performance of BLDC motor is analyzed using Simulink and then implemented for hardware. The various performance parameters are analyzed using Simulink software. The torque characteristics of BLDC motor is very important factor in designing BLDC motor drive system. Modeling and simulation has been done for "Speed control of BLDC motor using is done using Boost converter". The Simulation is done in MATLAB / Simulink software for speed control of Brushless DC motor using Boost Converter. Simulation results with regard to stator current, stator back-emf, electromagnetic torque, speed are observed and waveforms are recorded. The hardware has been implemented of using MOSFET as the switching device for the voltage source Inverter.

Keywords: Microcontroller, Solar panel, MPPT controller, BLDC Motor

I. Introduction

Conventional motors suffer from drawbacks such as low efficiency, high power consumption, inaccurate control, more electromagnetic interference (EMI), and large dimensions. To overcome the drawbacks of Conventional motors, Brush-Less Direct Current (BLDC) motors are being used. The prominent feature which makes Brushless DC Motors different from conventional DC motor is the substitution of mechanical commutation system with the electronic commutation. The mechanical commutation has disadvantages like sparking and wear and tear of brushes and commutator assembly. The hardware has been implemented for water-pump application. Modeling and simulation is done for Solar-powered BLDC Motor-drive. The Simulation is done in MATLAB / Simulink software version 9.1.0.441655 (R2016b). Simulations results with regard to stator current, stator back emf, electromagnetic torque, speed are observed and waveforms are recorded in the scope. In hardware implementation, uses MOSFET as the switching device.

II. Description

The solar-powered BLDC motor drive for irrigation water pump uses solar panel, MTTP charger controller, battery, boost converter. The circuit uses ATmega 16 Microcontroller, which is programmed to generate six PWM pulses to drive the BLDC motor. The speed can be set to desired value with the help of speed setting potentiometer VR1. The PWM pulses from Microcontroller are feed to opto isolator PC817 followed by the MOSFET driver IC IR2110. The opto isolation is necessary to provide the voltage isolation between control circuit operating at 5V and power circuit operating at 24V. And also driver IC's IR2110 is necessary to provide sufficient voltage as well as current to drive the MOSFET bridge formed by six MOSFET IRF450.

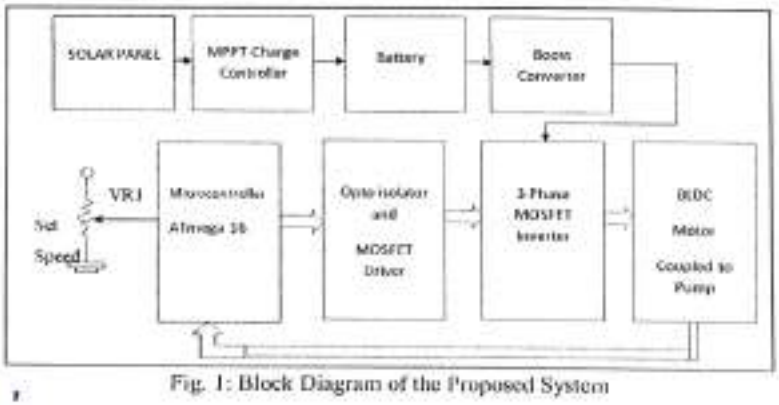

Fig. 1: Block Diagram of the Proposed System

The 3Phase inverter formed by six MOSFETs generates 3Phase Pulses to drive the 3 Phase BLDC Motor. As BLDC Motor rotates, the hall sensors, which are magnetically coupled to the motor gives the speed sensor pulses. These hall sensor pulses are fed to microcontroller as a feedback to regulate the speed of the BLDC motor to maintain at the stetted speed set by the potentiometer VR1. The Speed regulation has been achieved by varying the width of the PWM pulses given to the Inverter. The speed regulation operation will be done by the microcontroller by comparing with reference voltage from VR1with DC voltage derived from hall sensor pu;ses from the BLDC motor.

To power the DC voltage to the 3Phase inverters, a Boost converter has been implemented. This boost converter provides 24V at maximum current more than 2Amp to the Inverter. Because the BLDC motor operates at rated voltage of 24V at 60Watts in the prototype. So, separate control circuit has been implemented for boost converter. This boost converter provides constant 24V to the inverter by sensing the output voltage of the boost converter.

The output voltage for boost converters is derived from the charged battery 12V, which is charged by Solar-panel with the help of MPPT charge controller. Even in the day time also one can run the motor to pump the water if suitable solar panel with high power rating has been used.

Once the battery has been charged, the boost converters can provide sufficient driving voltage to BLDC motor in the absence of sun light, means in night also can run the BLDC motor to pump the water.

A. Advantages

The following are the advantages of BLDC Motor:

1) High efficiency
2) Continuous operation(Heavy duty)
3) Low Power consumption
4) Precise control
5) Speed Stability
6) Constant Torque
7) Wide speed control range
8) Silent operation(low noise)
9) Reliable/long life time (no brushes)
10) High Power/ Size ratio(compact)
11) Low EMI (Electronic Commutation)
12) Compact (no brushes)

B. Applications

The following are the applications of BLDC Motor:

1) Automotive applications: BLDC motors are very useful in Industrial automation. They are less time consuming, high speed operation and reduce manpower.
2) Medical applications: An important application concerns the treatment of sleep apnea which requires the use of Positive Airway Pressure (PAP) respirators BLDC motors are ideal for this application because they are noiseless due to the absence of brushes, which emit audible noise during rotation, thus avoiding disturbing the sleep of the person sleeping next to the patient.
3) Industrial applications: BLDC motors are optimal for switching between high speed and low speed operation, for arbitrary adjustment of speed and also for space saving.
4) Robotic applications Micro BLDC motors in bionic hand prosthesis due to their lightness, small dimensions and energy saving.

III. Conclusion

The proposed work has been implemented for driving BLDC motor using Solar Power. The unit uses boost converters to boost the voltage to a rated voltage of the BLDC motor. The test motor has operating voltage 24V at 60W. The proposed system uses microcontroller ATmega 16 to provide the PWM pulses to control and to regulate the speed of the BLDC motor. The designed unit has been tested with the BLDC motor 24V, 60W, 3000rpm. The modeling and simulation of speed control of BLDC motor using is done using Boost converter is carried out. The Simulation is done in MATLAB / Simulink software version 9.1.0.441655(R2016b) for speed control of Brushless DC motor using Boost Converter .Simulations results with regard to stator current, stator back emf, electromagnetic torque, speed are observed and waveforms are recorded.

In hardware implementation MOSFET is used as the switching device for the voltage source Inverter. Hall-sensor based closed loop control technique for the speed control of BLDC motor is used. The BLDC motor speed is controlled by the ATMEGA16 controller based on the feedback from the Hall-effect sensors. The speed of the BLDC motor is measured using Digital tachometer.

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Monitoring Multi-Parameters of a Motor Using GSM

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ABSTRACT

Now-a-days wireless and mobile communication is the major tool that can be used to provide the information to the operator for their supervisory. The mobile communication technology in the recent years has been extensively used in different form in different application areas. In this paper, the proposed scheme uses Global System for Mobile (GSM) modem along with the microcontroller which is interfaced with analog unit to display the motor performance parameters like temperature, speed, voltage, current, direction and status on Liquid Crystal Display (LCD). The same data can be acquired remotely through Short Message Service (SMS) from the user mobile handset by dialling the mobile number of SIM of GSM modem. The system is capable of monitoring the motor by receiving message from an authorized mobile number. Microcontroller is the heart of our system, which controls the overall operation of our system. System is always alert for receiving SMS from valid number and that message can be displayed on the LCD. This add-on unit monitors parameters of any motor (AC or DC). A proto-type lab model is set up and is working satisfactorily. The monitoring of the system is realized in real time.

Keywords : GSM modem, microcontroller, sensors, signal conditioner, LCD

I. INTRODUCTION

In the twenty first century, there is revolution of the sensor networks which have also come up with various applications like surveillance, traffic control, agricultural application, home automation and industrial process control. In today's world the need of the hour is atomization - remote monitoring, quick data acquisition and failure analysis and brings efficiency in asset management.

In the backdrop of above as we know that it is not possible, rather difficult, to keep track of the motor by days long manual observation. On the other side, modern civilization is advancing at very faster pace with the adoption of wireless technology. The convergence of wireless technology and the embedded technology with the different transducers makes these supervisory systems more reliable, much efficient as well as cost effective one. Keeping this in mind, the present approach has been made to apply the advantages of wireless communication and embedded technology towards monitoring the multi-parameters of a motor using GSM. This Proposed work is a very good example of embedded system as all its operations are controlled by intelligent software inside the microcontroller. The aim of this work is to monitor the following parameters of the motor:

1. Temperature
2. Speed
3. Voltage

4. Current
5. Direction
6. Status

For this purpose user can use any type of Mobile. This way it overcomes the limited range of infrared and radio remote controls. Using the convenience of SMS, this unit lets you remotely monitor the motor parameters, all of which can be pre-programmed into the controller.

II. SYSTEM IMPLEMENTATION

The block schematic of the proposed scheme is as shown in the Fig. 1. The heart of the system is the Microcontroller AT mega – 16 which is interfaced to the analog signal conditioner unit. This unit consists of sensors and signal conditioner for each parameter to be measured. The temperature sensor IC LM35 is used for sensing the motor temperature. The analog voltage from LM 35 is made compatible to microcontroller by using signal conditioner unit. This unit consist of scaling amplifier by which calibrated DC output proportional to temperature is given to analog port PA0 of the microcontroller, which converts it in to digital and displays on LCD.

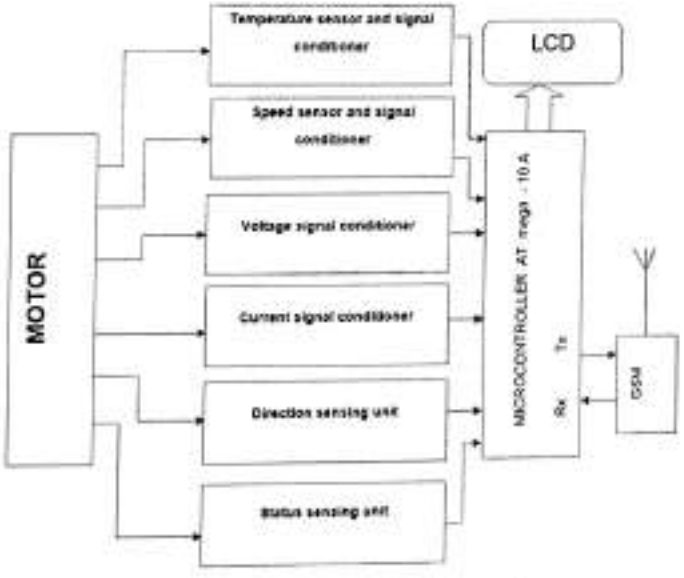

Figure 1: Block Diagram of proposed system.

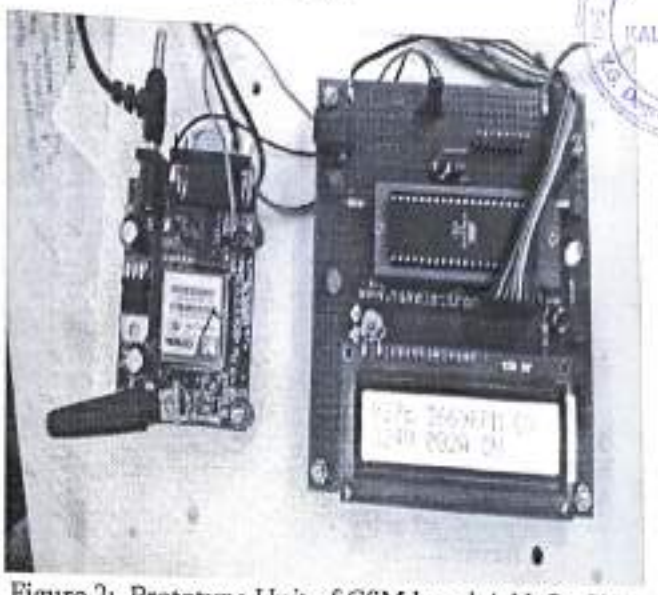

Figure 2: Prototype Unit of GSM based Add-On Unit

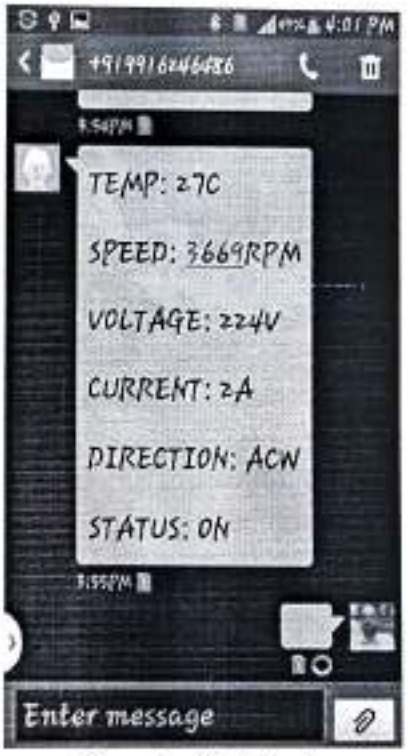

Figure 3: SMS display

'Texting', as its also known, is a fast and convenient way of communicating. In fact, SMS has taken on a life of its own, spawning a whole new shorthand language that's rapidly growing. Many industries have been quick to make use of this technology, with millions of handsets currently in use. As new models with "must have" features hit the market, older

models become virtually worthless and if not recycled, end up in landfill. With this in mind, in the proposed work we have designed to work with SIM900A GSM modem with simcom technology.

The speed sensor uses inductive proximity sensor, which provides pulses corresponding to the speed of the motor. The frequency of the pulses depends on the speed of the motor. This frequency is converted into analog voltage by frequency to voltage converter IC LM 331. This analog voltage fed to signal conditioning unit for providing calibrated DC output proportional to the speed of the motor. So, this signal conditioning unit provides maximum 5V corresponding to a motor speed of 5000 rpm. Similarly voltage and current of the motor are sensed by potential and current transformer, rectifier, filter and scaling unit which are made to provide 5V when line voltage is around 500V and 5V when maximum current drawing by the motor is around 50A. These analog voltages are fed to corresponding pins of the analog port of the microcontroller to digitize the analog voltage and display on LCD as 500V and 50A.

A separate logic unit is designed for sensing Direction and Status of the motor that will provide 0 logic for clockwise and logic 1 for anti-clockwise, for logic 0 the status of the motor is OFF and logic 1 for ON. These logic levels are interfaced to microcontroller to display direction as CW/ACW and status as ON or OFF on LCD as shown in the Fig. 2. and Fig.3 shows SMS display on user mobile.

Finally, serial interfacing of GSM modem with Tx and Rx pins of microcontroller for providing SMS data remotely on dialling the SIM number of the GSM modem is incorporated. A DC power supply for digital unit is provided by 5V DC and analog unit will be sourced by the +/- 12V DC.

The prototype system is tested with temperature sensor LM35, inductive proximity speed sensor, potential and current transformer for voltage and current measurement. The unit is tested with universal motor 230V, 1/16 H.P, 8000rpm.

III. CONCLUSION

The approach discussed in the paper has achieved the target of monitoring the motor parameters. The proposed unit provides many applications such as industrial applications; one can monitor the performance parameters of a motor from a long distance and can be used by everyone with the knowledge of text message. Since the unit is network dependent so network congestion can reduce the reliability of the system and this unit monitors the parameters but do not control it. Hence we can conclude that the required goals and objectives of GSM based monitoring multi-parameters of motors have been achieved.

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GSM Based Security Lock Using Linear Actuator

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ABSTRACT

Security describes the protection of life and property. There are doors to keep people out, key locks and chain reinforce the mode of security. Doors are being made of metals not wood anymore. Influential persons in our society have bullet proof doors to ensure a good measure of security of self and family. This has brought about the need to review the reliability of already existing systems and look into the possibility of creating better system that are smarter and more secure. The existing system largely consists of physical lock and keys. The problem with existing system is that it can cause security issues with the case of burglaries. The burglar can grapple with vault key and study it which can cause considerable damage to the property and valuable materials in the safe. Also, physically locks can be opened by lock picks. The main idea of designing the GSM based security locking system is to provide many modern security features than manual operated mechanical lock. The proposed locking system uses Microcontroller, GSM modem, switching circuit, relay and Linear Actuator.

Keywords: Microcontroller AT mega 16, Linear Actuator, GSM mode, Relays

I. INTRODUCTION

Today it is essential to provide the security system employing various sensors and alarm system in residential communities. A secure wireless alarm system for residential and other applications had been developed which incorporates central monitoring system for continuous monitoring the status of various sensors which are placed at the target place. In this proposed work idea of designing the GSM based security locking system is to provide many modern security features. When authorized user whose mobile number has been stored in the microcontroller dial the mobile number of the SIM card which is inserted in the SIM try of the GSM modem, after couple of rings the call has been disconnected by the microcontroller, once it matched with the stored number in the microcontroller. Then microcontroller output pin of the port D provides the high output, which in turn drive the relay, the relay switches the linear actuator so door is made to lock. Once the door locked, then return call back from GSM modem to user mobile number acknowledge the door lock. If user wants to unlock the door, once again user has to dial the mobile number of the SIM card, microcontroller receives the call, compare with the stored number and switches the actuator which in turn unlock the door. If any person whose mobile number has not been stored in the microcontroller fails to activates the lock. User only get return call while locking the door and not during unlocking the door.

II. BLOCK DIAGRAM AND DISCRIPTION

As shown in the Fig. 1. Microcontroller block uses AVR microcontroller ATmega16. Which is high performance low power Atmel? AVR microcontroller

and has advanced RISC Architecture, 16k bytes of in-system self-programmable flash program memory, This low power CMOS AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic logic unit (ALU), allowing two independent registers to be accessed in one signal instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving through puts up to ten times faster than conventional CISC microcontroller. These AVR microcontrollers are better on noise immunity and work good in industry conditions such as noise, humidity, temperature and vibration.

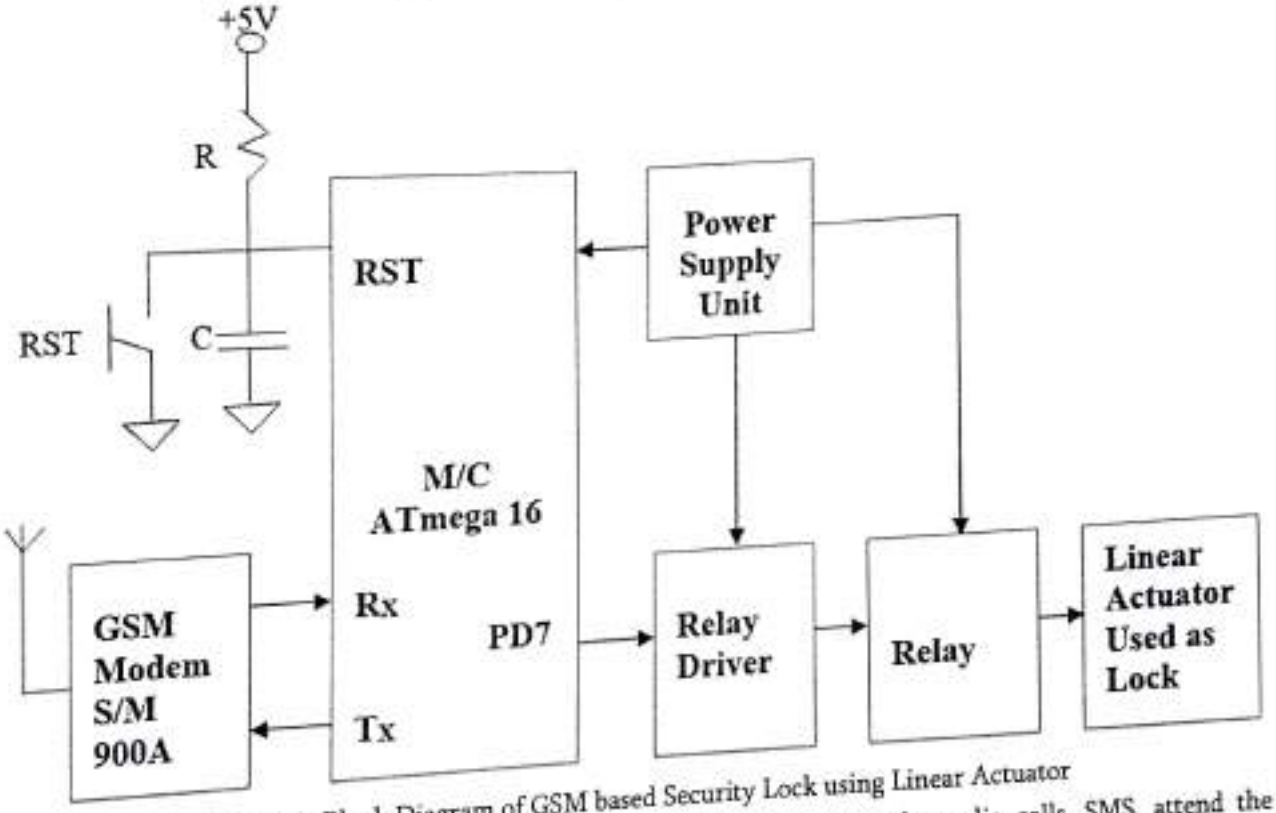

Figure 1: Block Diagram of GSM based Security Lock using Linear Actuator

The GSM modem block unit uses GSM modem SIM900A. GSM/GPRS modem RS232 is built with dual band GSM/GPRS engine. SIM 900A, works in frequencies 900/1800MHz. the modem is coming with RS232 interface, which allows to interface with PC or microcontroller. The band rate is configurable from 9600-115200 through AT command. The GSM/GPRS mode is having internal TCO/IP stack to enable to connect with internet is a GPRS. It is suitable for SMS, voice as well as DATA transfer application. The onboard regulated power supply allows to connect wide range of unregulated power supply. Using the modem one can make audio calls, SMS, attend the incoming calls and internet at through simple AT commands.

A. Features

- Dual band GSM/GPRS 900/1800 MHz
- Configurable band rate
- Built in network status LED
- Inbuilt powerful TCP/IP protocol stack for internet data transfer over GPRS
- SIM card holder
- Low power consumption 1.5mA (sleep mode)

The relay driver block consists of transistor amplifier to boost the current level of the output current provides by the microcontroller and provide sufficient current to drive the relay. The relay block uses electromagnetic relay which is used to switch the Linear Actuator ON/OFF with the help of relay driving transistors. It also provides voltage isolation between low control circuit and high Linear Actuator operating voltage and avoids electric shock. The proposed system uses Linear Actuator as safety Lock, which is linked to the system to be secured. This Linear Actuator is controlled by the relay.

B. Working

The Microcontroller (M/C) is programmed in such a way that only authorized user can operate the system, which is done by storing user mobile number in microcontroller. So, when authorized user dial the mobile number of the SIM card of the GSM modem after two to three rings the call has been cut off, the M/C received the number from GSM modem through proper AT command and compare with stored number if both matches, M/C send high output (PD7) to the relay driver and relay which in turn activate the Linear Actuator and hence the security lock. After few second M/C send the stored mobile number back to user through GSM modem acknowledging the activated lock. If user wants to unlock the system once again user has to call to the mobile number of the SIM card again after two to three rings the ring will be stopped, M/C output deactivate the lock.

Unauthorized person whose mobile number has not been stored in the M/C fail to activate the lock so, the system is made authorized to activate or deactivate the lock only that user whose mobile number has been stored in the M/C.

C. Power Supply

The unit needs +5V power supply for M/C and associated circuits and +12V,-12V for Linear Actuator. The +5V power supply is constructed by using step down transformer 0-9V/0.5A, bridge rectifier formed by 1N4007 diodes, filter capacitor 1000mf/25V,voltage regulator IC 7805 and decoupling capacitor 100mf/25V.

The bipolar power supply is constructed by using a step down transformer 12V-0-12V/1A, bridge rectifier using 1N5402 diodes and filter capacitor 2200mf/25V.This bipolar power supply is necessary to activate the Linear Actuator.

D. Advantages

1. Security lock can be operated from long distance
2. Economical design
3. Can be used by everyone
4. No need to have smart phone
5. No cost since it operates on missed call
6. The system assists handicapped/old aged persons

E. Disadvantages

The system is network dependent; hence network congestion can reduce the reliability of the system. It needs continuous power supply and costlier compare to mechanical lock.

III.CONCLUSION

The proposed work 'GSM Based Security Lock Using Linear Actuator' works satisfactorily. The unit is tested with valued SIM inserted in the SIM try of the GSM modem and operating range found to be very large. The present system uses missed call to switch the lock, so only one lock can be used means one cannot use more than one lock to switch door lock or door unlock. But by using SMS switching technique one can switch any number of lock, but switching lock by SMS may costs more so, in the present system the hardware has been implemented for only one lock. The proposed unit is the one of the example showing how one can use the Linear Actuator for locking

application. This versatile system finds many applications in different sectors such as Schools, colleges, hotels, Banks, Industries, Scientific institutions etc.

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Global Efficient Domination Number of a Graph

Dr. Sunita Chinmalli*

ABSTRACT

An efficient dominating set D of a graph G is a global efficient dominating set, if D is also an efficient dominating set of $\bar{G}$. The global efficient domination number $\gamma_{gef}(G)$ of G is the order of a minimum cardinality of a global efficient dominating set. In this paper, we obtain some bounds for $\gamma_{gef}(G)$ and obtain exact values for some standard graphs. Also we establish a Nordhaus - Gaddum type result.

INTRODUCTION

The graphs considered here are finite, undirected, without loops or multiple edges and without isolated vertices. Any undefined terms in this paper may be found in Harary [2].

A dominating set D of G is a global dominating set, if D is also a dominating set of $\bar{G}$. The global domination number $\gamma_{gef}(G)$ of G is the minimum cardinality of a global dominating set. (see[1]). The global aspect of efficient domination is introduced in this paper.

A set S of vertices in G is an efficient dominating set, if every vertex u in V-S is adjacent to exactly one vertex in S. The efficient domination number $\gamma_{ef}(G)$ of G is the minimum number vertices in an efficient dominating set of G (see[3]).

An efficient dominating set D of a graph G is a global efficient dominating set, if D is also an efficient dominating set of. The global efficient domination number of G is the order of a minimum cardinality of a global efficient dominating set of G.

The following known result will be used to prove a result later.

Theorem A[4]. For any connected graph G with p vertices,

$$(i) \ (G) \geq \left\lfloor \frac{p}{\Delta + 1} \right\rfloor$$

RESULTS

Now we list the exact values of $\gamma_{gef}(G)$ for some standard graphs.

Propositions -

(i) $\gamma_{gef}(C_p) = \left\lfloor \frac{p}{3} \right\rfloor$ if $p = 0,1 \pmod 3$;

$= \left\lfloor \frac{p}{3} \right\rfloor + 1$ if $p=2 \pmod 3$;

(ii) $\gamma_{gef}(P_p) = \left\lfloor \frac{p}{3} \right\rfloor$ if $p \geq 4$

(iii) $\gamma_{gef}(K_{m,n}) = 2$ if $m,n \geq 2$

Theorem 1. A efficient dominating set D of G is a global efficient dominating set if and only if for each vertex $v \in V-D$, there exists a vertex $u \in D$ such that v is not adjacent to u.

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Proof : This follows by definition

Theorem 2: Let D be a efficient dominating set of G. If there exists a vertex vV-D which is adjacent to only one vertex of D

Then $\gamma_{ge}(G) \leq \gamma_e(G)$

Proof :We consider the following two cases.

Case 1. Let V-D = {v}, then there exists a vertex u ∈ D which is not adjacent to v and hence D is a global efficient dominating set of G. Thus the result holds

Case 2. Let V-D ={v}, then there exists a vertex u ∈ V-D and DU {u,v} is a global efficient dominating set of G.

Hence the proff.

Theorem 3. For any graph G

$$\gamma_{ge}(G) \leq p - \Delta(G)$$

Proof : Let v be the vertex of degree Δ . Then clearly V(G)-N(v) is a global efficient dominating set. Hence the proof.

Theorem 4. Let G be any graph

$$\gamma_{ge}(G) \leq p - 1.$$

Proof : It is clear that G has two nonadjacent vertices u and v such that u is adjacent to some vertex in V – {u}. This implies that V – {u} is a global efficient dominating set of G.

$$\text{So, } \gamma_{ge}(G) \leq |V - \{u\}|$$
$$\leq p - 1$$

Theorem 5. Let G be any graph

Then, $\gamma_{ge}(G) \leq \alpha_o(G) + 1$. $\alpha_o(G)$ is the vertex covering numbers of G

Proof: Let D be maximum independent set in G. Let for any vertex v ∈ D,

|(V-D) ∪ {v} is a global efficient dominating set of G

$$\text{Hence , } \gamma_{ge}(G) \leq |(V\text{-}D) \cup \{v\}|$$
$$\leq |(V\text{-}D)| + 1$$
$$\leq p - \beta_o(G) + 1$$
$$\leq \alpha_o(G) + 1$$

Theorem 6. For any graph G

Proof : Clearly, every global efficient dominating set is a dominating set..

$$\text{Hence , } \gamma(G) \leq \gamma_{ge}(G)$$

Theorem 7. For any graph G, with p vertices

$$\gamma_{ge}(G) \geq \left\lfloor \frac{p}{\Delta+1} \right\rfloor$$

Proof : From theorem (A) we have

$$\gamma(G) \geq \left\lfloor \frac{p}{\Delta+1} \right\rfloor$$

And we know that

from theorem (6)

Hence $\gamma_{gpr}(G) = \lceil \frac{n}{2} \rceil$

Theorem 8. Let G be a graph with diam(G) $\geq$ 5. Then D $\subseteq$ V is a minimal efficient dominating set of G if and only if D is a minimal global efficient dominating set.

Proof: Let D be a minimal efficient dominating setoff G. Let u,v $\in$ V such that d(u,v) $\geq$ 5. Then D $\cap$ N(u) $\neq \emptyset$. Let $u_1 \in D \cap N(u)$ and $v_1 \in D \cap N(v)$. Then u_1 and v_1 are not adjacent and further every vertex in V- $\{u_1, v_1\}$ is adjacent tone of u_1 and v_1. This implies that $\{u_1, v_1\}$ is a efficient dominating set of G and hence D is a minimal global efficient dominating set.

Conversely, let D be minimal global efficient dominating set of G. Let us assume that D is not a minimal efficient dominating set. Let there exist a vertex w $\in$ D such that D-{w} is a efficient dominating set of G. As before, let $u_1 \in$ D-{w} N(u) and $v_1 \in$ T-{w} $\cap$ N(v), then $\{u_1, v_1\}$ is a efficient dominating set of G and hence T – {w} is a global efficient dominating set, a contradiction. Hence D is a minimal efficient dominating set.

Theorem 9. Let G be any graph

Then, $\gamma_{gpr}(G) + \gamma_{gpr}(\bar{G}) \leq p + \alpha_o(G) - \omega(G) + 2$

Where $\omega(G)$ is the clique number of (G)

Proof: From theorem (5) we have

$$\gamma_{gpr}(G) \leq \alpha_o(G) + 1$$

Simularly we can prove that

$$\gamma_{gpr}(\bar{G}) \leq \alpha_o(\bar{G}) + 1$$
$$\leq p - \beta_o(G) + 1$$
$$\leq p - \omega(G) + 1$$

Hence, $\gamma_{gpr}(G) + \gamma_{gpr}(\bar{G}) \leq p + \alpha_o(G) - \omega(G) + 2$

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Solar Powered BLDC Motor Drive for Irrigation Water Pump

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Abstract

The Brushless DC motors are widely used in many industrial and traction applications because of their high efficiency, high torque, low maintenance, less noise and low volume. The BLDC motor can act as an alternative for traditional motors like Brushed DC motor, induction motor, switched reluctance motors etc. The performance of BLDC motor is analyzed using Simulink and then implemented for hardware. The various performance parameters are analyzed using Simulink software. The torque characteristics of BLDC motor is very important factor in designing BLDC motor drive system. Modeling and simulation has been done for "Speed control of BLDC motor using is done using Boost converter". The Simulation is done in MATLAB / Simulink software for speed control of Brushless DC motor using Boost Converter. Simulation results with regard to stator current, stator back-emf, electromagnetic torque, speed are observed and waveforms are recorded. The hardware has been implemented of using MOSFET as the switching device for the voltage source Inverter.

Keywords: Microcontroller, Solar panel, MPPT controller, BLDC Motor

I. Introduction

Conventional motors suffer from drawbacks such as low efficiency, high power consumption, inaccurate control, more electromagnetic interference (EMI), and large dimensions. To overcome the drawbacks of Conventional motors, Brush-Less Direct Current (BLDC) motors are being used. The prominent feature which makes Brushless DC Motors different from conventional DC motor is the substitution of mechanical commutation system with the electronic commutation. The mechanical commutation has disadvantages like sparking and wear and tear of brushes and commutator assembly. The hardware has been implemented for water-pump application. Modeling and simulation is done for Solar-powered BLDC Motor-drive. The Simulation is done in MATLAB / Simulink software version 9.1.0.441655 (R2016b). Simulations results with regard to stator current, stator back emf, electromagnetic torque, speed are observed and waveforms are recorded in the scope. In hardware implementation, uses MOSFET as the switching device.

II. Description

The solar-powered BLDC motor drive for irrigation water pump uses solar panel, MTTP charger controller, battery, boost converter. The circuit uses ATmega 16 Microcontroller, which is programmed to generate six PWM pulses to drive the BLDC motor. The speed can be set to desired value with the help of speed setting potentiometer VR1. The PWM pulses from Microcontroller are feed to opto isolator PC817 followed by the MOSFET driver IC IR2110. The opto isolation is necessary to provide the voltage isolation between control circuit operating at 5V and power circuit operating at 24V. And also driver IC's IR2110 is necessary to provide sufficient voltage as well as current to drive the MOSFET bridge formed by six MOSFET IRF450.

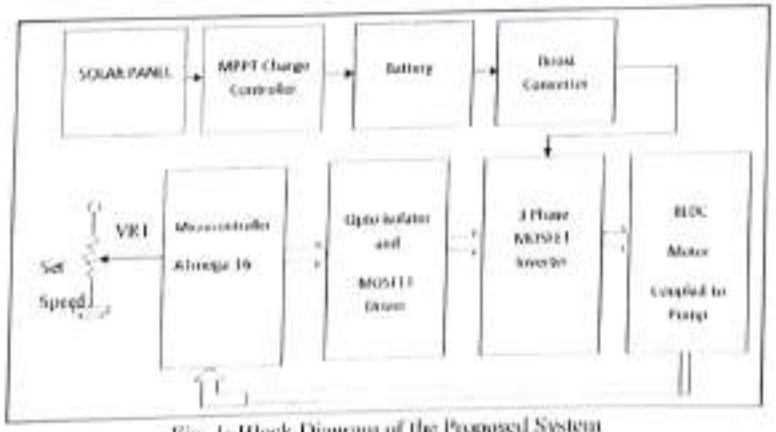

Fig. 1: Block Diagram of the Proposed System

The 3Phase inverter formed by six MOSFETs generates 3Phase Pulses to drive the 3 Phase BLDC Motor. As BLDC Motor rotates, the hall sensors, which are magnetically coupled to the motor gives the speed sensor pulses. These hall sensor pulses are fed to microcontroller as a feedback to regulate the speed of the BLDC motor to maintain at the stetted speed set by the potentiometer VR1. The Speed regulation has been achieved by varying the width of the PWM pulses given to the Inverter. The speed regulation operation will be done by the microcontroller by comparing with reference voltage from VR1with DC voltage derived from hall sensor pu;ses from the BLDC motor.

To power the DC voltage to the 3Phase inverters, a Boost converter has been implemented. This boost converter provides 24V at maximum current more than 2Amp to the Inverter. Because the BLDC motor operates at rated voltage of 24V at 60Watts in the prototype. So, separate control circuit has been implemented for boost converter. This boost converter provides constant 24V to the inverter by sensing the output voltage of the boost converter.

The output voltage for boost converters is derived from the charged battery 12V, which is charged by Solar-panel with the help of MPPT charge controller. Even in the day time also one can run the motor to pump the water if suitable solar panel with high power rating has been used.

Once the battery has been charged, the boost converters can provide sufficient driving voltage to BLDC motor in the absence of sun light, means in night also can run the BLDC motor to pump the water.

A. Advantages

The following are the advantages of BLDC Motor:

1) High efficiency
2) Continuous operation(Heavy duty)
3) Low Power consumption
4) Precise control
5) Speed Stability
6) Constant Torque
7) Wide speed control range
8) Silent operation(low noise)
9) Reliable/long life time (no brushes)
10) High Power/ Size ratio(compact)
11) Low EMI (Electronic Commutation)
12) Compact (no brushes)

B. Applications

The following are the applications of BLDC Motor:

1) Automotive applications: BLDC motors are very useful in Industrial automation. They are less time consuming, high speed operation and reduce manpower.
2) Medical applications: An important application concerns the treatment of sleep apnea which requires the use of Positive Airway Pressure (PAP) respirators BLDC motors are ideal for this application because they are noiseless due to the absence of brushes, which emit audible noise during rotation, thus avoiding disturbing the sleep of the person sleeping next to the patient.
3) Industrial applications: BLDC motors are optimal for switching between high speed and low speed operation, for arbitrary adjustment of speed and also for space saving.
4) Robotic applications Micro BLDC motors in bionic hand prosthesis due to their lightness, small dimensions and energy saving.

III. Conclusion

The proposed work has been implemented for driving BLDC motor using Solar Power. The unit uses boost converters to boost the voltage to a rated voltage of the BLDC motor. The test motor has operating voltage 24V at 60W. The proposed system uses microcontroller ATmega 16 to provide the PWM pulses to control and to regulate the speed of the BLDC motor. The designed unit has been tested with the BLDC motor 24V, 60W, 3000rpm. The modeling and simulation of speed control of BLDC motor using is done using Boost converter is carried out. The Simulation is done in MATLAB / Simulink software version 9.1.0.441655(R2016b) for speed control of Brushless DC motor using Boost Converter .Simulations results with regard to stator current, stator back emf, electromagnetic torque, speed are observed and waveforms are recorded.

In hardware implementation MOSFET is used as the switching device for the voltage source Inverter. Hall-sensor based closed loop control technique for the speed control of BLDC motor is used. The BLDC motor speed is controlled by the ATMEGA16 controller based on the feedback from the Hall-effect sensors. The speed of the BLDC motor is measured using Digital tachometer.

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Monitoring Multi-Parameters of a Motor Using GSM

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ABSTRACT

Now-a-days wireless and mobile communication is the major tool that can be used to provide the information to the operator for their supervisory. The mobile communication technology in the recent years has been extensively used in different form in different application areas. In this paper, the proposed scheme uses Global System for Mobile (GSM) modem along with the microcontroller which is interfaced with analog unit to display the motor performance parameters like temperature, speed, voltage, current, direction and status on Liquid Crystal Display (LCD). The same data can be acquired remotely through Short Message Service (SMS) from the user mobile handset by dialling the mobile number of SIM of GSM modem. The system is capable of monitoring the motor by receiving message from an authorized mobile number. Microcontroller is the heart of our system, which controls the overall operation of our system. System is always alert for receiving SMS from valid number and that message can be displayed on the LCD. This add-on unit monitors parameters of any motor (AC or DC). A proto-type lab model is set up and is working satisfactorily. The monitoring of the system is realized in real time.

Keywords : GSM modem, microcontroller, sensors, signal conditioner, LCD

I. INTRODUCTION

In the twenty first century, there is revolution of the sensor networks which have also come up with various applications like surveillance, traffic control, agricultural application, home automation and industrial process control. In today's world the need of the hour is atomization - remote monitoring, quick data acquisition and failure analysis and brings efficiency in asset management.

In the backdrop of above as we know that it is not possible, rather difficult, to keep track of the motor by days long manual observation. On the other side, modern civilization is advancing at very faster pace with the adoption of wireless technology. The convergence of wireless technology and the embedded technology with the different transducers makes these supervisory systems more reliable, much efficient as well as cost effective one. Keeping this in mind, the present approach has been made to apply the advantages of wireless communication and embedded technology towards monitoring the multi-parameters of a motor using GSM. This Proposed work is a very good example of embedded system as all its operations are controlled by intelligent software inside the microcontroller. The aim of this work is to monitor the following parameters of the motor:

1. Temperature
2. Speed
3. Voltage

4. Current
5. Direction
6. Status

For this purpose user can use any type of Mobile. This way it overcomes the limited range of infrared and radio remote controls. Using the convenience of SMS, this unit lets you remotely monitor the motor parameters, all of which can be pre-programmed into the controller.

II. SYSTEM IMPLEMENTATION

The block schematic of the proposed scheme is as shown in the Fig. 1. The heart of the system is the Microcontroller AT mega – 16 which is interfaced to the analog signal conditioner unit. This unit consists of sensors and signal conditioner for each parameter to be measured. The temperature sensor IC LM35 is used for sensing the motor temperature. The analog voltage from LM 35 is made compatible to microcontroller by using signal conditioner unit. This unit consist of scaling amplifier by which calibrated DC output proportional to temperature is given to analog port PA0 of the microcontroller, which converts it in to digital and displays on LCD.

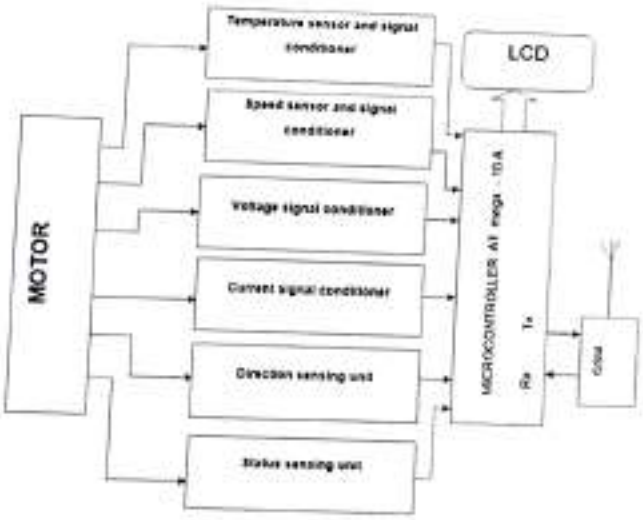

Figure 1: Block Diagram of proposed system.

Figure 2: Prototype Unit of GSM based Add-On Unit

Figure 3: SMS display

'Texting', as its also known, is a fast and convenient way of communicating. In fact, SMS has taken on a life of its own, spawning a whole new shorthand language that's rapidly growing. Many industries have been quick to make use of this technology, with millions of handsets currently in use. As new models with "must have" features hit the market, older

models become virtually worthless and if not recycled, end up in landfill. With this in mind, in the proposed work we have designed to work with SIM900A GSM modem with simcom technology.

The speed sensor uses inductive proximity sensor, which provides pulses corresponding to the speed of the motor. The frequency of the pulses depends on the speed of the motor. This frequency is converted into analog voltage by frequency to voltage converter IC LM 331. This analog voltage fed to signal conditioning unit for providing calibrated DC output proportional to the speed of the motor. So, this signal conditioning unit provides maximum 5V corresponding to a motor speed of 5000 rpm. Similarly voltage and current of the motor are sensed by potential and current transformer, rectifier, filter and scaling unit which are made to provide 5V when line voltage is around 500V and 5V when maximum current drawing by the motor is around 50A. These analog voltages are fed to corresponding pins of the analog port of the microcontroller to digitize the analog voltage and display on LCD as 500V and 50A.

A separate logic unit is designed for sensing Direction and Status of the motor that will provide 0 logic for clockwise and logic 1 for anti-clockwise, for logic 0 the status of the motor is OFF and logic 1 for ON. These logic levels are interfaced to microcontroller to display direction as CW/ACW and status as ON or OFF on LCD as shown in the Fig. 2. and Fig.3 shows SMS display on user mobile.

Finally, serial interfacing of GSM modem with Tx and Rx pins of microcontroller for providing SMS data remotely on dialling the SIM number of the GSM modem is incorporated. A DC power supply for digital unit is provided by 5V DC and analog unit will be sourced by the +/- 12V DC.

The prototype system is tested with temperature sensor LM35, inductive proximity speed sensor, potential and current transformer for voltage and current measurement. The unit is tested with universal motor 230V, 1/16 H.P, 8000rpm.

III. CONCLUSION

The approach discussed in the paper has achieved the target of monitoring the motor parameters. The proposed unit provides many applications such as industrial applications; one can monitor the performance parameters of a motor from a long distance and can be used by everyone with the knowledge of text message. Since the unit is network dependent so network congestion can reduce the reliability of the system and this unit monitors the parameters but do not control it. Hence we can conclude that the required goals and objectives of GSM based monitoring multi-parameters of motors have been achieved.

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GSM Based Security Lock Using Linear Actuator

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ABSTRACT

Security describes the protection of life and property. There are doors to keep people out, key locks and chain reinforce the mode of security. Doors are being made of metals not wood anymore. Influential persons in our society have bullet proof doors to ensure a good measure of security of self and family. This has brought about the need to review the reliability of already existing systems and look into the possibility of creating better system that are smarter and more secure. The existing system largely consists of physical lock and keys. The problem with existing system is that it can cause security issues with the case of burglaries. The burglar can grapple with vault key and study it which can cause considerable damage to the property and valuable materials in the safe. Also, physically locks can be opened by lock picks. The main idea of designing the GSM based security locking system is to provide many modern security features than manual operated mechanical lock. The proposed locking system uses Microcontroller, GSM modem, switching circuit, relay and Linear Actuator.

Keywords: Microcontroller AT mega 16, Linear Actuator, GSM mode, Relays

I. INTRODUCTION

Today it is essential to provide the security system employing various sensors and alarm system in residential communities. A secure wireless alarm system for residential and other applications had been developed which incorporates central monitoring system for continuous monitoring the status of various sensors which are placed at the target place. In this proposed work idea of designing the GSM based security locking system is to provide many modern security features. When authorized user whose mobile number has been stored in the microcontroller dial the mobile number of the SIM card which is inserted in the SIM try of the GSM modem, after couple of rings the call has been disconnected by the microcontroller, once it matched with the stored number in the microcontroller. Then microcontroller output pin of the port D provides the high output, which in turn drive the relay, the relay switches the linear actuator so door is made to lock. Once the door locked, then return call back from GSM modem to user mobile number acknowledge the door lock. If user wants to unlock the door, once again user has to dial the mobile number of the SIM card, microcontroller receives the call, compare with the stored number and switches the actuator which in turn unlock the door. If any person whose mobile number has not been stored in the microcontroller fails to activates the lock. User only get return call while locking the door and not during unlocking the door.

II. BLOCK DIAGRAM AND DISCRIPTION

As shown in the Fig. 1. Microcontroller block uses AVR microcontroller ATmega16. Which is high performance low power Atmel? AVR microcontroller

and has advanced RISC Architecture, 16k bytes of in-system self-programmable flash program memory, This low power CMOS AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic logic unit (ALU), allowing two independent registers to be accessed in one signal instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving through puts up to ten times faster than conventional CISC microcontroller. These AVR microcontrollers are better on noise immunity and work good in industry conditions such as noise, humidity, temperature and vibration.

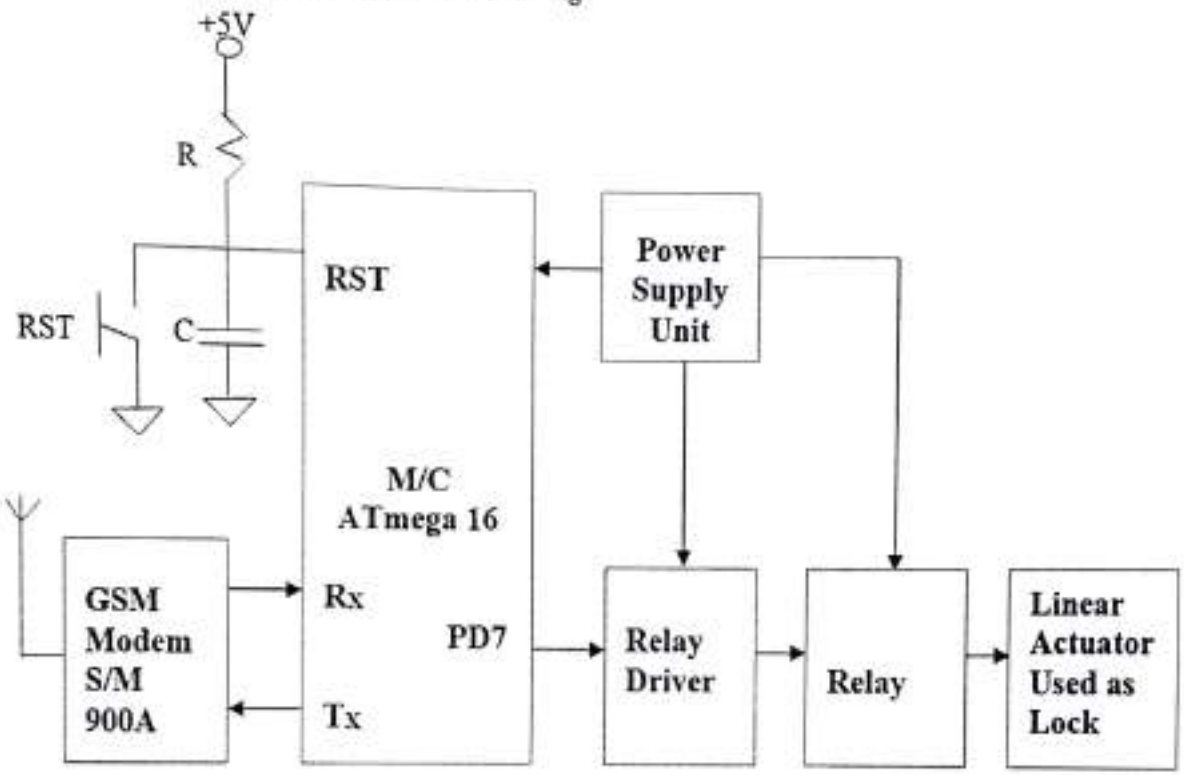

Figure 1: Block Diagram of GSM based Security Lock using Linear Actuator

The GSM modem block unit uses GSM modem SIM900A. GSM/GPRS modem RS232 is built with dual band GSM/GPRS engine. SIM 900A, works in frequencies 900/1800MHz. the modem is coming with RS232 interface, which allows to interface with PC or microcontroller. The band rate is configurable from 9600-115200 through AT command. The GSM/GPRS mode is having internal TCO/IP stack to enable to connect with internet is a GPRS. It is suitable for SMS, voice as well as DATA transfer application. The onboard regulated power supply allows to connect wide range of unregulated power supply. Using the modem one can make audio calls, SMS, attend the incoming calls and internet at through simple AT commands.

A. Features

- Dual band GSM/GPRS 900/1800 MHz
- Configurable band rate
- Built in network status LED
- Inbuilt powerful TCP/IP protocol stack for internet data transfer over GPRS
- SIM card holder
- Low power consumption 1.5mA (sleep mode)

The relay driver block consists of transistor amplifier to boost the current level of the output current provides by the microcontroller and provide sufficient current to drive the relay. The relay block uses electromagnetic relay which is used to switch the Linear Actuator ON/OFF with the help of relay driving transistors. It also provides voltage isolation between low control circuit and high Linear Actuator operating voltage and avoids electric shock. The proposed system uses Linear Actuator as safety Lock, which is linked to the system to be secured. This Linear Actuator is controlled by the relay.

B. Working

The Microcontroller (M/C) is programmed in such a way that only authorized user can operate the system, which is done by storing user mobile number in microcontroller. So, when authorized user dial the mobile number of the SIM card of the GSM modem after two to three rings the call has been cut off, the M/C received the number from GSM modem through proper AT command and compare with stored number if both matches, M/C send high output (PD7) to the relay driver and relay which in turn activate the Linear Actuator and hence the security lock. After few second M/C send the stored mobile number back to user through GSM modem acknowledging the activated lock. If user wants to unlock the system once again user has to call to the mobile number of the SIM card again after two to three rings the ring will be stopped, M/C output deactivate the lock.

Unauthorized person whose mobile number has not been stored in the M/C fail to activate the lock so, the system is made authorized to activate or deactivate the lock only that user whose mobile number has been stored in the M/C.

C. Power Supply

The unit needs +5V power supply for M/C and associated circuits and +12V,-12V for Linear Actuator. The +5V power supply is constructed by using step down transformer 0-9V/0.5A, bridge rectifier formed by 1N4007 diodes, filter capacitor 1000mf/25V,voltage regulator IC 7805 and decoupling capacitor 100mf/25V.

The bipolar power supply is constructed by using a step down transformer 12V-0-12V/1A, bridge rectifier using 1N5402 diodes and filter capacitor 2200mf/25V.This bipolar power supply is necessary to activate the Linear Actuator.

D. Advantages

1. Security lock can be operated from long distance
2. Economical design
3. Can be used by everyone
4. No need to have smart phone
5. No cost since it operates on missed call
6. The system assists handicapped/old aged persons

E. Disadvantages

The system is network dependent; hence network congestion can reduce the reliability of the system. It needs continuous power supply and costlier compare to mechanical lock.

III.CONCLUSION

The proposed work 'GSM Based Security Lock Using Linear Actuator' works satisfactorily. The unit is tested with valued SIM inserted in the SIM try of the GSM modem and operating range found to be very large. The present system uses missed call to switch the lock, so only one lock can be used means one cannot use more than one lock to switch door lock or door unlock. But by using SMS switching technique one can switch any number of lock, but switching lock by SMS may costs more so, in the present system the hardware has been implemented for only one lock. The proposed unit is the one of the example showing how one can use the Linear Actuator for locking

application. This versatile system finds many applications in different sectors such as Schools, colleges, hotels, Banks, Industries, Scientific institutions etc.

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Wireless Multi-Channel Non-Contact Liquid Level Controller

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Abstract: *The wireless technique of non-contact liquid level controlling and monitoring system concentrated with some newly available devices which are softly aggregated together in the proposed system. The proposed system employs non-contact liquid level control principle for controlling the liquid level of electrically conductive or non-conductive liquids. The system uses IR transceiver sensor for sensing liquid level, a microcontroller and HC 12 RF transceiver. The liquid level can be programmed to any lower and upper level values by using level control switches. The microcontroller compares the sensor output with upper and lower levels and provides serial data which is wirelessly coupled to the remotely placed RF transceiver. The RF receiver along with microcontroller provides the switching command signal for the suitable switching relay which in turn switches the motor ON or OFF. The unit is designed for eight (8) different units. Each unit is defined to work at different transmitting frequency to avoid interference free transmission. The validity of the proposed control scheme is verified by means of a practical testing on an experimental liquid level control device. The implementation of this control in a prototype design shows satisfactory and encouraging results which are effective, precise and reliable.*

Keywords: AT Mega 16 microcontroller, IR transceiver, HC 12 transceiver, LCD.

1. Introduction

Liquid level control of any tank, packages or industrial processes is a very important requirement; it belongs to accuracy, quality, quantity and finally with cost. This is directly related to efficient use of the resources, which means by controlling liquid level, it reduces or eliminates possibility of wastage which is directly related to cost saving, energy saving, optimal utilization of resources. Sudden fall of liquid level can effects continuous process and requirement in industries. Each and every time it might not be possible for the operator to keep an eye on the Liquid filling process in the reservoir and immediately switch the motor OFF manually once the reservoir is completely filled. It may happen few times that the operator might be busy with some work and unknowingly forgets about switching the motor OFF manually and due to this kind of negligence, there might be unnecessary wastage of Liquid. So intelligent close loop independent control with monitoring, display status can help to maintain process continuous. Keeping this in mind we have designed a system which can avoid these issues by completing the task automatically by wireless. The automatic Liquid level indicator and controller systems are quite useful to reduce the wastage of Liquid from any reservoir, while filling water in such reservoir without worrying about switching the motor OFF once the reservoir is completely filled so as to avoid wastage of water. In this project we have used two limits Upper (U) and Lower (L) which are adjusted respectively of Liquid in the tank. In this project we have also used LCD indicator. The microcontroller based control is advantageous in carry out information processing and control functions. It is obvious that the digital control system can offer high accuracy and high speed responses.

2. Block Diagram and Description

As shown in the Fig. 1 The IR transceiver (GP2YOA21YK) set-up used to sense the level of the liquid. This sensor provides DC analog voltage proportional to the level of the liquid. These analog voltage is fed to analog port of the microcontroller, which in turn converts it into digital and compare with the upper and lower liquid level settings and provides the data accordingly, the upper and lower liquid level setting are done by using up/down and mode select tactile switches as shown in Fig. 2. These set values can be monitored on LCD and stored in microcontroller.

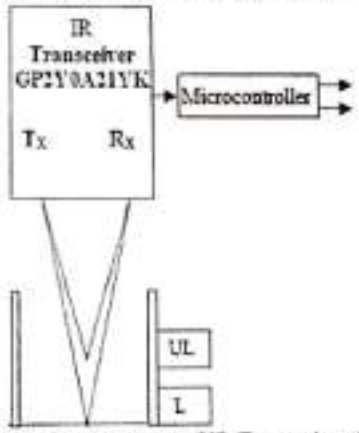

Figure 1: Block Diagram of IR Transceiver Set-Up

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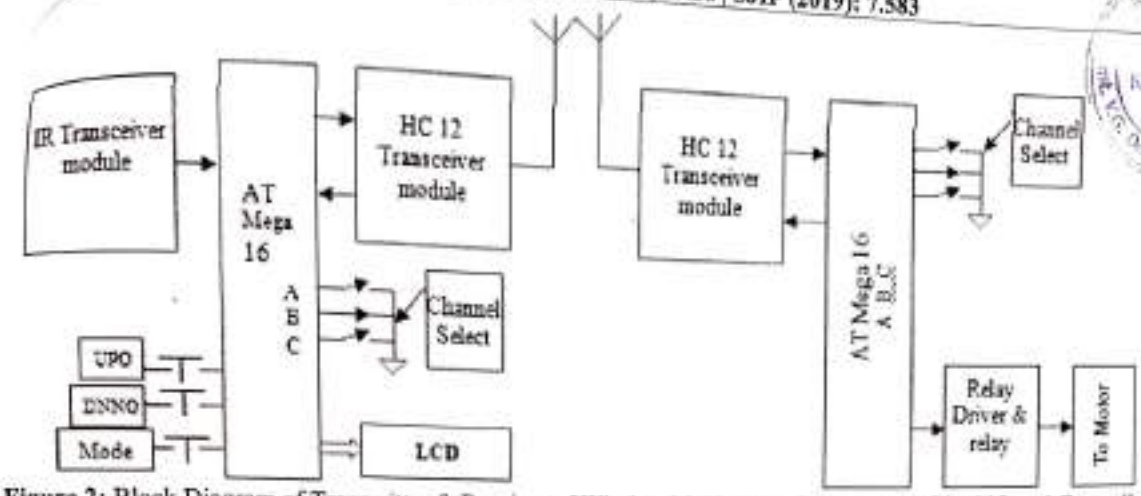

Figure 2: Block Diagram of Transmitter & Receiver of Wireless Multi-channel Non-contact Liquid Level Controller

Motor is turned OFF when it reaches upper level and ON when reaches lower level; these levels decide the status of the motor. These serial data from microcontroller is then fed to transceiver which modulates the serial data and radiates to the space through antenna. The receiver receives signals demodulates and fed to microcontroller.

3. Conclusion

This paper was intended to design a simple and low cost Wireless Multi-channel Non-contact Liquid Level Controller.

This is not only for water tank but also can be used for various liquids & oil level in industries and chemical labs too. To design this system, we used Microcontroller as a platform connected to relay along with local materials for low cost. We tried to design a system in such a way that its components will be available easily and when connected together, will be able to prevent the wastage of Liquid. The whole system operates automatically. So it does not need any expert person to operate it. It is not at all very expensive. Optimum operation is maintained to run of motor and pump by monitoring level of process tank which saves energy. By sensing the liquid level automatically zero possibility of liquid over flow can be achieved and display of system status on LCD. In total it can be said, this model is effective, reliable, informative, energy efficient, time efficient and automatic.

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