

Progression of stair climbing wheelchair of microcontroller of Global Positioning System (GPS) To Explore The Autonomous Robot

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Abstract— This paper deals with the arranging and progression of a stair climbing stage can be executed to modified wheelchair for physically weakened people. The usage of this remarkable vehicle beats the troubles went up against by physically incapacitated people. The change of stair climbing insightful stage is used to screen and control the course of action of ATMEGA 328 Microcontroller has been used. The obstruction acknowledgment evading is done by sensor unit. It is used to outfit with a game plan of sensor, for instance, Infrared sensors and Ultrasonic sensors. In the present advances of robotization is unmistakably can associated in the ser-unfortunate propensity robots for future change. The past work of Intelligent Wheelchair nonattendance of computerization inside them. This work use to beat the inconveniences of manual wheelchair structure. The assignments dealt with by the coordinating system are the treatment of assembled GPS data, affirmation of preoccupations from the reference course way (a gathering of way centers) and issuance of controlling summons. An essential computational module was made to figure the evasion of current vehicle position and its heading-edge in regard to the masterminded course.

Keywords—stair climbing; microcontroller; autonomous navigation; global positioning system

I. INTRODUCTION

Nowadays one can witness the extension of aggregate people passing on some sort of physical absence of capacity, impacting speed. In perspective of World Health Organization (WHO) data, it is evaluated that around 15 % of the aggregate people (200 million people) live with physical hindrances. Rates of cripple are growing a result of masses developing and augmentations in ceaseless prosperity conditions. The number is a direct result of various reasons and it has been, truth is told, creating. The developing of the masses in view of future augmentation, natural corruption and sub sustenance provoke the nearness of consistent diseases which, together with factors like development and work setbacks, wars and intrinsic deficiencies, add to the extension of people with adaptability challenges. "The World expounds on failure" (2011) [3] commonly presented by World Health Organization (WHO) and World Bank says that there are 70 million people are debilitated on the planet. Tragically well ordered the amount of disabled people is keeping extending due to road incidents and also contamination like loss of movement, malady and low motor neuron wounds. Mechanical self-sufficiency Wheelchairs extend the limits of traditionally powered contraptions by exhibiting control and navigational learning. For crippled individuals, a human found a wheel arrange which can be moved by utilizing hands for the general population who don't have legs. Wheelchairs are valuable for debilitated individuals who are not set up to work to utilize general wheelchairs. One of the parts of sharp wheelchairs moves with the utilization of navigational learning.

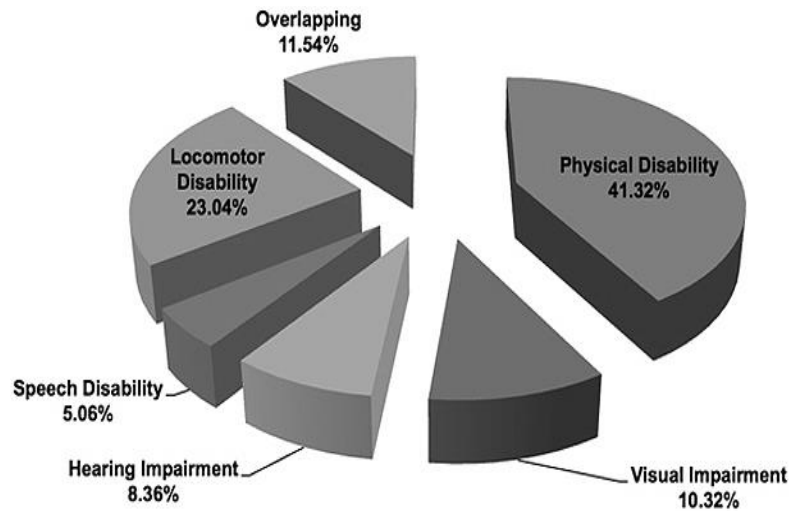
II. STATISTICS OF DISABILITY IN INDIA

A. Problem Identification

We understand that reliably the quantity of tenants in the World and furthermore India is growing rapidly. In India 120million people are disabled out of which 41.32% are physically crippled. [4].The number of physically crippled people is industriously

extending a result of reasons like setbacks and ailments like loss of movement, disease and low motor neuron wounds. The graphical depiction of impede in India shows up in figure 1. The estimations are given underneath in rate out of 120 million people. Physical Disability 41.32%, Locomotor Disability 23.04%, Overlapping 11.54%, Visual Impairment 10.32%, Hearing Impairment 8.36%, Speech Disability 5.06%. In our domain of Tamilnadu which has encountered the quantity of impeded people in females than folks. The quantity of occupants in India was encountering seeing, hearing, talk, improvement, mental deterrent, passionate shakiness and different debilitations. The wheelchair is used for a critical number of the all-inclusive community who are physically crippled, low motor neuron wounds, loss of movement patients. The Wheelchair is a useful contraption for society and will be particularly important for the physically injured individuals keeping in mind the end goal to engage them to accomplish the required spots without the assistance of others.

Fig. 1 Statistics of disability in India 2011



Physical Disability 41.32%
 Locomotor Disability 23.04%
 Overlapping 11.54%
 Visual Impairment 10.32%
 Hearing Impairment 8.36%
 Speech Disability 5.06%

In our region of Tamilnadu which has encountered the quantity of debilitated people in females than folks. The quantity of occupants in India was encountering seeing, hearing, talk, improvement, mental obstacle, passionate precariousness and distinctive debilitations.

TABLE I. Disability of population in India 2011

Type of Disability	Total Number of Population		
	Persons	Males	Females
Total	100	100	100
Seeing	18.8	17.6	20.2
Hearing	18.9	17.9	20.2
Speech	7.5	7.5	7.4
Movement	20.3	22.5	17.5
Mental Retardation	5.6	5.8	5.4
Mental Illness	2.7	2.8	2.6
Any Other	18.4	18.2	18.6
Multiple Disability	7.9	7.8	8.1

The essential course of action of stair climbing sharp wheelchair extends the capacities of expectedly powered contraptions by introducing control and navigational information. Enumeration of India 2011 has revealed those more than 21 million people in India as anguish from either kind of cripple.

III. RELATED WORKS

A. Malik Mohd Ali, Razali Tomari and M. Mahadi Abdul Jamil proposed a system to control the multifinger grippers with significance on the finger tips and finger joints [1]. François Pasteau, Vishnu K. Narayanan and Marie Babel proposed a method for autonomous navigation for an electric wheelchair allows moving corridors and pass-ing through an open door ways. [2]. Yoichi Morales, Takahiro Miyashita and Norihiro Hagita propose a balanced navigation model for the passenger and pedestrians in terms of social issues regarding wheelchair navigation. Model validation was performed with human participants in the case of a single passenger and a pedestrian where experimental results show that overall comfort should be considered for computing socially accepted paths. Passengers and pedestrians scored the paths computed by the social planner as more comfortable than state of the art shortest paths [6].

PauloCoelho and UrbanoNunes propose a way following control, utilizing a Kalnian-based Active Observer Controller, connected to wheeled portable robots subject to nonholonomic limitations. This new control procedure exhibits the particularities of being utilized as a part of discrete mode and being vigorous against vulnerabilities and aggravations. The execution of the proposed control calculation is checked through PC recreation [7]. Christian Buhler, Ralf Hoelper, Helmu Hoyer and Wolfram Humann gives the utilization of automated innovation in assistive gadgets opens new open doors for individuals with serious incapacities (tetraplegia, spinal string wounds, and so on.) at work and in their private homes. It can lessen social prohibition and help social and professional combination. Because of their versatility, they are accessible on various areas, e.g. in various rooms of a home for use in exercises of day by day living (ADL). The measured programming configuration gives agreeable methods for coordination. Parts of the work depicted are done inside the ESPRIT venture PMMA, the SPRINT venture IMMEDIATE and the TIDE venture OMNI [8].

Ananda Sankar Kundu, Oishee Mazumder, Prasanna K.Lenka and Subhasis Bhaumik introduced a plan and advancement of a four wheel driven Omni wheelchair suited for indoor route with lessened wheel slippage and vibration. The outline has been assessed with wheel stack estimation from current utilization and vibration estimation with a 3 hub accelerometer mounted on the skeleton. From the outcome and investigation, it is apparent that our proposed configuration demonstrates less wheel slippage and vibration than existing plans. The framework can discover its application as an assistive guide for geriatric populace or as a shrewd indoor versatility vehicle [9]. Andrej Skraba, Radovan Stojanovic, Anton Zupan, Andrej Kolozvari and Davorin Kofjac propose the improvement of a model discourse controlled cloud-based wheelchair stage. The control of the stage is actualized utilizing a minimal effort WebKit Speech API in the cloud. The depiction of the cloud-based wheelchair control framework is given. Notwithstanding the voice control, a GUI is executed, which works in a web program and additionally on cell phones giving live video spilling. Advancement was done in two stages: initial, a little, beginning model was produced and, second, a full size model was constructing.

The precision of the discourse acknowledgment framework was assessed as going from around 60% to up to 97%, subject to the speaker. The discourse controlled framework dormancy was estimated and additionally the idleness when the control is given by means of touch on a supposed shrewd gadget. Estimated latencies ran from 0.4 s to 1.3 s. The stage was likewise clinically tried; giving promising consequences of cloud-based discourse acknowledgment for encourage execution. The created stage depends on a Quad Core ARM Mini PC GK802 running Ubuntu Linux and an Arduino UNO Microcontroller. Programming improvement was done in JavaScript/ECMA Script [10].

Marc Hanheide, Moritz Gobelbecker and Graham S.Horn presents a long-standing objective of AI is to empower robots to design despite unverifiable and fragmented data, and to deal with errand disappointment brilliantly. This paper demonstrates to accomplish this. There are two focal thoughts. The main thought is to sort out the robot's learning into three layers: case information at the base, sound judgment information over that, and analytic information to finish everything. Learning in a layer above can be utilized to adjust information in the layer(s) beneath. The second thought is that the robot ought to speak to how its activities change the world, as well as what it knows or accepts.

There are two kinds of learning impacts the robot's activities can have: epistemic impacts (I trust X since I saw it) and suspicions (I'll accept X to be valid). By consolidating the learning layers with the models of information impacts, we can at the same time tackle a few issues in mechanical technology: (i) assignment arranging and execution under vulnerability; (ii) errand arranging and execution in open universes; (iii) clarifying undertaking disappointment; (iv) confirming those clarifications. The paper depicts how the thoughts are executed in three-layer design on a portable robot stage. The robot usage was assessed in five distinct examinations on question hunt, mapping, and room arrangement [11].

Mohd Razali Md Tomari, Yoshinori Kobayashi and Yoshinori Kuno propose a structure that can help clients to defeat such conditions utilizing a progressive semi-independent control technique. At that point, ecological data is seen utilizing the mix of a laser run discoverer and the Kinect sensor for deciding security outline wheelchair's region. In the end, the client's data sources

are furnished to the route organizer alongside the wellbeing guide to direct movement that is without impact and the best for client inclination. Trial comes about show the attainability of the proposed approach [12].

Mohamed Slim Masmoudi and Najla Krichen exhibit another plan approach for a canny route calculation for omnidirectional versatile robots. This last change is a piece of investigates completed on Intelligent Transport Systems (ITS). Mulling over the downsides of corresponding fundamental (PI) control when connected to omnidirectional robot route, we build up a way to deal with plan a fluffy rationale PI controller (Fuzzy-PI) [13].

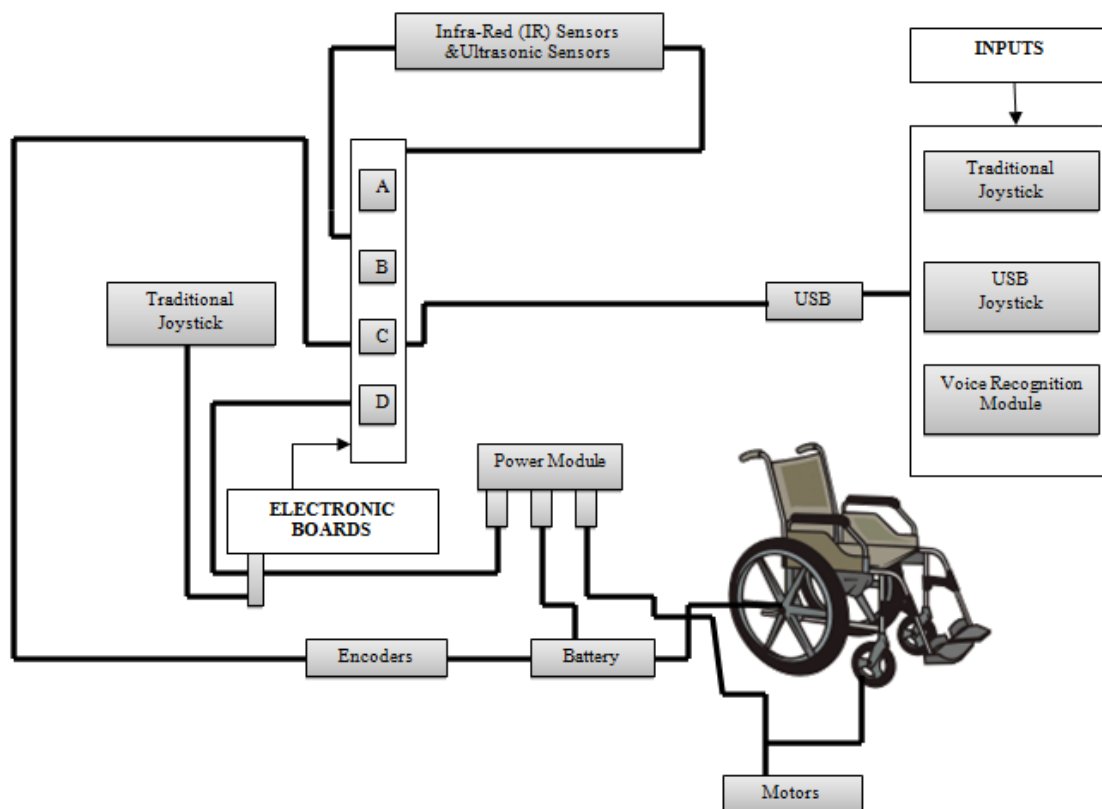
Jill D.Crisman, Michael E.Cleary and Juan Carlos Rojas depict the equipment and the control interface of this human-robot framework. The portrayal here spotlights on the framework's video calculations for following and assessing targets. The framework manufactures a paired shape display for each objective chose by the client. This mapping is utilized on consequent pictures to make a parallel picture which can be immediately coordinated with the objective's shape show. We have tried this following calculation on recorded picture groupings and on a few keeps running with our wheelchair portable robot. Our underlying outcomes demonstrate that this calculation is sensibly hearty for different kinds of edge and corner targets essential for route [14].

Celso De La Cruz, Teodiano Freire Bastos and Ricardo Carelli propose the dynamic model of an automated wheelchair is produced thinking about a sidelong deviation of the focal point of mass. The Lyapunov and info/yield steadiness hypotheses are utilized to outline a novel following and situating versatile control for the automated wheelchair. Properties of the dynamic model as for its frameworks and parameters are appeared. A channel is utilized to get a shut circle condition that permits outlining the versatile control law. At that point, a projection calculation is utilized to enhance the versatile control in the feeling of evading parameter float [15].

IV. HARDWARE DESIGN OF STAIR CLIMBING WHEELCHAIR

The equipment plan of stair climbing wheelchair model has appeared in Figure 2. The equipment gadget square is made out of ultrasonic sensors and infra-red sensors. The capacities of electronic sheets are accepting data from ultrasonic sensors and infra-red sensors are sending data to the microcontroller.

Fig 2. Hardware design of stair climbing wheelchair



The principle arrangement of stair climbing clever wheelchair expands the capacities of customary controlled gadgets by presenting control and navigational insight. The Powered Wheelchair has following elements: Two differential driven back wheels; Two 12 V Lead-Acid Battery 7Ah and Power Module. The main solution of stair climbing intelligent wheelchair extends the capabilities of traditional powered devices by introducing control and navigational intelligence.

A. *Design of stair climbing platform*

The outline of the product utilizing Catia. It introduces the model execution of a smart wheelchair is shown in figure 3.

Fig 3. Design of stair climbing vehicle in Catia

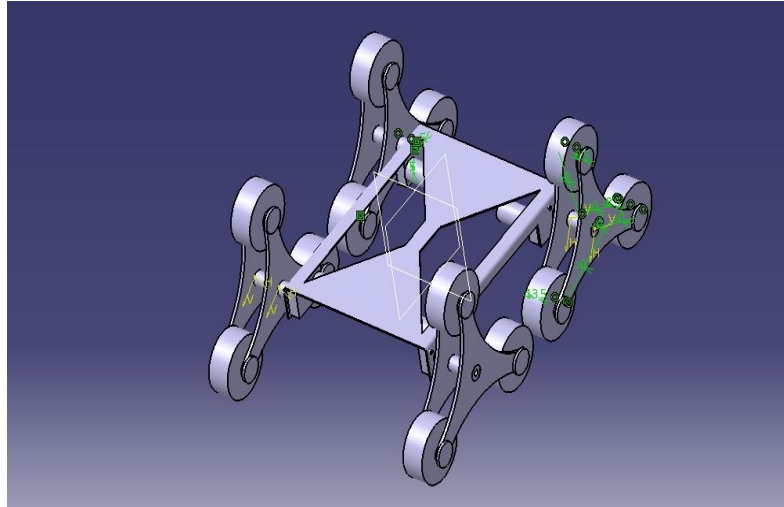


Fig 4. Design model of wheelchair

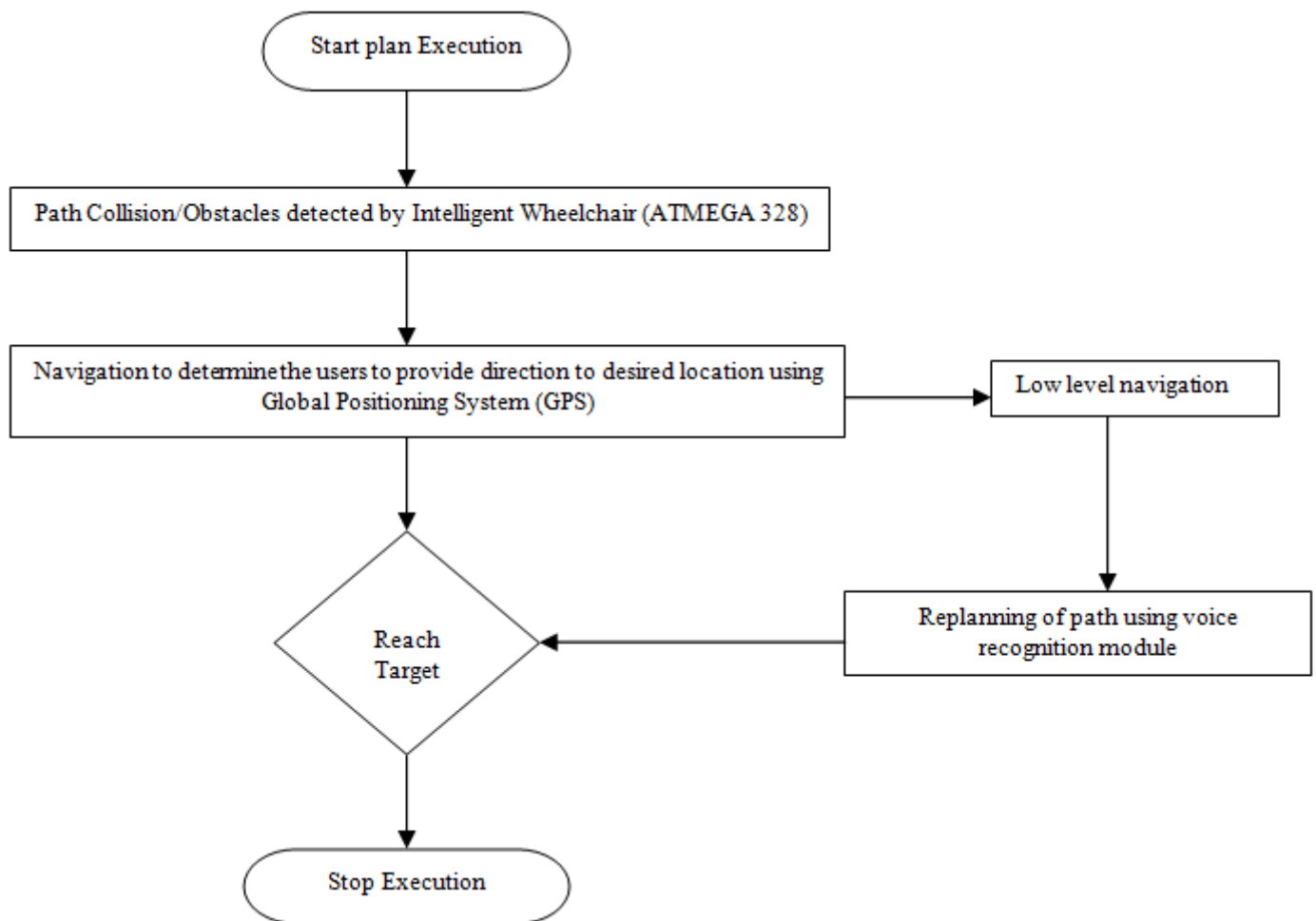


It demonstrates the mechanical structure and the equipment execution of wheelchair utilizing Catia in fig.4. Wheelchair expands the abilities of conventional controlled gadgets by presenting control and navigational knowledge.

B. Path planning of stair climbing wheelchair

The path planning of stair climbing wheelchair is shown in fig 5.

Fig 5. Path planning of stair climbing wheelchair

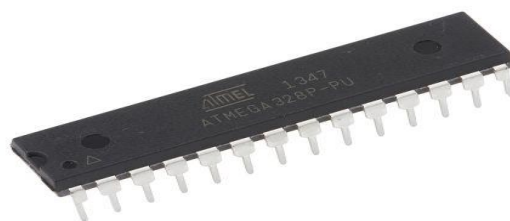


The ATMEGA328 begins executing their current navigational plans and constantly faculties the hindrances for next developments. The wheelchair administrator will utilize the touch screen to choose the goal. On the off chance that low level route it shows up, it goes to replanning the way of utilizing voice acknowledgment module. From that point forward, it achieves the objective. This stage is intended for stair climbing vehicle ought to be intended for executing the wheelchair show. Wheelchair can explore for both indoor and open air situations. The Wheelchair expands the capacities of customary fueled gadgets by presenting control and navigational insight. The Wheelchair is a helpful gadget for society and will be particularly valuable for the physically debilitated people in order to empower them to achieve the required spots without help of others.

C. Microcontroller unit

The ATMEGA 328 Microcontroller is shown in fig 6.

Fig 6. ATMEGA 328 Microcontroller

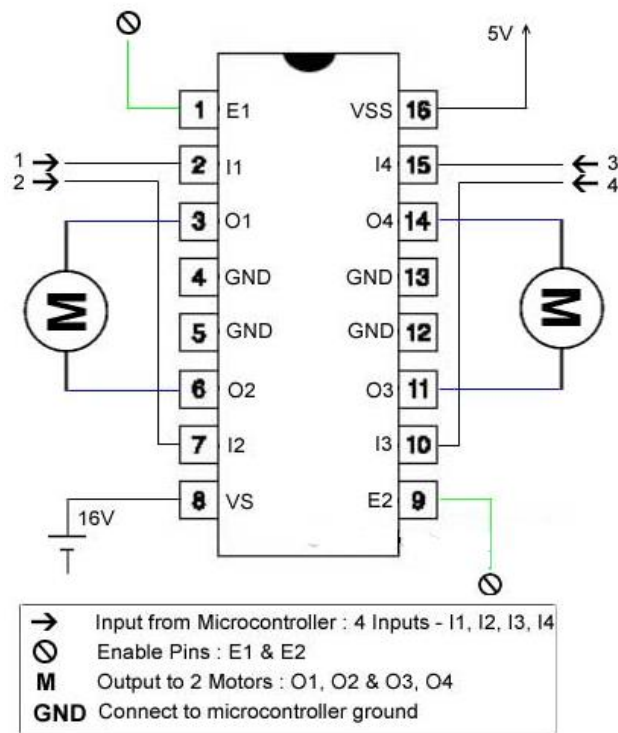


Rationale 01 and 10 will pivot it in clockwise and anticlockwise headings, separately. Empower pins 1 and 9 (relating to the two engines) must be high for engines to begin working. At the point when an empower input is high, the related driver gets empowered. Subsequently, the yields wind up noticeably dynamic and work in stage with their sources of info. Also, when the empower input is low, that driver is incapacitated, and their yields are off and in the high-impedance state.

D. Motor driver

The motor driver L293D is shown in fig 7.

Fig 7. L293D Motor driver



L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher current signal. This higher current signal is used to drive the motors.

E. Experimental set up

This section presents the prototype of stair climbing platform is shown in fig.8

Fig 8. Prototype of stair climbing platform



It shows the mechanical structure of the hardware implementation of stair climbing vehicle is shown in fig.9.

Fig 9. Stair climbing vehicle

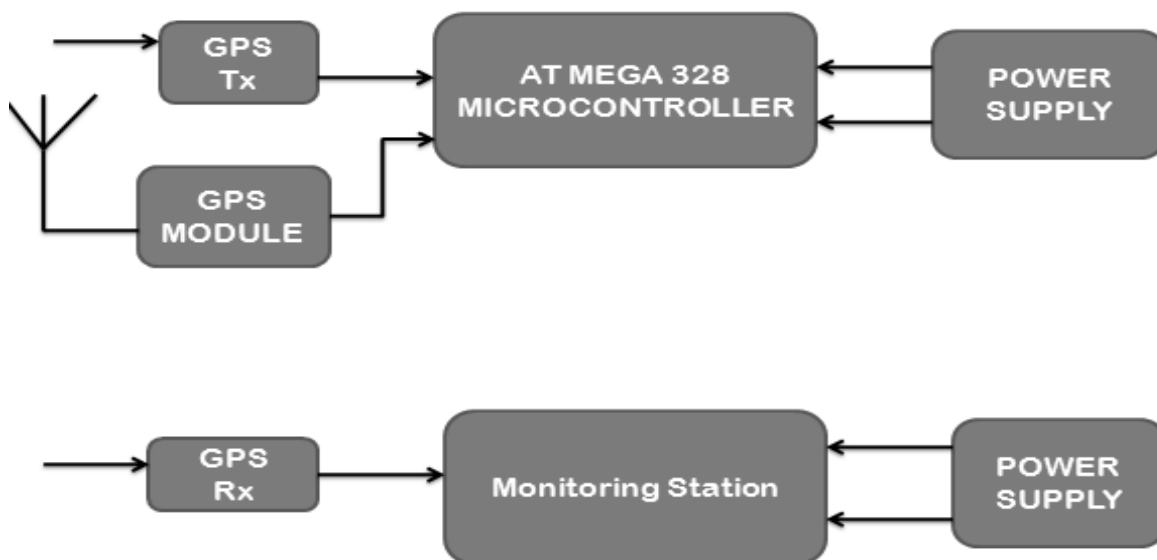


Low Motor Neuron lesions (LMN), Leprosy patients and Paraplegic/Paraperesis. These implications caused by diseases affect several millions of people.

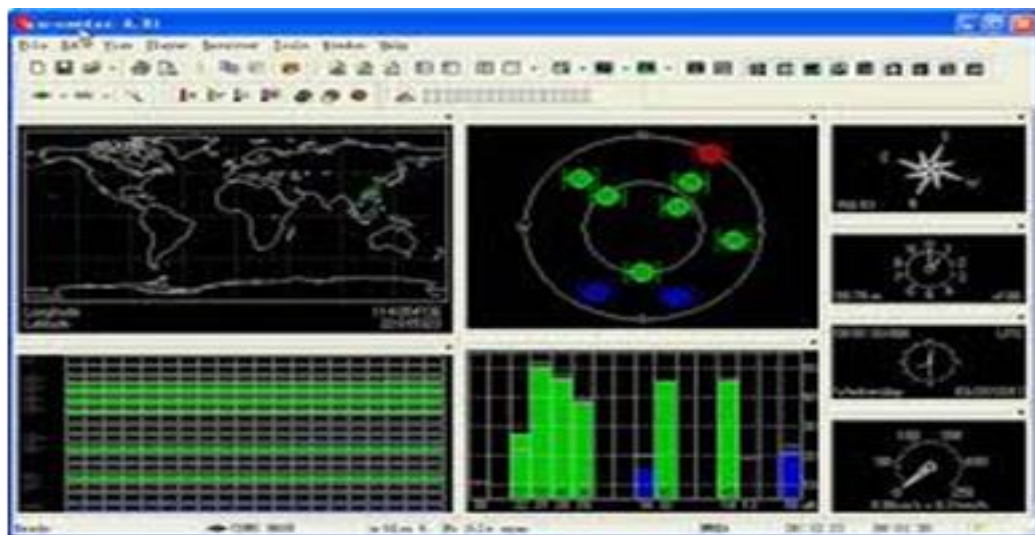
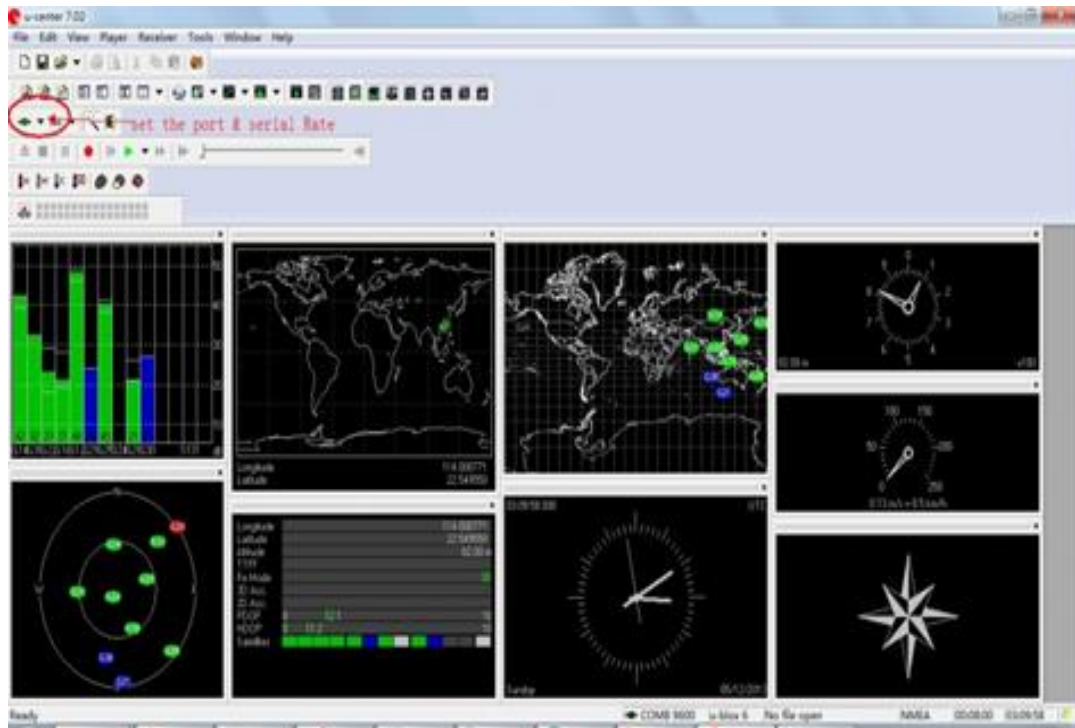
V. GLOBAL POSITIONING SYSTEM (GPS)

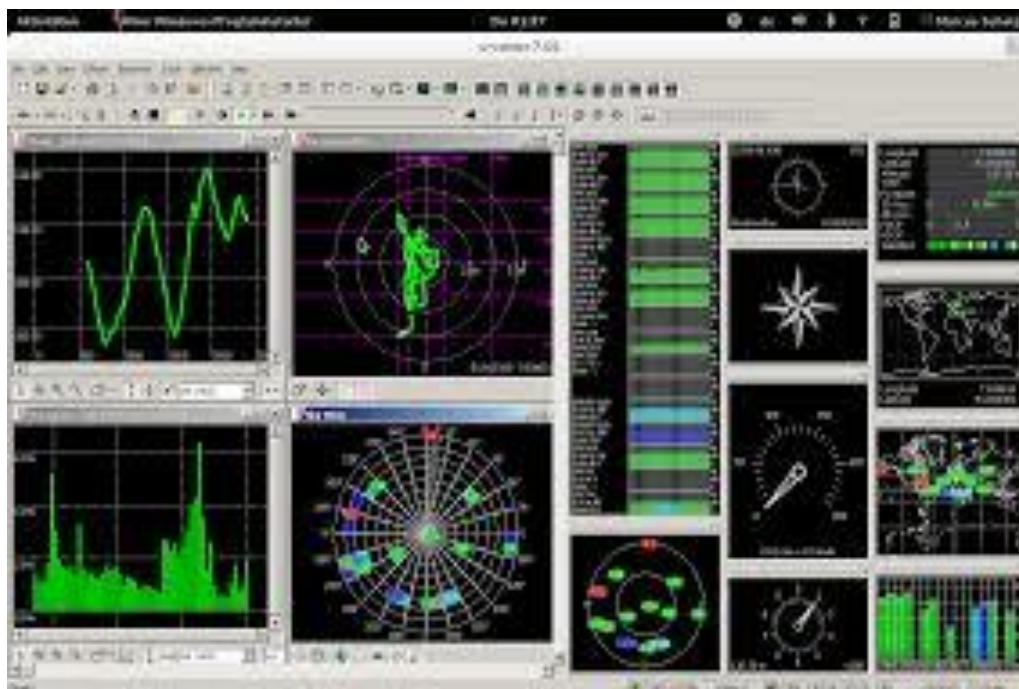
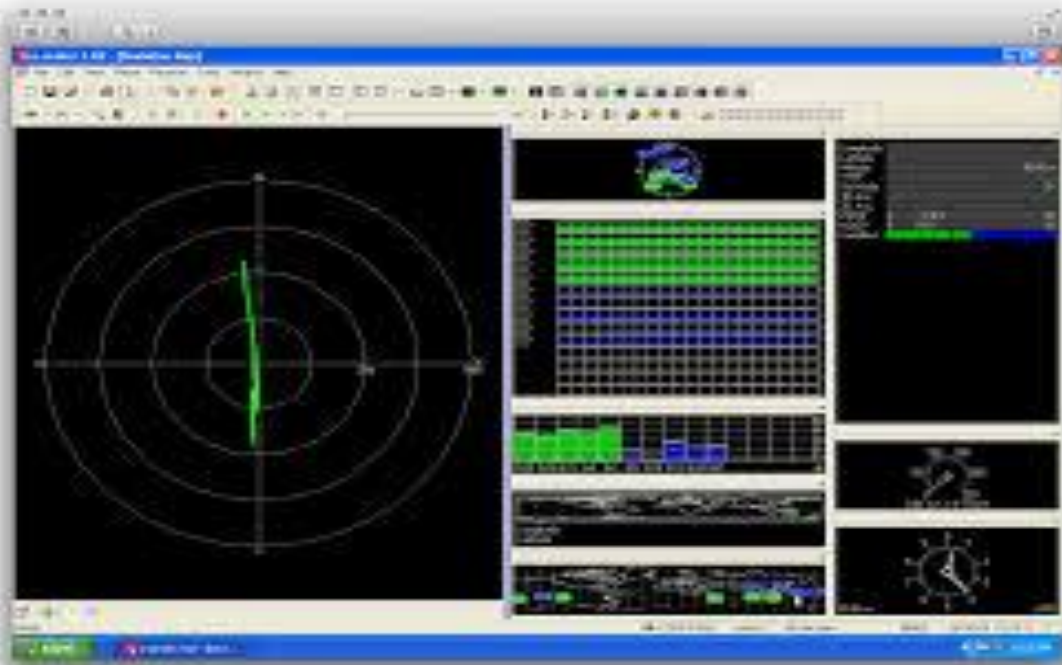
The square chart of GPS has appeared in fig 10.

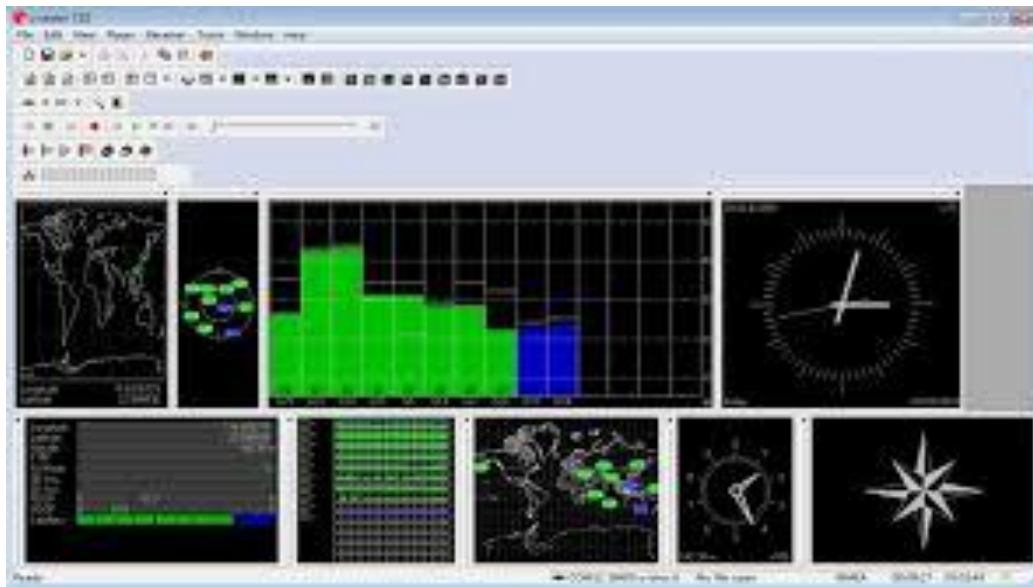
Fig 10. Block diagram of GPS



The following figure has taken through the software reading is shown below.







A. Future works

The wheelchair is utilized for physically crippled people. The wheelchair is controlled by three ways: Navigation, Voice and joystick. Work is proceeding towards the objective of an actualizing the wheelchair. In this undertaking can find the topology maps to decide the area of goal focuses for future works. The smart automated wheelchair will keep on taking abnormal state directional summons from the client and execute them to guarding the clients. The keen wheelchair will consequently run the wheelchair to choose the goal to achieve the objective. The Wheelchair is a valuable gadget for society and will be particularly helpful for the physically impaired people in order to empower them to achieve the required spots without aiding of others.

VI. CONCLUSION

This paper demonstrates the arrangement and headway organize for Wheelchair. This stage supports the change of wheelchair for future works. We assume that new advances can bring the wheelchair for real breaking points of orchestrating, a self-representing course to allow in a semi-independent strategy for the customer conveyed in the strange state vernacular of charges. The Intelligent wheelchair vehicle is used for countless all inclusive community who are physically debilitated, low motor neuron wounds, loss of movement and periphraisis patients. The Wheelchair is a profitable device for society and will be especially useful for the physically debilitated individuals to engage them to accomplish the required spots without the assistance of others.

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