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Revolving Self-Propelled Carrier: Fabrication

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ABSTRACT: Self-propelled carrier can be defined as a driving mechanism that contains a container which can be used for carrying the material from one place, lifting up and dumping at another place. These types of machines are quite useful in shaft mining. Here the machine is designed for carrying the material from the mines through containers coupled to the revolving mechanism and transfers the material to another container that lifts up the other container up to the specific reference point and dumps it over the surface (earth). Entire process is automated except filling the container inside the mine which is to be done manually. The system is useful for coal, mica, iron ore, etc. mines. The same machine can be used in big industries like cement factories, where lot of raw material is to be carried from one place and to dump at another place. The machine constructed with Electro-mechanical components is driven by the microcontroller. Various fields of technologies are used to drive this comprehensive machine. After filling the container inside the mine start button is to be activated, there by the container revolves round horizontally to reach the vertical lifting container. When it reaches to the reference point, the material will be transferred to the other container and is lifted vertically through another mechanical transmission section to dump the material over the surface of the Earth. The lifting mechanism is also automated. The entire mechanical movements are derived through DC motors. A total of three DC motors are used and these motors are constructed with reduction gear mechanism from inside by which speed is reduced and torque is increased. The control circuit is designed with 89C51 microcontroller and the required power supply for the entire circuit is derived from the mains.

KEYWORDS: Rope ,Propeller, Container, Voltage regulator and Circuit.

I. INTRODUCTION

The machine designed here can be used for many applications, the main task of this machine is to transport the material from lower level to the upper level. In lower level, the collected material from one place is dumped in to the container and is rotated and carried up to a specific reference point, there the container will be stopped automatically. Here at this reference point, another container is waiting for the first container, whenever the first container reaches to the reference point it will be tilted automatically and the material inside this container will be dumped in to the second container. After completing this process at lower level, automatically the second container will be lifted up vertically up to the specific height, at this reference point the container will be stopped automatically and it will be tilted to unload the material on the surface of the earth.

Since the unloading process is continued from certain height, huge material can be accumulated in less area, the collected material at one place looks like a hill. When the machine is used for underground activities, the dumped material over the surface of the earth must be cleared every time. The itemized depiction of whole process is clarified in next part. As this exploration work falls under the subject of Mechatronics, different fields of innovations must be incorporated to full-fill the objective.

The joining of electronic building, mechanical designing, electrical designing, and control innovation is framing a urgent part in this plan. Particularly the control circuit composed with microcontroller plays prevailing come in this undertaking work. The term mechatronics is utilized to portray this incorporated approach, along these lines every single above subject are depicted in this venture report in following parts. Most systems that provide motion and force contain a mixture of Mechanical, Electrical, Electronic, and Digital Components. In fact, today most systems are

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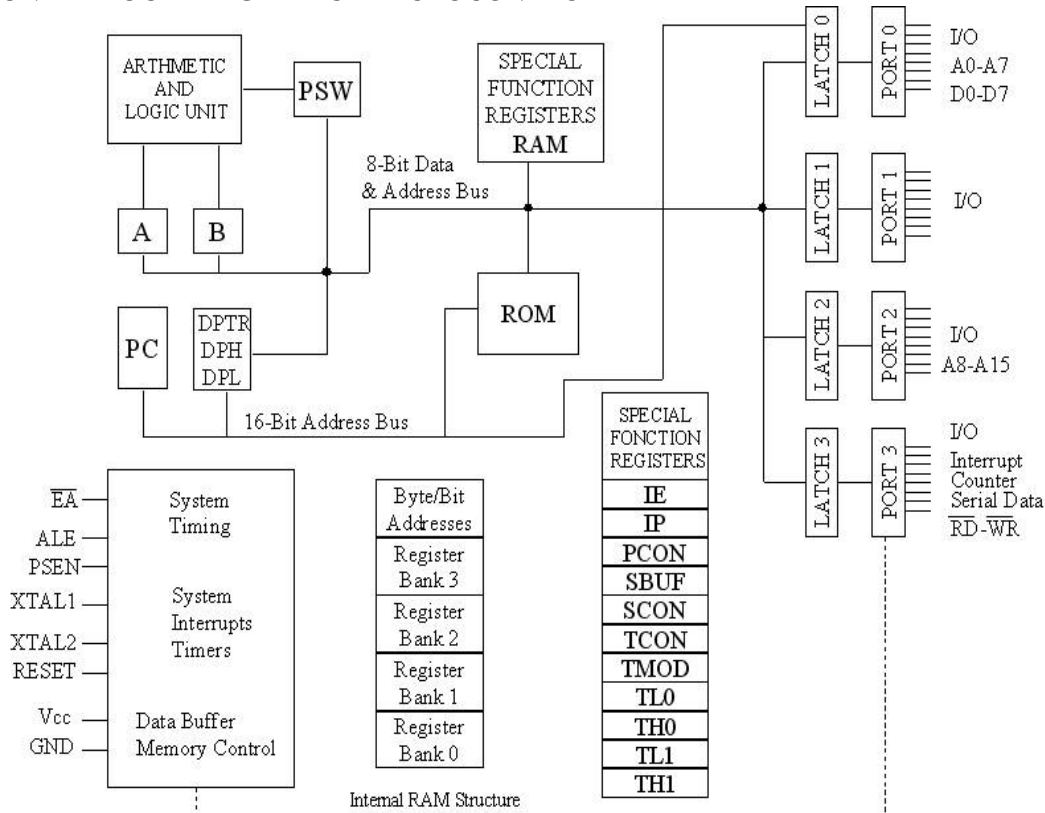
mixed systems. The design of these mixed systems requires knowledge from all these fields. The purpose of mechatronics is to provide knowledge regarding the Mechanical, Electrical, Electronics, Embedded Software, and Digital components required for the system, for analyzing the interface requirements for signals, power transmission, and conversion, and for investigating the performance of the integrated system.

The control circuit is designed with 89C51 microcontroller, this chip belongs to atmel family and offers many latest expectations. This is an 8-bit controller widely used for control systems. This microcontroller is the integration of a microprocessor having 4kb memory, 32 I/O lines, timers, ROM, etc. on a single chip. As this chip is having four ports, part of electronic hard product can be interfaced with this single chip. Its high-thickness non-unpredictable memory perfect with standard MCS-51 direction set makes it a capable controller that gives very adaptable and financially savvy answer for control applications. Smaller scale controller works as indicated by the program written in it.

The program is composed in such a way, with the goal that the Micro controller can read and it can store the data got from the detecting circuit. Small scale controllers are inserted inside some other gadget with the goal that they can control the highlights or activities of the item. Another name for a smaller scale controller is inserted controller. Smaller scale controllers are devoted to one assignment and run one particular program. The program is put away in ROM and for the most part does not change. Small scale controllers are regularly low-control gadgets.

This part of the project work is intended to explain the block diagram in step by step, i.e. block wise. By studying this block diagram carefully, one can understand the fundamentals of this project work. The entire square outline gave toward the finish of this section demonstrates the innovation that is planned to take care of the demand of substantial enterprises by investigating the self-impelled bearers.

FUNCTIONAL BLOCK DIAGRAM OF MICROCONTROLLER



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II. DESCRIPTION ABOUT MECHATRONICS

Mechatronics is an engineering field which involves various fields of technologies working together can be called as Mechatronics. All most all electro-mechanical machines designed for hundreds of applications falls under the subject of mechatronics. The procedure begins from mechanical structure and its related mechanisms driven through electrical components like motors, solenoid coils, etc. The control circuit that restricts the mechanical transmission through electrical devices will be in function based on the input & output signals obtained from the sensors.

Depending up on the type of machine & its function, various sensors are in use. Often Computers, microcontrollers, & microprocessors are used for monitoring & controlling the machines. These days embedded control systems are becoming popular because of its simplicity & economy. The control circuit designed with microcontroller is acting as a single chip computer & it offers many latest features those are offered by a big computer. Therefore in this project work, preference is given for embedded system. In this regard the most popular chip from atmel group, i.e. 89C51 is used to control the machine. The main advantage of using this chip is, it is having more I/O lines & most of them are programmable independently, thereby lot of electronic hardware like sensors, display systems, control keys, etc. can be interfaced with this single controller.

The approach exhibited here is a framework level way to deal with outlining electromechanical frameworks that consolidations mechanical, electrical, control framework, and installed programming plan. It speaks to a broad push to enhance the outline procedure by coordinating the best accessible advancement practices and innovations to streamline plan, prototyping, and sending.

In the event that we outline mechanical apparatus, gear, vehicles, or different gadgets with moving parts and electronically controlled actuators, mechatronics innovation may enable us to bring down improvement costs, decrease hazard, and create higher-quality items. View this web cast to lean about the Mechatronics approach to machine design.

As every engineer knows that the electrical energy can be converted in to mechanical energy, & based on the signals available from the sensors motion is controlled and it is measured. These days embedded microcontrollers are dominating other signal processing units. Most of electromechanical machines contain an embedded system in addition to the mixture of mechanical, electrical, electronic, and digital components. The designer of these systems should have knowledge about all these fields. The purpose of this project work is to acquire knowledge regarding these fields & for investigating the performance of embedded system, in addition analyzing the power transmission and conversion is also important. Mechanical engineers have to deal with issues regarding electrical and electronics engineering design with computer knowledge, whereas electrical and electronics engineers have to understand mechanical issues like machine design mechanism, machine structure, force measurement, etc.

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III. DESIGNING OF PRODUCT

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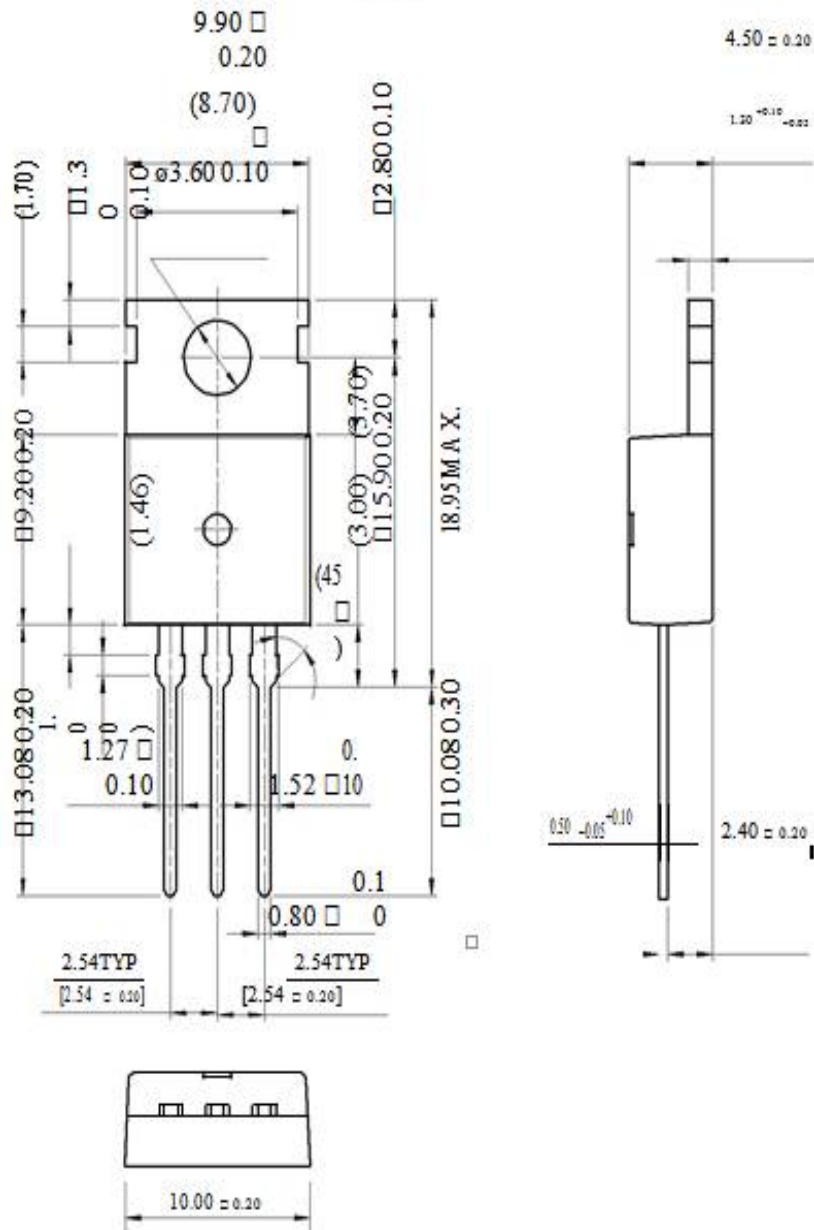


Fig.1. 3-Terminal 1A Positive Voltage Regulator

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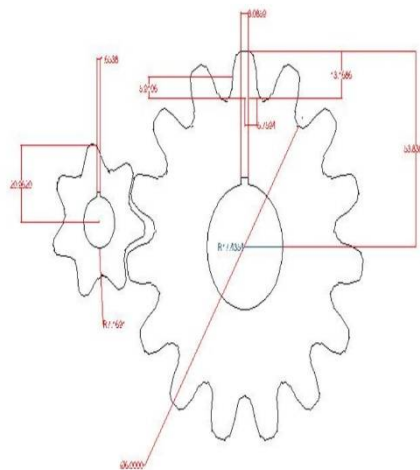


Fig.2. Spur Gear

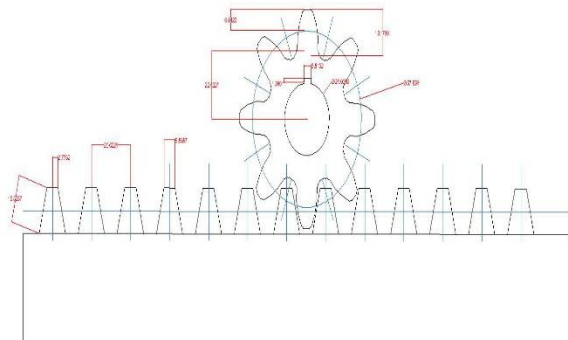


Fig.3. Rack and Pinion

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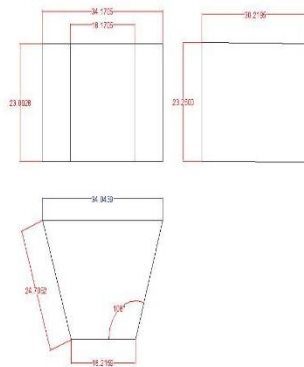


Fig.4. Container

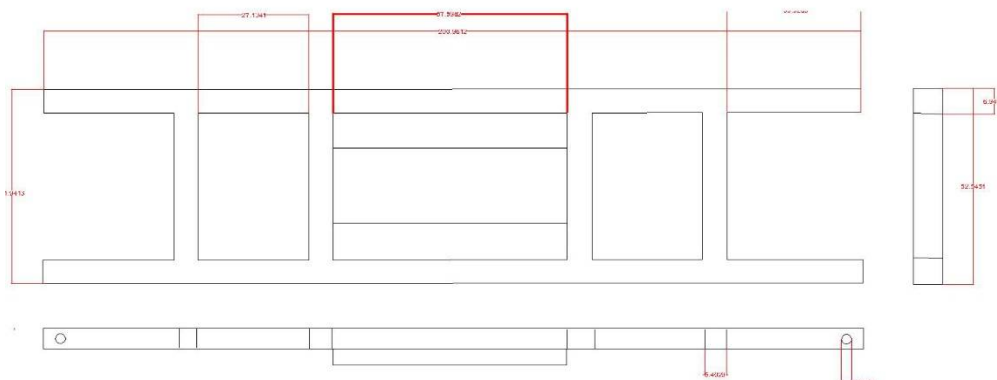


Fig.5. Base Design

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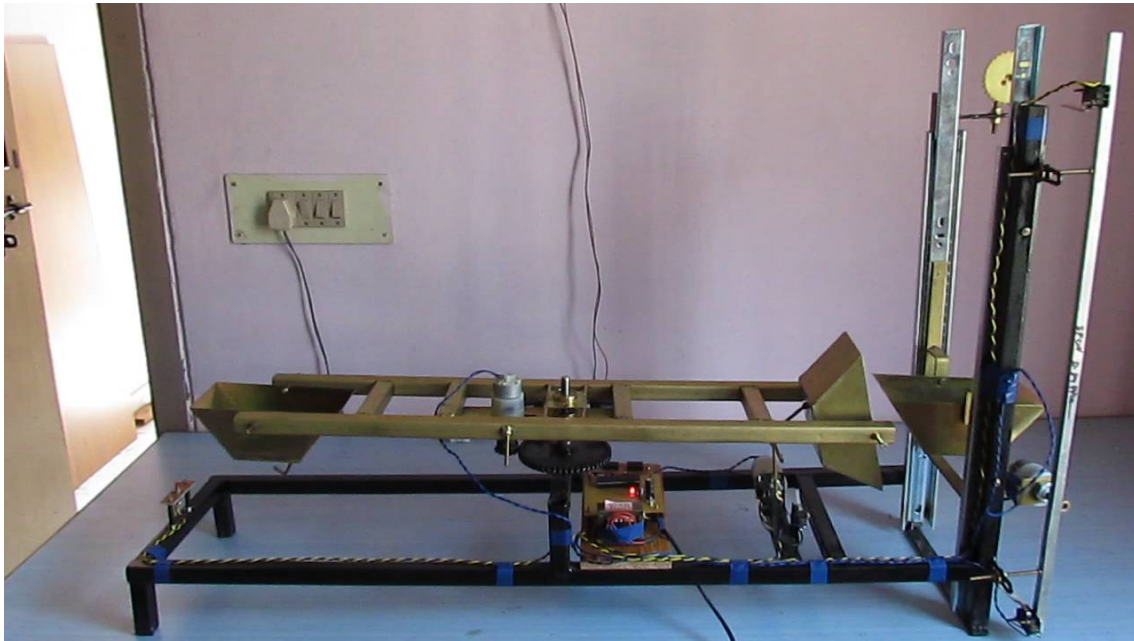


Fig.6.Revolving Self Propelled Carrier

IV. CONCLUSIONS

The project work is designed and developed successfully, for the demonstration purpose a small prototype module is constructed and the results are found to be satisfactory. While designing and developing this proto type module, we have consulted few experts those who are having knowledge in Mechatronics, these professionals working at different organizations belongs to Hyderabad helped us while fabricating the machine. Since it is a model module, much sum is not contributed, the entire machine is developed with locally accessible parts, particularly the mechanical segments utilized as a part of this task, work are secured from mechanical fabricators, and they are not up to the prerequisite, parcel of adjustments must be completed in outline and is basic to make it a real working system. Hence, the machine is to be enhanced further for obtaining better results. The prototype module constructed for the demonstration purpose can be said as automatic, but it is not fully automated, to begin the process human involvement is required. After filling the container someone has to activate the start button, likewise many appropriate modifications are to be implemented to make it as fully automated.

The system designed here can be used for mining activities; the advantage of using this system is that the material collected from the mine can be transported directly to the surfaces of earth. The same system also can be used in big industries for carrying and accumulating huge raw material at one place. Generally at these places trippers are used, thereby man power is essential and in addition lot of fuel is required. Therefore this method is not proven economically; hence this system can be used for saving the man power and fuel.

REFERENCES

While designing and fabrication of this project work, we studied lot of material gathered from websites, consulted experts of various field. The information gathered from yahoo.com search Engine. Regarding micro controllers plenty of books are available, the following are the references made during design, development and fabrication of the project work.

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