

# Magnetically Propelled Warehousing, Courier and Same Hour Delivery System

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**Abstract**— This paper describes about an alternative Warehousing, Courier and Delivery System which will involve minimalist or almost no human involvement. The system is primarily designed to run on magnetic propulsion system called MegProp invented by Author. When in place, the warehousing will be completely automated with robots which will help deliver orders within an hour or minutes to customers. The System can be used as automated courier system for masses as well. The System is designed to utilize magnetic propulsion MegProp and Cities Sewerage System to complete the purpose. The paper also describe ways to maintain the System. Once in place. Not only can the System be used for Same Hour Delivery of products and automated courier. But other purposes such as waste management, Food delivery etc as well.

**Index Terms**— Magnetically Propelled, MegProp, Automated, Warehouse, Courier, Same Hour Delivery.

## 1 INTRODUCTION

ONLINE shopping has become an integral part of lives of people in the modern world. The major player in this arena are Amazon, Flipkart, Snapdeal etc. The industry is booming and has sprang up into multi billion dollar industry. These big companies majorly stack the products in their big warehouses housed around different parts of countries. People orders the order online. Then someone from warehouse packs and gets it ready for shipment. Then these products are dispatched through courier companies. And then it reaches the customer. The delivery time of products ranges from 2 days to many weeks. And then there are problems that even when the product is ready, the customer sometimes is at office or had plans and are not at home when delivery man arrives. Then delivery man again tries to deliver next day. This whole time consuming process is frustrating for the customer. That's why online shopping sometimes is not that enticing\lucrative for customer for stuffs which he can directly go and buy in store nearby in an hour.

To get past this problem all these online companies had been trying to find solutions so that delivery time can be reduced. These companies had been trying to find ways for same day delivery. But as most of the process of shipment, courier and delivery is manual, the time reduction if tried to be shortened will result in either need of more manpower which means higher cost or more stress on under-resourced staff. Higher cost or more stress on already stressed staff is not viable. That's why these companies are looking for robotic systems to reduce time and cost of delivery.

Amazon in 2012 acquired Kiva Systems for 775 million dollars. Kiva was a Massachusetts-based company that manufactured mobile robotic fulfillment systems so that warehousing can be automated. [1][2] This system has automated guided mobile robots which are guided by computerized barcode stickers on the floor. When robot reaches the goal it slides underneath, picks up by lifting it up and takes it to nearest human operator to complete rest of process.

As you see Kiva System still involves human intervention and picks up whole tray instead of specific item. Due to it the System is still inefficient because only few robots move and when they move they pick up whole tray. And then there is still

human involvement. The System although reduced the time very much but still has inefficiencies.

To get past it, MegProp [3][4][5][6] system is advised and explained below which can guarantee same hour delivery within the city. As it will not only make warehousing efficient but will automate shipment, courier and delivery process too. Plus it will also lower down the cost of delivery as well.

The subsequent points will describe the complete working of thought out System. But as the System is built on MegProp System. Let us first understand what Megprop system is all about.

## 2 BASIC PRINCIPLE OF MEGPROP VEHICLE

Take two magnets and a sheet of cardboard. Place one magnet M1 above the sheet and one magnet M2 below. If you will move the magnet M2 the magnet M1 will also move. You can test it by placing a toy car with ferrous base above any cardboard. Place a magnet below the cardboard surface on which toy car is standing. Now if you will move magnet below the surface of cardboard, the toy car will also move along. This is the basic



Fig. 1 MegProp car concept through a permanent magnet. A car with ferrous base is above the tray. On the base of tray is permanent magnet. If permanent magnet is moved to any direction, the car also moves along.

principle of MegProp vehicle.

### 3 DETAILED WORKING OF MEGPROP VEHICLE

MegProp System was originally designed for automated autonomous transportation system. Below is an excerpt from one of its paper describing the System working for transportation.

#### 1. Figures

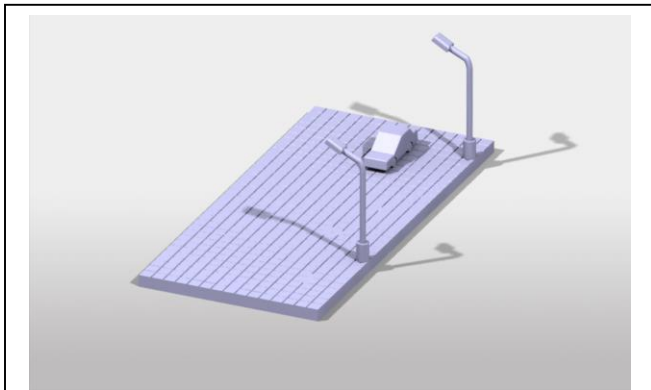


Fig. 2.

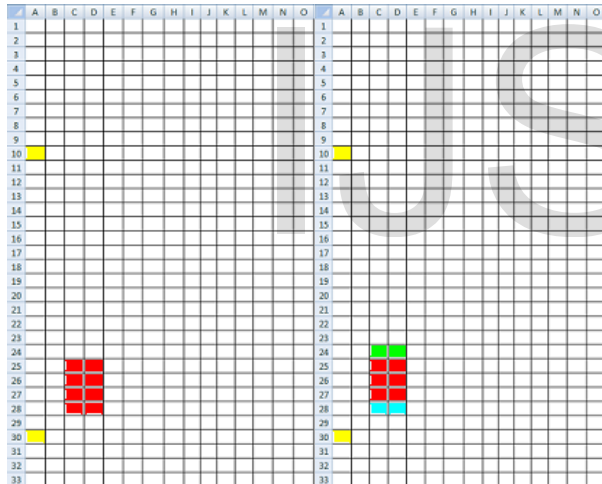


Fig. 3.

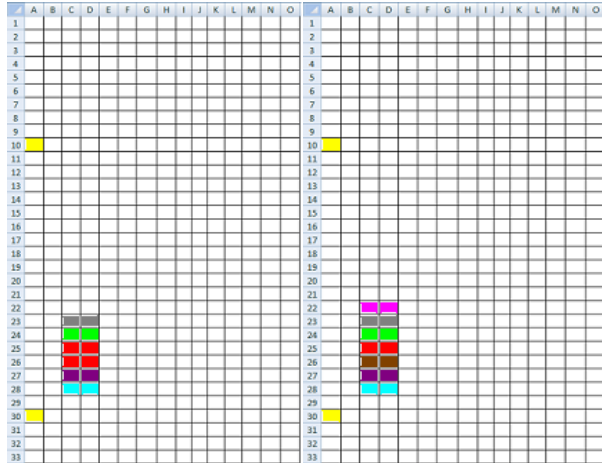


Fig. 5.

Fig. 4.

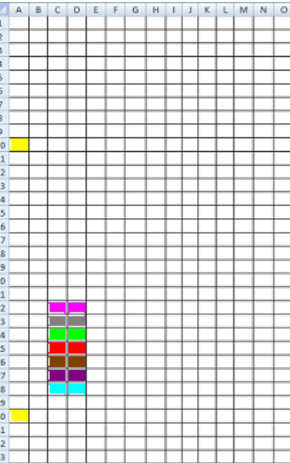


Fig. 6.

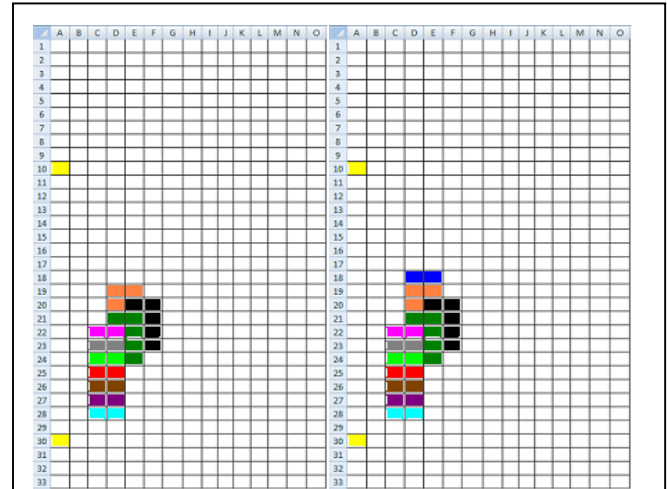


Fig. 7.

Fig. 8.

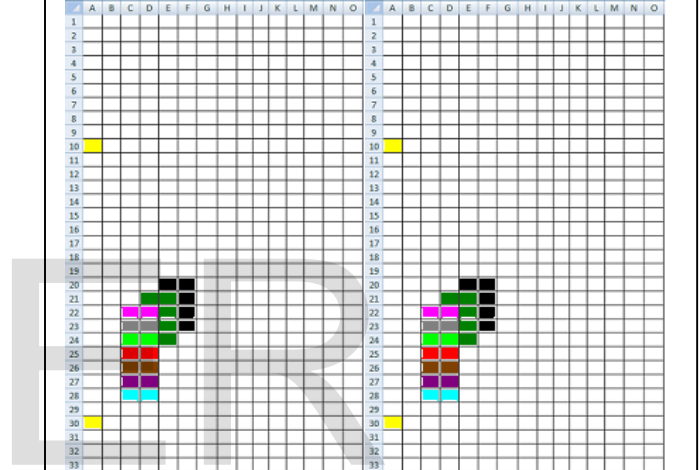


Fig. 9.

Fig. 10.

#### 2. Detailed Working Based on Figures.

1) FIG. 2: Figure shows isometric view of MegProp car vehicle resting stationary over road. Each box represents an electromagnet.

2) FIG. 3: Figure shows top view of the MegProp vehicle resting over array of electromagnets (road). Electromagnet boxes are arranged in an array. Box with no color represents an inactive electromagnet. The vehicle body is not shown. Only the area, which the vehicle will occupy, is shown in red color. The boxes with red color represent electromagnets which are active. The figure at present shows only section of road which can be extended to any length. For giving reference number to electromagnets, the column are marked as A,B,C etc and rows are marked as 1,2,3 etc. So B1 marks electromagnet in 2nd column and 1st row and so on. The column A here don't have any electromagnets but only BC2's (Box Controls), spaced 20 rows apart. Poles are being shown in figure with yellow colors. These BC2 takes instruction from central computing system and then gives instructions about which set of electromagnets to activate in the road. If CCS(Central Computing System) decides to move forward. The instruction of the CCS will be sent to BC2 which will in turn activate the magnets in front of vehicle and the ones

at the rear will be deactivated which will move the vehicle forward. In figure 3 vehicle is stationary (the vehicle is standing over area in color red) with electromagnet set (C25, D25, C26, D26, C27, D27, C28, D28) just below the vehicle marked in red color being active. Means electricity is flowing to them only and rest of electromagnets are not supplied with electricity.

3) FIG 4: To move forward CCS via BC2 will activate two electromagnets(C24, D24) in front and deactivates two electromagnets (C28, D28) in the rear. The active set of electromagnets is now (C24, D24, C25, D25, C26, D26, C27, D27). The time gap of activating electromagnets is defined by the velocity which CCS decides to be given to the vehicle. The more rapid the electromagnets are activated the more fast the vehicle moves.

4) Fig. 5: Shows vehicle still moving forward. The active set now is (C23, D23, C24, D24, C25, D25, C26, D26) and (C27, D27) are now deactivated.

5) Fig. 6: Shows vehicle still moving forward. The active set now is (C22, D22, C23, D23, C24, D24, C25, D25) and (C26, D26) are now deactivated.

6) Fig. 7: CCS now decides to move vehicle slightly right while still moving forward. The set (D21, E21, D22, E22, D23, E23, D24, E24) is made active now while (C22, C23, C24, C25, D25) are deactivated.

7) Fig. 8: Now suppose CCS decides to move more right still while still moving forward. The set (E20, F20, E21, F21, E22, F22, E23, F23) is made active now while (D21, D22, D23, D24, E24) are deactivated.

8) Fig. 9: Here CCS decides to move left instead while still moving forward. The set (D19, E19, D20, E20, D21, E21, D22, E22) is made active now while (F20, F21, F22, F23, E23) are deactivated.

9) Fig. 10: CCS now decides to move forward only without moving left or right. So active set now made is (D18, E18, D19, E19, D20, E20, D21, E21) while (D22, E22) are deactivated.

So in this way vehicle can be maneuvered in any direction.

This system can be designed in whatsoever ways and can give traffic control options which are unimaginable until now. For example roads may have upside traffic having 3 rows on left and downside traffic of 3 rows on the right. But at present downside traffic is low and upside traffic is high. In such case 2 rows from right side of downside traffic can be added to upside traffic which is high. There's no need of any additional traffic management equipment as everything is computer managed. Although the track is costly but once build can last for long time. Also the traffic catering advantages it gives, with the rush it can manage, the comfort and hassle free advantage it gives makes it eligible for extra cost of track.

The MegProp vehicle system should preferably have spheres as wheels so that they can be maneuvered in any direction. The true MegProp vehicles may not need to carry any fuel or batteries.

#### 4 AUTOMATED WAREHOUSING WITH MEGPROP

Now as we are conversant with MegProp System. We can now describe how a fully automated Warehouse can work upon this idea.

Megprop Vehicles can not only run on floor but can travel

vertically, sideways or in inverted position as well. Plus vehicles can be just iron\ tin boxes with spherical wheels. Therefore we can have any number of vehicles which will not cost to create or maintain.

The idea is that each product will be stored in its own vehicle. The vehicle size may differ from suppose 1in X 1in up to any big size. These vehicle will in shape of iron boxes with spherical wheels and barcode to identify it.

Just at the time of storing, a human or machine may load the products into boxes depending upon product size, at the Entry door of warehouse. Once in warehouse, the Warehouse Computer will then determine its most suitable location to store and drive it to it by using MegProp. Because vehicle can move vertically, sideways and inverted so they can travel through floors and then up the racks and walls and then pack themselves in some group all controlled by computer.

Whenever needed, the Computer can guide the vehicle to the Exit door of the warehouse ready to be shipped.

This system will be ultra efficient because we won't have numbered robots. All products will be kind of robot itself, like a swarm, constantly arranging and rearranging themselves. Each product ready to be moved on command of order.

#### 5 AUTOMATED COURIER AND DELIVERY

After getting out of Warehouse, Courier and Delivery takes a big chunk of time slice of delivering the products. Making the experience frustrating for customers quite some time.

With Megprop we can automate the complete process with no human involvement. However this will involve creating an infrastructure. Let us see how.

There can be many ways to do it. But the author of this paper thinks the best way out of all is using the sewerage System for quick implementation.

The sewerage systems of cities are connected to all the offices and residences of the inhabitants of the city. And as it carries waste water, a big portion space of sewerage Pipes above waste water remains open and unused. We can utilize this space to house pipes which will have MegProp Systems. Orders may travel through these pipes to bottoms of Office building, residential building or house of Customer.

Now the problem is how to deliver them to Customer from bottom. For Office building and Residential Buildings we can have auto lockers stocked at basement of buildings. The locks of these lockers are supposed to be digital and are supposed to be controlled online. The orders of customers will be placed into these lockers from sewerage MegProp pipes. The customer will be given a numerical key and locker number as soon as he orders. When the order arrives, the customer will be notified. Then customer can go to basement, punch in the key into desired locker and pick its order.

For individual houses. There might be need for owners to install such lockers. Or Govt\Companies should install ones. And take commission for usage by different online companies.

#### 6 END-TO-END "SAME HOUR DELIVERY" PROCESS



## THAT IS THOUGHT OFF

Lets just once again explain how the whole process takes place and how it makes same hour delivery possible and how it minimizes human involvement and reduces the cost.

The various companies will be supplying their products for online retailing to companies like suppose Amazon which will have MegProp System installed. Amazon may ask these companies to supply product packed in Megprop Vehicles with a barcode. Or Amazon may themselves pack them and barcode them. Until only here can there be any manual process. As soon as these products in MegProp vehicle arrive at warehouse. The warehouse will send and store them at appropriate computer decided locations.

Now Customer may go online. Select any product and orders. As soon as Customer orders, he will be given a locker number and a numerical key. The selected product will immediately start its journey from warehouse. It will travel down the stacks and then out from warehouse directly to cities sewerage system MegProp Pipes. And from these pipes it will travel to Customers building base. There it will automatically get transferred to desired locker. The customer may then go to base-ment, open locker and get its parcel.

As there won't be any traffic in sewerage system so most probably it won't take more then hour for products even if customer is at far end of city. Plus as now there is almost no human involvement or need of any courier. The cost will be lowered to minimest as well.

## 7 SPACE USED IN SEWORAGE

As we know, Sewerage is used primarily for drainage. And they are usually built much bigger in size then what they accommodates so that in emergency situations like floods it can handle the situations. But if MegProp will utilize this space then it may create hindrance for such emergency use. So to resolve this issue, the MegProp pipe is supposed to have an openeable lid. In case of flood calamity, computer will halt the supply and open those lids so that the space that pipe occupied can be released for water to occupy.

## 8 OTHER SIMILAR SYSTEMS

We can think of many other ways of using MegProp System which will automate process so that order delivery time can be reduced. Like we can just automate Warehouse. Or instead of integrating with sewerage, we can think of integrating with cities Metro train systems which have some spaces empty a s clearance between train and tunnel walls. Many other configurations are also possible.

## 9 MAINTAINANCE OF SYSTEM

All System needs to be maintainable. MegProp System can be easily maintained. The System can be divided into chunks of Electromagnet groups. If suppose some or all electromagnets of such chunks becomes faulty, then the whole chunk can be designed to be easily replacable.

The System will be able to easily ascertain such route. And

will block that part of route. Because Sewerages are created in a web fashion. So an alternate routes can be easily determined by the System and used. To correct it we can then have a mechanic or we can have a travelling robot which is another Megprop vehicle. It will go to that place and replace that chunk with working one.

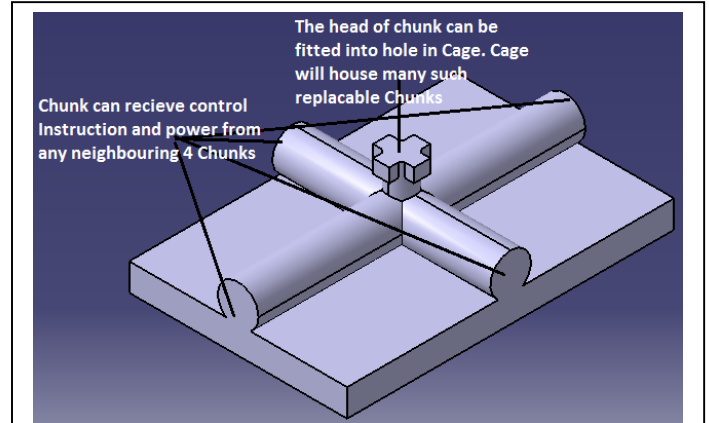


Fig. 11 Single Chunk of grouped Electromagnets. The Chunk can receive electricity and power from any neighbouring Chunk

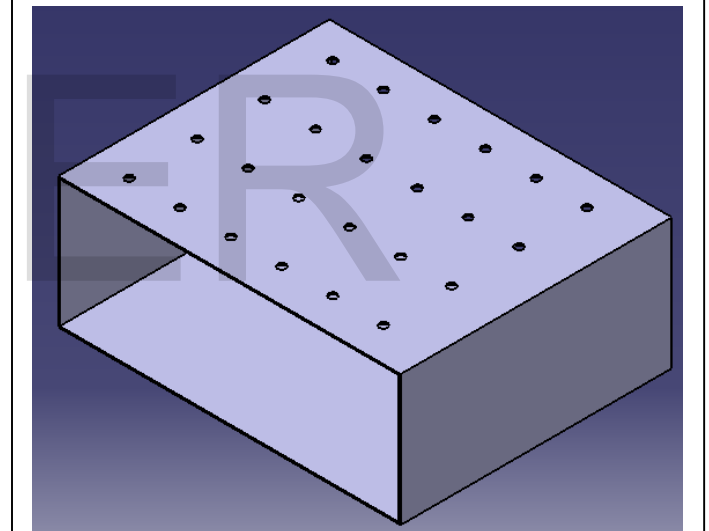


Fig. 12 Cage that will have holes as shown that will house Chunks in them.

And suppose that chunk stopped, that made the packet not deliverable anywhere and that vehicle has choked a route. Then MegProp System can easily identify such routes and packets with some controls. And then warehouse will send a replacement package immediately from alternate route to customer. And to correct choked route, system can again send a mechanic or robot to repair the chunk and remove\bring back the packet to remove the choke.

## 10 OTHER USES OF SYSTEM

Once the infrastructure is built in sewerages. The system can be used for other purposes as well. Like below:

- 1) People can use the system as courier. Suppose someone

need to pass on a gift or parcel to another person in city. He can purchase the courier online and then online system will assign it locker and key of a locker in his building or house. He will then place parcel in MegProp vehicle in that locker and the parcel will be sent. Or there can be interfaces on locker itself where person can feed in destination details and pay through credit card. The system will then deliver the parcel to intended destination and inform the recipient.

- 2) The System can be used for waste management. People can put waste in boxes and pack in Megprop vehicle to waste disposal facilities.
- 3) The system can be used to deliver groceries.
- 4) The System can boom up the restaurant business. People can order Pizza\Burger\Food etc online. The hot food will be immediately dispatched from nearest restaurant and delivered fresh.
- 5) People can sell off their old second hand stuffs online and deliver them through MegProp System.
- 6) The System can be used to send and receive Laundries.
- 7) The system can be used for medical purpose. Suppose someone needs to send his urine sample to Hospital. He can do it through this System.
- 8) The system can be used for automated delivering of Newspapers in the morning.

And there can be many other uses.

## 9 CONCLUSION

The Author has proposed a new System of Warehousing, Shipping, Courier and Delivery using magnetic propulsion called Megprop. The new System is supposed to give the best automation possible to online ordering using MegProp and sewerage System. And can help deliver the orders at same hour. Apart from it System can be used for automated courier delivery purpose as well. The system can be designed to be easily maintainable as well.

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