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Fabrication Of Farmer Friendly Agricutlure Machine

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Abstract*—The paper aims on the design, development and the fabrication of the vehicle which can dig the soil, sow the seeds, cutting grass, and pump to spray water, these whole systems of the vehicle works with the battery and motors the vehicle is controlled by wireless remote. In recent years the development of the autonomous vehicles in the agriculture has experienced increased interest. The advantages of these vehicles are hands-free and fast input operations. In the field of agricultural autonomous vehicle, a concept is been developed to investigate if multiple small autonomous machine could be more efficient than traditional large tractors and human forces. Keeping the above ideology in mind, a unit with the following feature is designed, Ploughing is one of the first steps in farming. During this process we till the land and make it ready for the seed sowing. By tilling we mean that a plough will be used which will have teeth's like structure at the end and will be able to turn the top layer of soil down and vice-versa. Seed sowing comes next where the seeds need to be put in ground at regular intervals and these needs to be controlled automatically. Limiting the flow of seeds from the seeds chamber is typically doing this. Soil leveler is fitted to close the seeds to the soil and to level the ground. Water pump is used to spray the water*.

I.INTRODUCTION

Modern agriculture depends heavily on engineering, technology and the biological and physical sciences. Irrigation, drainage, conservation and channelling are all important fields to guarantee success in agriculture and require the expertise of agricultural engineers. Agricultural chemistry deals with other issues vital to agriculture, such as the use of fertilizers, insecticides and fungicides, soil structure, analysis of agricultural products and the nutritional needs of farm animals. Plant breeding and genetics represents an invaluable contribution to agricultural productivity. Genetics has also introduced a scientific basis in animal husbandry. Hydroponics, a method in which plants thrive without soil by chemical nutrient solutions can solve other additional agricultural problems. The packaging, processing and marketing are closely related activities also influenced by the development of science. The methods of rapid freezing and dehydration have increased the markets for agricultural products. Mechanization, the outstanding feature of agriculture in the late nineteenth and twentieth century has relieved much the work of the farmer. Even more significantly, mechanization has increased efficiency and productivity of farms. Planes and helicopters are used for agriculture purposes, such as planting, transportation of perishable goods and fighting forest fires and crop fumigant to control insect pests and diseases. The radio and television transmit vital weather data and other information of interest to farmers. Modern agriculture depends heavily on engineering, technology and the biological and physical science Irrtagation drainage conversation and channelling are all important fields to guarantee success in agriculture and require the expertise of agriculture engineer Every machine is constructed for the purpose of performing certain mechanical operations, each of which supposes the existence of two other things besides the machine in question, namely, a moving power, and an object subject to the operation, which may be termed the work to be done. Machines, in fact, are interposed between the power and the work, for the purpose of adapting the one to the other.

II. LITERATURE SURVEY

Background nationally, most of the food we eat is produced by large Agricultural supply chains, which link farmers, seed suppliers, pesticide and Fertilizer suppliers, transporters, distributors, wholesalers and retail outlets. Currently, the United States harvests about 114.8 million acres of grain per year worth some $15 billion (USDA Census of Agriculture, 2007). On a number of Dimensions this scale of production is not sustainable. One of these issues is that $28 billion is spent by all the farms in the U.S. on chemical fertilizer alone, which is made primarily from nonrenewable resources including fossil fuels (USDA Census of Agriculture 2007). On an average farm in the United States, 107 gallons of fossil fuels per acre will be used, with one third of that going into the production of fertilizer (Pimentel, 2006). These chemical fertilizers, Pesticides, and herbicides end up either on our food or into our groundwater, Posing health risks to farm workers, nearby residents, and consumers(Groundwater, 2003). An alternative to these large and distant supply chains, And reliance on chemical fertilizers and other inputs, is to grow food, such as Grains, organically and closer to where it is consumed. Such interest in Encouraging local and regional agricultural production is evident in a number of Cities, such as Portland, Seattle, New York, Detroit and Philadelphia where Community gardens are burgeoning, farmers markets are expanding, urban Farmers are growing food on rooftops, vacant lots, in retrofitted warehouses, in Backyards, and new value chains that connect small and medium size growers To Markets are proliferating (Lovell, 2010). Even though there is a growing trend to produce local, fruits and vegetables in cities and on the periphery of urban Areas, local grain production remains limited. It is rare, for example, for locally Produced grains to be used even in small craft breweries since most breweries Buy malted barley from large malt houses in the Midwest at commodity prices; nor is locally grown grain typically found in farmers markets since farmers typically get greater profits from selling fruit and vegetables. One barrier to Expanding the market for locally produced grain is the lack of appropriate Machinery to harvest grain grown on a small scale (C. Stanley, personal Communication, 11/12/2011). While these small-scale grain harvesters exist in Europe and parts of Asia, farmers do not import this machinery into United States because of exorbitant transportation costs. To harvest IV grain, small-Scale farms either rent a combine harvester or use hand tools, such as a scythe or sickle (Pitter, 2010). Neither technology is suitable for small-scale grain Production. Combine harvesters are too large and

cumbersome for this scale, and would be next to impossible to maneuver in an urban farming Environment. Hand tools may work for less than a half an acre, but if there are multiple small Plots, it would be a very labor intensive and time consuming job. What is? Needed is an appropriately scaled machine that could be used by Growers to Reap and bind grain grown on a few acres. The goal of this project was to help Small-scale growers meet an increased demand for local grains by designing a Reaper-binder machine to harvest grains more efficiently. We Interviewed Small-Scale growers and agricultural engineers to identify the Current problems With Growing grains in New England, to learn about the types of machines currently Used to harvest grains, and to develop appropriate Design criteria for Our Product. Once we designed a three-dimensional Computer model, we worked with a three person review panel to refine our Ideas. With this design we hope to provide farmers with a means to harvest and bind grains on small Plots of Land and in broader terms develop urban and Small-scale agriculture. Findings our team determined that the best machine to Harvest a small scale Plot of Grain is a reaper binder that attaches to a two-Wheeled, walk behind Tractor. The basic steps taken in growing grains are Planting, harvesting, Binding, threshing, cleaning, and milling. The machine we Designed handles the Harvesting and binding aspects of farming grain. Through Our interviews, we found that developing an attachment for a two-wheeled Tractor would be the most practical solution. This would provide farmers with a Simple platform that only requires farmers to purchase the necessary

Attachments. Based on our Interviews with our sponsor and Joel Detour, we assumed that most Commercial farmers would be willing to spend up to $8,000 Dollars for a Machine to harvest grains (J. Detour, personal communications, and 11/10/2011). Subtracting the cost of the base tractor, which has a minimum Price of $1,587 and a maximum of $5,899, we estimated the budget for Materials and labor would be about $6,500 or less for our attachment (see Appendix B: Cost Report). We came up with an initial design that used a sickle bar cutter and two Channels to feed the grain back to the binder. We then sent this design to our Review board that provided v feedback. This review board Included Andy Pressman, who is our sponsor for this project, Dorn Cox, an Innovative farmer From New Hampshire, and Joel Detour, who owns Earth Tools Inc., and sells BCS Tractors. After we received comments from our design Board, it was decided that we should start our design from the beginning again. For this redesign, we used the BCS 622 reaper binder as a base for our design in Order to eliminate some of the problems that we encountered when we were Utilizing the existing Sickle bar attachment. One of these problems was the Grain had to be diverted two separate ways because the existing sickle bar Mower's Body was in the Middle. Thus, the cut stalks of grain needed to go to the right and left of this Body. The first step our redesigned Machine will take in harvesting grains will be to cut the stalks of grain with the Use of oscillating Blades at the front of the machine. Once cut, the grain will be brought to the Center of the machine by finger-like appendages. These feeding Fingers will also be powered by the PTO output of the tractor and feed the stalks of grain into the middle of the binder to be bound. These fingers also serve the Purpose of Compacting the grain into the binder as well as keeping the stalks of Grain Upright. This way more grain will be bound in each bundle, thus increasing Efficiency. The feeders were designed so that one feeder would be at its center- Most position while the other would be at its furthest position away From the Center of the machine. This way, they reach the center of the binder at Alternating times, maximizing the amount of grain that can be brought and Compacted into the main channel. With this alternating movement, any Collisions would be avoided between the two feeder arms. The two Wheeled Tractor will be connected to the binder at the back left-hand side (Viewing the Machine from the front). The reason we chose this location for the Placement of The tractor was so the bound grain would fall and land to the left of the driver. If the tractor had been placed in the middle, the bundles of grain would need to be diverted to one side or the other after they were bound. This could potentially cause problems if the bundles were dropped into the uncut Stalks of Grain. With the design we created, the bundles of grain would fall in the center of the cutting path of the machine thus reducing the chances that the bundles of grain would fall into the uncut stalks. The binder mechanism for our design is located at the end of the channel. Before any grain reaches the Tying Mechanism, twine will be strung across the opening. The free end of the VI Twine is held on the tying side of the machine by a rotating disk. This piece Of Twine will hold the stalks of grain until there was enough to be bound. The Rotating twine clamp will be powered by a small motor that will be timed with the rest of the tying mechanism. The location of the arm is located at a position so the grain will not fall over as it is being bound. When the bundling area is filled to capacity, an arm that has the twine running inside it moves across the Channel and encompasses the stalks of grain with twine. This rod is powered by a slider and bar linkage driven by gears. At the other end, a mechanism would Tie and cut the twine, thus forming a complete bundle. This mechanism consists of a hook that rotates around and creates one loop of twine. At a point along the rotation, a jaw that is hinged on the hook, opens and then closes, grabbing the two ends of twine. There is a metal loop above the hook that is used to help create the loop. At the same time, a blade cuts the twine that was brought by The arm and held in place by the disk and the hook rotates, pushing the loop of Twine over the top of the two newly cut ends thus forming a knot. The tying Arm would then retract back to the other side, drawing the twine back and the Process would start all over again. The newly bound bundle will then be pushed off the back of the attachment by newly cut grain. Guards were placed on the Undercarriage of the binder in order to protect the gears and axles. Another Guard was placed in the channel to protect the rotating hook from catching any of the stalks of grain. This reduces the chances that debris will kick up and Damage the gears. We determined that this design satisfied most of our Parameters that we had specified. Conclusions and Recommendations From our Interviews with grain farmers and distributers, we learned that while there is no Suitable small-scale grain harvesting machines available to growers in the United States and there is an emerging need for a cost friendly machine that could efficiently harvest grains on a small-scale. There are a few different Potential end users that could benefit from our reaper binder. The first would be a current farmer who grosgrains on one to two acre plots. This could include multiple lots in need of portable equipment like our grain binder. Our product could also be used by urban farmers collectively. They could buy the reaper-Binder communally thereby reducing upfront costs. Vii Even though our project only focuses on the grain bundling aspect of small-scale grain growing, we Researched other

aspects as well. After grain is harvested, the threshing process can begin. Threshing is done to the bundles to remove the seeds from the chaff. This process is normally done by hand, which is a very inefficient, laborious Process. After talking with few of our contacts, we recommend buying or Building a small machine similar to John Howe's thresher/winnower device that He has created (Northern Grain Growers, 2011). This machine efficiently separates the seeds of the grain from the chaff by sending it over a screen with Force. The seeds fall through the holes in the screen. Once separated, the seeds can be processed further towards consumption. During our design process, There were some aspects that could have been further refined if we had more Time. Future research should focus on the timings for the tying mechanism and the tying arm. In our design, they are both driven off the feeder arm axle, which means the tying mechanism is moving constantly regardless of the amount of Stalks ready to be bundled. The design would be improved if the timing Mechanism only engaged when it was triggered by a full bundle. Another area that needs further research is the ability to cut grains at different height. Depending on the type of grains grown, the cutting height will vary. By designing a machine that can have variable cutting heights, a farmer will be able to grow a wider variety of grains. Most likely other small unknown issues would be found and fixed if a prototype were built and further time was spent on

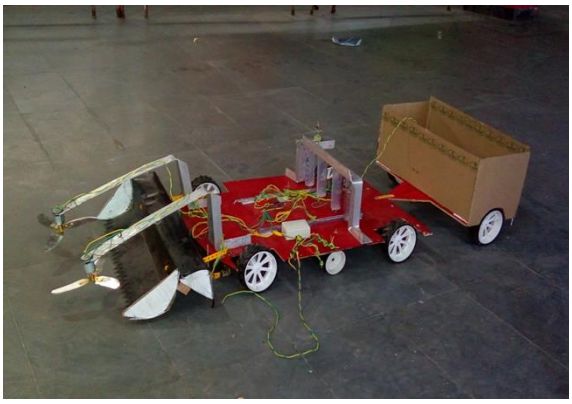
Design and testing. This was not able to be done due tithe time constraints of our project and lack of resources. Ideally, other designers will look at our model and determine a plan for the manufacturing of our design. After that, a Prototype will be built and tested to see if there are any issues that need to be worked out. After a couple iterations, we hope, the binder could then be sold in the market. Viii Contributions Christopher Boyle Chris was the primary writer of the conclusion chapter and wrote sections in the background and results. He also was one of the primary editors of the paper. Chris also provided feedback and help to the design process of our machine. Ian Kutras Ian was the designer behind both revisions of the reaper-binder design. He also wrote a large section of the results section, as well as sections in the background, methodology, and Introduction. He also was a primary editor of the paper. Ian also recorded Interviews as well as helped in our final presentation video. Christopher Mojica Chris wrote a large section in the background and methodology. He also edited Parts of the paper. Chris also contributed a lot tithe development of Presentations. He created and managed our website. Earl Ziegler Earl wrote Section in the introduction, background, and methodology. Heals edited parts of the paper. He contributed with the content for the presentations. Earl along With the rest of the team conducted personal interviews.

III.RESEARCH METHODOLOGY

The research begins with the planning, the planning consist of identifying the present problems in agriculture fields. collecting the raw materials for fabrication of the equipment. Fabrication of various components with different machining operations like cutting,welding,joining etc. after the completion of fabrication of different parts assembling the parts to ensure the final prototype of the project.

IV.OBJECTIVES

The objective of this paper is to present the status of the current trends and Implementation of Agricultural and autonomous systems and outline the Potential for future applications. Different applications of autonomous vehicles In agriculture have been examined and compared with conventional systems And are proved as efficient and effective.



V.WORKING

Hydraulic operation The power for motor is supplied by a Battery, A DC N20 Motor shaft is welded to a bolt, & a lead screw is also welded to a bolt, by this arrangement the rotary motion of the motor is converted into linear motion of the lead screw. As the cultivator is welded to the lead screw, it is lowered down, soil is dogged to 1.5 mm for one rotation since the lead screw pitch is of 1.5 mm, and the direction of motor rotation can be controlled by remote for up and down movement of the cultivator.

Seed sowing Seed sowing operation A ladle is used for Seed storage, We have provided hole to the hallow cylinder which is coupled to the DC motor shaft, where the funnel is placed above it, The DC motor is powered by a battery which is controlled using a remote, As the motor is switched on, the hallow cylinder tend to rotate which But our seeding process is to understand difficult. Because there different types of parts used in this mechanism. First the 100 rpm dc motor, and connecting rod, pulley and attach to the seeding rod.The storage of seed is stayed in upper and the lower pipe is to supply the seed in the soil. This process is work in last because first work is digging after then watering and last seeding process. Makes the seeds fall on the cultivated field making consistent gap between seeds.

Toggle switchSwitch The most familiar form of switch is a manually operated electromechanical device with one or more sets of electrical contacts, which are connected to external circuits. Each set of contacts can be in one of two states: either "closed" meaning the contacts are touching and electricity can flow between them, or "open", meaning the contacts are separated and the switch is no conducting. Mechanism actuating the transition between these two states (open or closed) can be either a "toggle" (flip switch for

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continuous "on" or "off") or “momentary” (push-for "on" or push-for "off") type. Leveler closes the soil in the sowed soil & levels the land.

A switch may be directly manipulated by a human as a control signal to a system, such as a computer keyboard button, or to control power flow in a circuit, such as a light switch. Switches may be operated by process variables such as pressure, temperature, flow, current, voltage, and force, acting as sensors in a process and used to automatically control a system. For example, a thermostat is a temperature-operated switch used to control a heating process. A switch that is operated by another electrical circuit is called a relay.

Digging Digging is the process of using some implement such as claws, hands or tools, to remove material from solid surface, usually solid or sand on the surface of the earth.To break up turn over or remove earth, sand etc., as with a shovel, spade, bulldozer or claw; make an excavation. To make one’s way or work by or as by removing or turning over material to dig through the files we worked in gangs of six digging and passing up the dirt into the night tubs.The boring company is currently only digging short preliminary tunnels in California in, many land, so there’s presumably not enough to start. A bad digging technique can double the load on the joints in the body and increase risk of osteoarthritis.

Leveling Leveling operation A Sheet metal Plate is used as mud closer and leveler, the long bolt and nut is used for leveler up & down movement. The Leveler is not powered, instead it is fixed to required level initially.

Water spraying operation The water pump basically used in watering to the garden and agriculture field .pour or sprinkle water over in order to encourage plant growth.to furnish water to as by streams supply with water as by irrigation. The valley is watered by branch of the Colorado River. Our land is watered by the all American canal. To dilute, weak en, soften, or adulterate with, or as with water .this mechanism used in this system and the watering to proposal time. The water pump used in mechanism and this motor is connect the storage of water jar. And sprinkle the water. A water container is used for water storage, a submersible pump is used for pumping water to the water sprayer. The water flows to the sprayer through pipe. The power for pump is supplied by a driver.

cutting blades Cutting blades specially used in cutting the grass. Our machine specially working for this .the sharp blade used this machinery .this mechanism the most important part is 12v high speed dc motor. Its cuts the different type of grass like that maize, wheat, barley, bamboo. First mechanism is used in the two cutting blade used in the machine. And two different dc motor attached .after then this dc motor is fix to ‘z’ type aluminum rod. Because the strong support is hold the cutting blade. The aluminum rod length is 60*4 cm .this aluminum rod is bending manually and made the shape z type. After then making whole to attach the dc motor to cutting blade. Finish this mechanism to attach the aluminum sheet in body machine.

VI. ADVANTAGES

Use of Natural Forces: Machinery has harnessed the forces of nature in the service of man. Man can fly in the air; he can send messages thousands of miles away; he generates electricity from waterfalls. All this he has done with the aid of machinery. For such jobs, the use of machinery is indispensable.

Heavy and Delicate Work: Tasks which are too heavy or too delicate for human muscles to do can be done easily by a machine. A crane can lift loads which man never can. No man can produce silk as fine and delicate as a spider’s web, but a machine can. Without the aid of machinery such jobs would not have been done.

Faster Work: While man can make only a few dozen pins in a day by himself, with the help of machinery he can make thousands. A charkha cannot spin as much yarn in a year as a spinning machine can in one day. We value machinery for the speed with which it works, and in the modern world speed matters the most.

More Accurate Work: No painter can paint exactly the same picture twice. But a machine can turn out thousands of identical articles. Production has thus been standardized. Only machines are capable of mass production.

Strain on: Human Muscles Relieved. The work of the laborer has become much lighter.-He has simply to press a knob, and lo! The machine starts working! Thus machinery has proved a great blessing to the workers.

Cheap Goods: The-use of machinery has resulted in large-scale production and has reduced costs to levels never dreamt of before. Thus cheap goods have been placed in the hands of consumers. A man of ordinary means can now enjoy goods and services which were not available even to a rich man in the past. Consequently the standard of living has risen.

Mobility of Labour: In most industries, the machines used are very similar. A worker, therefore, can easily move from one industry to another. This is helpful in relieving or preventing unemployment as well as finding better jobs.

More Employment: The introduction of machinery has created many new occupations. It has thus widened the scope of employment. In the long run, machinery creates more employment than displacing labour immediately.

Disagreeable Jobs: All dirty jobs can be done by machines. Human beings are thus relieved of all disagreeable and unpleasant jobs. What a great boon machinery is to the under-dog

VII. RESULTS

Following are the results outcome of the project under different time frame for the processes.

Time(in min) / process	digging	grass cutting	seeding
5 min	15 meter	15 meter	15 meter
10 min	22 meter	22 meter	22 meter
15 min	28 meter	28 meter	28 meter

Table.1 Results

VIII. CONCLUSION

The idea was to create a machine which is cheap and will reduce the labor required to cultivate crops. This machine has the capability and the economic Value for fulfilling the needs of farmers having small land holdings. This machine is cost effective and easy to maintain and repair for the Farmers.

Lack of mechanization in farming
Required excess efforts for different process.
Required more man power.
Excess time consumption for performing individual process.

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