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Seed Sowing Machine Using IOT

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ABSTRACT
All sowing machines should be suitable for all kinds of farms, all types of crops, and should be constructed robustly, as well as be reliable, this is a basic requirement for a sowing machine. In this way, we made a sowing machine that is operated manually while reducing the amount of work farmers have to do, thereby increasing the efficiency of planting and reducing problems associated with manual planting. We can plant seeds using this machine of different shapes, sizes, and spacings between two seeds. We are also able to plant more efficiently and accurately. Using raw materials, we made it inexpensive and easily usable by small farmers. In order for any farmer or untrained worker to handle the machine effectively, its design has been simplified. The adjusting and maintaining of the machine have been simplified as well.
Keywords:*. Seed, Motor, Battery, Sensors, Relay.*

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I. INTRODUCTION

India is agricultural country. And whose economic balance is based on farming. Development in farming increases economic level of country. In India farmers have to face lots of problem due to ineffective time consuming farming techniques, lack of labors which ultimately increases the cost of farming. This project is about to plant seeds and maintains proper distance between two seeds, spacing between two rows and planting seeds at proper depth of soil with appropriate soil compaction. As variety of seeds changes shape and size also changes which requires to change certain parameters like distance between two rows and two seeds as well as depth of the seed plantation. The main intention is to produce cost effective machine which will reduces cost as well as time of plantation and enhances overall productivity. Conventional way of farming based on consideration of seed to seed distance level of seed plantation which is highly ineffective, time consuming and besides of this it's require lots of efforts Farmers are facing one more serious problem because of different harmful pests and insects. Farmers use conventional way of pesticide spraying by carrying the heavy pump on their back throughout the field which requires lots of efforts and time. This machine use as seed planter machine along with turmeric harvesting machine.

II. METHODOLOGY

Existing Methodology.
In previous method the seed sowing and harvesting process are done in separate machine or by manually. So it takes time consumption and labour time for harvesting.

Proposed Methodology.
The main objective of the project is to combine the two activities in a single robot. So we likely to introduce an autonomous robot for doing the combined process seed sowing and harvesting. We also used rack and pinion mechanism for the wheel movement .

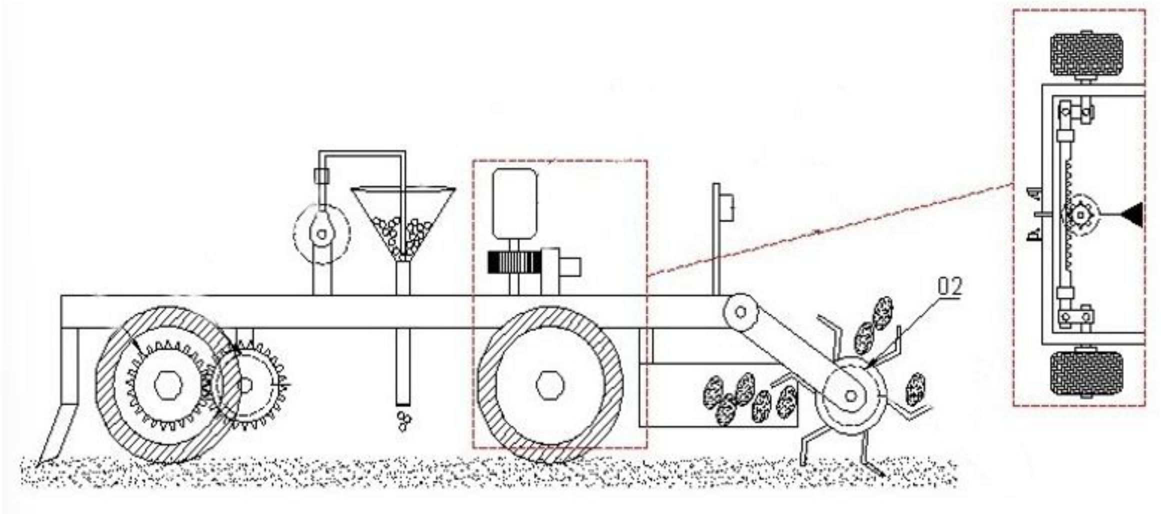

Fig : DESIGNING OF PROPOSED SYSTEM

III. MODELING AND ANALYSIS

Here were mounting the all components on the base frame. In the front of the frame were making the ploughing arrangement to collect the materials like turmeric's and collected in the box. In the middle of the frame were attaching the seed sowing arrangements to put the seeds on the land by using the cam disc & the hopper. The ultrasonic sensor is used to detect the objects in front of the vehicle for the safety precautions. There are two motors used in this robot to drive the vehicle and the another one is to steer to the robot.

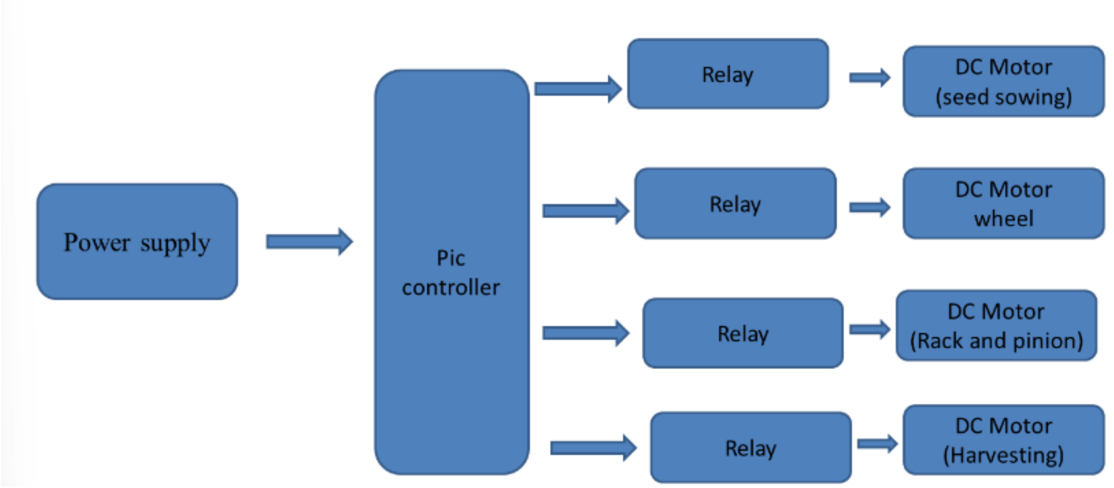

Figure3.1: Electrical design layout

Microcontrollers are destined to play an increasingly important role in revolutionizing various industries and influencing our day to day life more strongly than one can imagine. Since its emergence in the early 1980's the microcontroller has been recognized as a general purpose building block for intelligent digital systems. It is finding using diverse area, starting from simple children's toys to highly complex spacecraft. Because of its versatility and many advantages, the application domain has spread in all conceivable directions, making it ubiquitous. As a consequence, it has generate a great deal of interest and enthusiasm among students, teachers and practicing engineers, creating an acute education need for imparting the knowledge of microcontroller based system design and development. It identifies the vital features responsible for their tremendous impact; the acute educational need created by them and provides a glimpse of the major application area.

A microcontroller is a complete microprocessor system built on a single IC. Microcontrollers were developed to meet a need for microprocessors to be put into low cost products. Building a complete microprocessor system on a single chip substantially reduces the cost of building simple products, which use the microprocessor's power to implement their function, because the microprocessor is a natural way to implement many products. This means the idea of using a microprocessor for low cost products comes up often. But the typical 8-bit microprocessor based system, such as one using a Z80 and 8085 is expensive. Both 8085 and Z80 system need some additional circuits to make a microprocessor system. Each part carries costs of money. Even though a product design may require only very simple system, the parts needed to make this system as a low cost product. To solve this problem microprocessor system is implemented with a single chip microcontroller. This could be called microcomputer, as all the major parts are in the IC. Most frequently they are called microcontroller because they are used they are used to perform control functions. The microcontroller contains full implementation of a standard MICROPROCESSOR, ROM, RAM, I/0, CLOCK, TIMERS, and also SERIAL PORTS. Microcontroller also called "system on a chip" or "single chip microprocessor system" or "computer on a chip". A microcontroller is a Computer-On-A-Chip, or, if you prefer, a single-chip computer. Micro suggests that the device is small, and controller tells you that the device' might be used to control objects, processes, or events. Another term to describe a microcontroller is embedded controller, because the microcontroller and its support circuits are often built into, or embedded in, the devices they control. Today microcontrollers are very commonly used in wide variety of intelligent products. For example most personal computers keyboards and implemented with a microcontroller. It replaces Scanning, Debounce, Matrix Decoding, and Serial transmission circuits. Many low cost products, such as Toys, Electric Drills, Microwave Ovens, VCR and a host of other consumer and industrial products are based on microcontrollers.

Microcontroller is a general purpose device, which integrates a number of the components of a microprocessor system on to single chip. It has inbuilt CPU, memory and peripherals to make it as a mini computer. A microcontroller combines on to the same microchip:

- The CPU core
- Memory(both ROM and RAM)
- Some parallel digital i/o

Microcontrollers will combine other devices such as:

- A timer module to allow the microcontroller to perform tasks for certain time periods.
- A serial I/O port to allow data to flow between the controller and other devices such as a PIC or another microcontroller.

An ADC to allow the microcontroller to accept analogue input data for processing.

PIC is a Peripheral Interface Microcontroller which was developed in the year 1993 by the General Instruments Microcontrollers. It is controlled by software and programmed in such a way that it performs different tasks and controls a generation line. PIC microcontrollers are used in different new applications such as smart phones, audio accessories and advanced medical devices. There are many PICs available in the market ranging from PIC16F84 to PIC16C84. These types of PICs are affordable flash PICs. Microchip has recently introduced flash chips with different types, such as 16F628, 16F877 and 18F452. The 16F877 costs twice the price of the old 16F84, but it is eight times more than the code size, with more RAM and much more I/O pins, a UART, A/D converter and a lot more features.

PIC MICROCONTROLLERS ARCHITECTURE:

The PIC microcontroller is based on RISC architecture. Its memory architecture follows the Harvard pattern of separate memories for program and data, with separate buses.

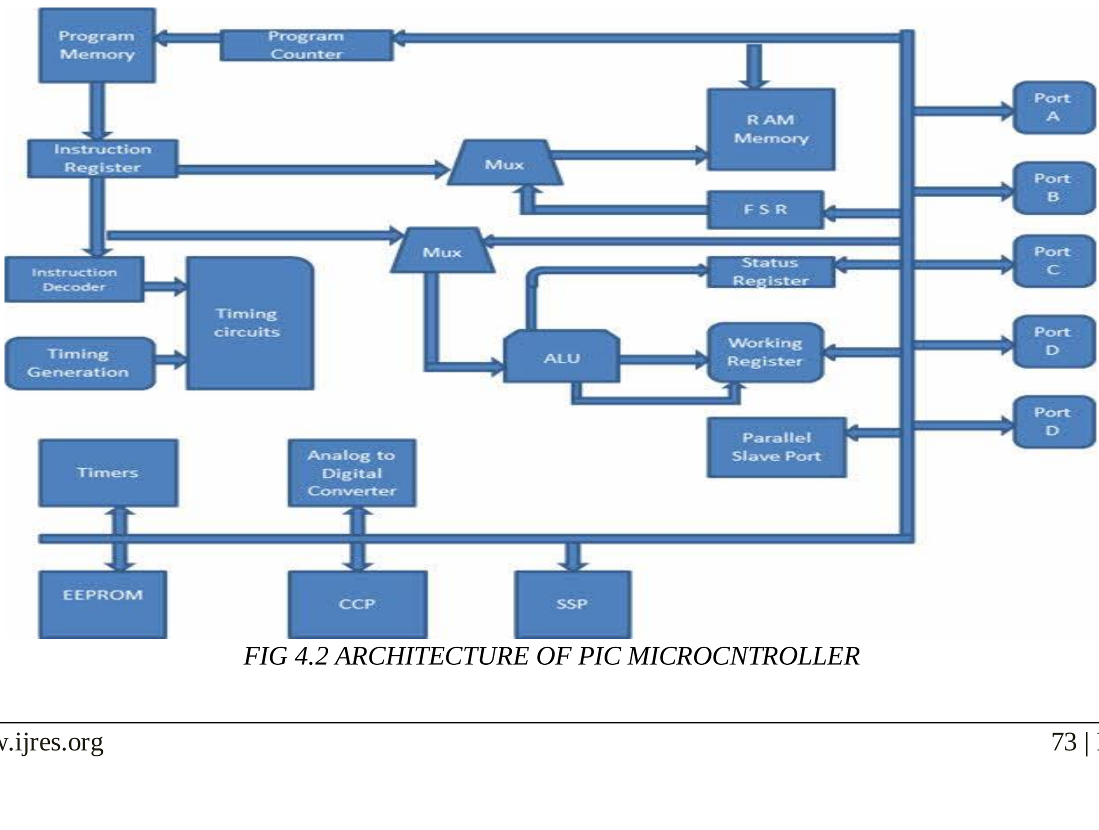

FIG 4.2 ARCHITECTURE OF PIC MICROCNTROLLER

We will use the International System of Units (SI). This is modern metric system that is officially accepted in electrical engineering in the USA. One of the most important laws of physics is the fundamental Ohm's Law.

It states that current through the conductor is directly proportional to applied voltage and is expressed as:

$I = V / R$

where I – current, measured in amperes (A); V – applied voltage, measured in volts (V); R – resistance, measured in ohms (Ω).

This formula could be used in many cases. You may calculate the resistance of your motor by measuring the consumed current and applied voltage. For any given resistance (in the motors it is basically the resistance of the coil) this formula explains that the current can be controlled by applied voltage.

The consumed electrical power of the motor is defined by the following formula:

$Pin = I * V$

where Pin – input power, measured in watts (W); I – current, measured in amperes (A); V – applied voltage, measured in volts (V).

Motors supposed to do some work and two important values define how powerful the motor is. It is motor speed and torque – the turning force of the motor. Output mechanical power of the motor could be calculated by using the following formula:

$Pout = \tau * \omega$

where Pout – output power, measured in watts (W); τ – torque, measured in Newton meters (N•m); ω – angular speed, measured in radians per second (rad/s).

It is easy to calculate angular speed if you know rotational speed of the motor in rpm:

$\omega = rpm * 2\pi / 60$

where ω – angular speed, measured in radians per second (rad/s) rpm – rotational speed in revolutions per minute; π – mathematical constant pi (3.14). 60 – number of seconds in a minute.

If the motor has 100% efficiency all electrical power is converted to mechanical energy. However such motors do not exist. Even precision made small industrial motors such as one we use as a generator in generator kit have maximum efficiency of 50-60%. Motors built from our kits usually have maximum efficiency of about 15% (see Experiments section on how we estimated this). Don't be disappointed with 15% maximum efficiency. All our kits are intended for education and not designed for real applications. This efficiency is not bad at all – it is actually much better than most of other self made designs on Internet can provide. The motors have enough torque and speed to do all kinds of experiments and calculations. Measuring the torque of the motor is a challenging task. It requires special expensive equipment. Therefore we suggest calculating it.

Efficiency of the motor is calculated as mechanical output power divided by electrical input power:

$E = Pout / Pin$

Therefore

$Pout = Pin * E$

After substitution we get

$T * \omega = I * V * E$

$T * rpm * 2\pi / 60 = I * V * E$

And the formula for calculating torque will be

$\tau = (I * V * E *60) / (rpm * 2\pi)$

Connect the motor to the load. Using the motor from generator kit is the best way to do it. Why do you need to connect the motor to the load? Well, if there is no load – there is no torque. Measure current, voltage and rpm. Now you can calculate the torque for this load at this speed assuming that you know efficiency of the motor. Our estimated 15% efficiency represents maximum efficiency of the motor which occurs only at a certain speed. Efficiency may be anywhere between zero and the maximum; in our example below 1000 rpm may not be the optimal speed so the for the sake of calculations you may use 10% efficiency (E = 0.1).

Example: speed is 1000 rpm, voltage is 6 Volts, and current is 220 mA (0.22 A):

$\tau = (0.22 * 6 * 0.1 * 60) / (1000 * 2 * 3.14) = 0.00126$ N•m

As the result is small usually it is expressed in milliNewton meters (mN•m). There is 1000 mN•m in 1 N•m, so the calculated torque is 1.26 mN•m. It could be also converted further to still common gram force centimeters (g-cm) by multiplying the result by 10.2, i.e. the torque is 12.86 g-cm.

In our example input electrical power of the motor is 0.22 A x 6 V = 1.32 W,

Output mechanical power is,

1000 rpm x 2 x 3.14 x 0.00126 N•m / 60 = 0.132 W.

Motor torque changes with the speed. At no load you have maximum speed and zero torque. Load adds mechanical resistance. The motor starts to consume more current to overcome this resistance and the speed decreases. If you increase the load at some point motor stops (this is called stall). When it occurs the torque is at maximum and it is called stall torque. While it is hard to measure stall torque without special tools you can find this value by plotting speed-torque graph. You need to take at least two measurements with different loads to find the stall torque. How accurate is the torque calculation? While voltage, current and speed could be accurately measured, efficiency of the motor may not be correct. It depends on the accuracy of your assembly, sensor position, friction, alignment of the motor and generator axles etc. If you want to get meaningful numbers you might use a second generator kit as explained in Torque and Efficiency Calculation section. Speed, torque, power and efficiency of the motors are not constant values. Usually the manufacturer provides the following data in a table like this one Also the manufacturers usually provide power curves for the motor at nominal voltage: These curves are generated by plotting motor speed, consumed current, and efficiency as functions of the motor torque. Sometimes there might be also a curve representing mechanical output power.

As you can see from the graph speed and current are linear functions of torque so you might need only two measurements to draw these graphs. Efficiency and power will need more data. Usually for small motors maximum power is at 50% of stall torque (approximately 50% of no load speed). Maximum efficiency may be 10-30% of motor stall torque (70-90% of no load speed). While it is technically better to follow the same format and create similar curves for your motor it is not absolutely necessary for a good science project. You may take all measurements, calculate unknown values and plot the graphs where for example speed and torque are represented as functions of applied voltage or current etc.

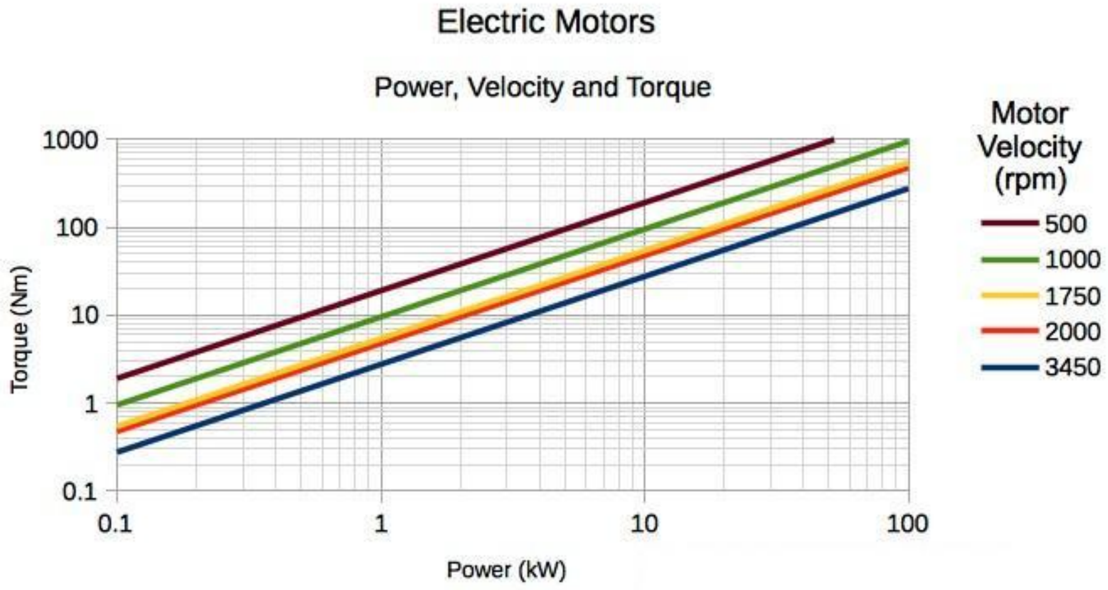

Fig 5.2.4.3(A) POWER VELOCITY AND TORQUE

Electrical Motor Power, Velocity and Torque Equations

Torque in Imperial units can be calculated as

$T_{inlb} = P_{hp}\ 63025 / n$ (1)

Where

T_{inlb} = torque (in lb_f)

P_{hp} = horsepower delivered by the electric motor (hp)

n = revolution per minute (rpm)

Alternatively

$T_{ftlb} = P_{hp}\ 5252 / n$ (1b)

Where

T_{ftlb} = torque (ft lb_f)

- *1 ft lb_f = 1.356 Nm*

Torque in SI units can be calculated as

$T_{Nm} = P_W\ 9.549 / n$ (2)

Where

T_{Nm} = torque (Nm)

P_W = power (watts)

n = revolution per minute (rpm)

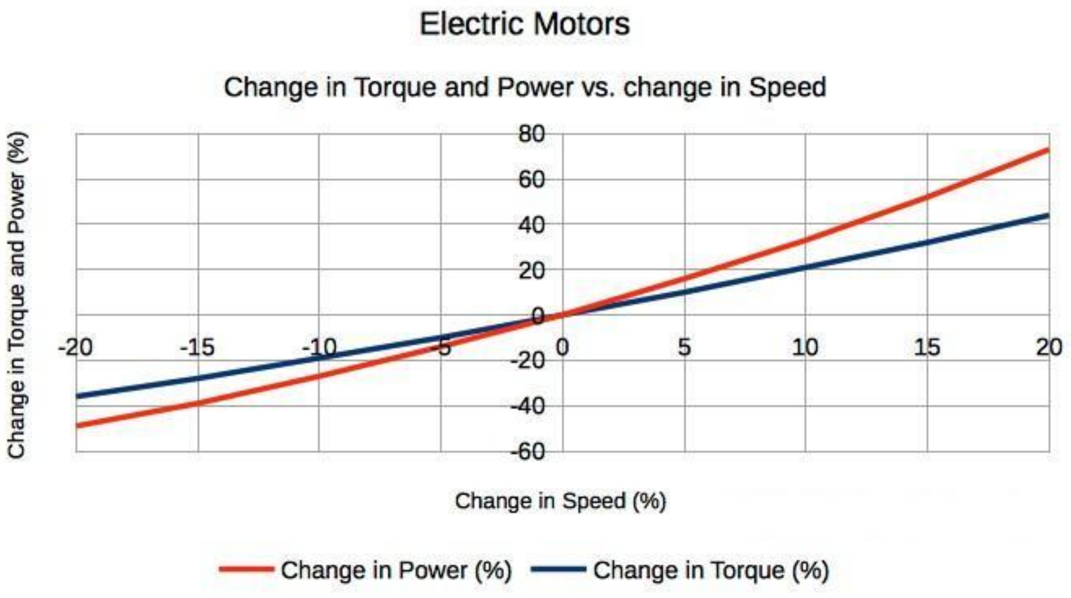

Fig 5.2.4.3(B) CHANGE IN TORQUE VS CHANGE IN SPEED

IV. RESULTS AND DISCUSSION

The results that we experienced while fabricating this project. We mainly concentrated on cost and power efficient project, we also obtained thee automation in the agriculture sector which results in the reduction of human effect. The robot cultivates the seed in quick succession of time and also results in cost efficient. We also able to achieve some of the following results from our project.

- We used only one controllers in our project hence the power consumption is nominal so, the power wastage is reduced.
- The budget of the project is very low and it can be marketed with high profit.

The results of the project are discussed in the simulation part. During the simulation we faced in the programming part and it was rectified through our literature survey. The whole prototype was able to be accomplished in a couple of months but the fabrication took longer. However we accomplished within the deadline and we are able to run test runs, error checks, etc. Finally the robot was manufactured with its full features.

V. CONCLUSION

Farmer's main problem was having to carry the entire pest load on their shoulders, a problem that this method can very efficiently solve. Improved planting efficiency, increase in crop yield and cropping reliability, uniform application of pesticides and fertilizers. By utilizing the mechanism of machines in agriculture, it is possible to improve agriculture processes like sowing seeds on ploughed soil and distributing fertilizer together.

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