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# Hybrid Electric Power Tiller for Agriculture Applications

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**ABSTRACT:** Agriculture has been an integral part of the human ecosystem. However, traditional farming methods require a lot of human effort and are very time-consuming. Farm tilling is one of the most labour intensive operations in agriculture. Manual tiling of fields is very strenuous task while tractors incur high capital along with heavy fuel consumption costs. This low-cost portable battery charged electric power tiller machine is a one-stop modern solution to enhance the conventional agriculture methods of farming, as it reduces the human effort, at a very negligible price using motorized tilling mechanism. The electric power tiller helps reduce the time and cost involved in tilling using a smart portable design thereby increasing the productivity and efficiency in agriculture.

**KEYWORDS-** Lead Lead Acid Battery, Relay, Starters, Motor, Engine, Plough, Chain Sprockets

## I.INTRODUCTION

Power tiller is also called as a single axle walking type tractor, though a seat is provided in some designs. Now-a-days some models of power tiller have an optional riding facility. Power tillers have been especially designed and developed for use on small or medium farms where four wheel tractors are not easily available. Although power tiller is mainly used for seedbed preparation in low land paddy fields. Power tiller is also used as a power source for other agricultural operations such as seed bed preparation, sowing and fertilizer application. Tillers are also useful in inter-culture in wide spaced row crops (more than 1.0 m row to row spacing) and harvesting of cereal crops under upland conditions including transportation of farm products and power source for stationary farm operations. Lightweight tillers are being used very recently. The most of the power tillers being manufactured in India is provided with a rear mounted powered rotary unit for giving forward movement as well as tillage operation. Special attention is necessary for maintaining such tillers. Power tillers occasionally termed as walking tractors or are sometimes called by other names such as single axle tractor, hand tractor, etc have been conceived as an equipment to prepare seedbeds with rotary tillers and for transportation. They have limitations in their use for traction work due to the low drawbar power per brake horsepower of the engine (Mandal and Maity, 2013). The two-wheel tractor with different attachments can accomplish many kinds of farm work like tillage, harvesting, planting and transportation. When a tillage implement is attached to a two-wheel tractor, it is called power-tiller. Two wheel tractors are categorized either as professional farm use tractors called agricultural tractors, or hobby-use tractors called garden tractors.

## II.EXISTING SYSTEM

This set-up involves visual inspection of the plant growth, manual irrigation of plants, turning ON and OFF the temperature controllers, manual spraying of the fertilizers and pesticides. It is time consuming, vulnerable to human error and hence less accurate and unreliable. **PARTIALLY AUTOMATED SET-UP:** This set-up is a combination of manual supervision and partial automation and is similar to manual set-up in most respects but it reduces the labour involved in terms of irrigating the set-up. **FULLY- AUTOMATED:** This is a sophisticated set-up which is well equipped to react to most of the climatic changes occurring inside the greenhouse.

It works on a feedback system which helps it to respond to the external stimulation efficiently. Although this set-up overcomes the problems caused due to human errors it is not completely automated and expensive. IV.



**PROBLEM DEFINITION** Complexity involved in monitoring climatic parameters like humidity, soil moisture, illumination, soil ph, temperature, etc.

### III.PROPOSED SYSTEM

Agriculture has been an integral part of the human ecosystem. However, traditional farming methods require a lot of human effort and are very time-consuming. Farm tilling is one of the most labor intensive operations in agriculture. Manual tilling of fields is very strenuous task while tractors incur high capital along with heavy fuel consumption costs. This low-cost portable battery charged electric power tiller machine is a one-stop modern solution to enhance the conventional agriculture methods of farming, as it reduces the human effort, at a very negligible price using motorized tilling mechanism. A switch provided on the handle is used to switch on off the machine. The machine makes use of a wheel with welded angles to provide efficient gripping on soil. The machine is driven by an electric motor which uses a sprocket chain arrangement to drive the pulling wheel. A battery is used to power the motor with a force capable of pulling the forks through soil. The 3 x cultivator forks allow for easy and narrow tilling exactly as needed for farming.

### IV.SOFTWARE DESCRIPTION

An embedded system is an application that contains at least one programmable computer (typically in the form of a microcontroller, a microprocessor or digital signal processor chip) and which is used by individuals who are, in the main, unaware that the system is computer-based. Looking around, we find ourselves to be surrounded by various types of embedded systems. Be it a digital camera or a mobile phone or a washing machine, all of them has some kind of processor functioning inside it. Associated with each processor is the embedded software. were used to check correct execution of the program. Some 'very fortunate' developers had In-circuit Simulators If hardware forms the body of an embedded system, embedded processor acts as the brain, and embedded software forms its soul. It is the embedded software which primarily governs the functioning of embedded systems.

During infancy years of microprocessor based systems, programs were developed using assemblers and fused into the EPROMs. There used to be no mechanism to find what the program was doing. LEDs, switches, etc. were used to check correct execution of the program. Some 'very fortunate' developers had In-circuit Simulators (ICEs), but they were too costly and were not quite reliable as well. It is the embedded software which primarily governs the functioning of embedded systems. As time progressed, use of microprocessor-specific assembly-only as the programming language reduced and embedded systems moved onto C as the embedded programming language of choice. C is the most widely used programming language for embedded processors/controllers. Assembly is also used but mainly to implement those portions of the code where very high timing accuracy, code size efficiency, etc. are prime requirements.

Initially C was developed by Kernighan and Ritchie to fit into the space of 8K and to write (portable) operating systems. Originally it was implemented on UNIX operating systems. As it was intended for operating systems development, it can manipulate memory addresses. Also, it allowed programmers to write very compact codes. This has given it the reputation as the language of choice for hackers too. As assembly language programs are specific to a processor, assembly language didn't offer portability across systems. To overcome this disadvantage, several high level languages, including C, came up. Some other languages like PLM, Modula-2, Pascal, etc. also came but couldn't find wide acceptance. Amongst those, C got wide acceptance for not only embedded systems, but also for desktop applications. Even though C might have lost its sheen as mainstream language for general purpose applications, it still is having a strong-hold in embedded programming. Due to the wide acceptance of C in the embedded systems, various kinds of support tools like compilers & cross-compilers, ICE, etc. came up and all this facilitated development of embedded systems using C. Subsequent sections will discuss what is Embedded C, features of C language, similarities and difference between C and embedded C, and features of embedded C programming.

Embedded systems programming is different from developing applications on a desktop computers. Key characteristics of an embedded system, when compared to PCs, are as follows. Embedded devices have resource constraints (limited ROM, limited RAM, limited stack space, less processing power) Components used in embedded system and PCs are different; embedded systems typically uses smaller, less power consuming components. Embedded systems are more tied to the hardware. Two salient features of Embedded Programming are code speed and code



size. Code speed is governed by the processing power, timing constraints, whereas code size is governed by available program memory and use of programming language. Goal of embedded system programming is to get maximum features in minimum space and minimum time.

Embedded systems are programmed using different type of language

- Machine Code
- Low level language, i.e., assembly
- High level language like C, C++, Java, Ada, etc.
- Application level language like Visual Basic, scripts, Access, etc.

Assembly language maps mnemonic words with the binary machine codes that the processor uses to code the instructions. Assembly language seems to be an obvious choice for programming embedded devices. However, use of assembly language is restricted to developing efficient codes in terms of size and speed. Also, assembly codes lead to higher software development costs and code portability is not there. Developing small codes are not much of a problem, but large programs/projects become increasingly difficult to manage in assembly language. Finding good assembly programmers has also become difficult nowadays. Hence high level languages are preferred for embedded systems programming.

Use of C in embedded systems is driven by following advantages it is small and reasonably simpler to learn, understand, program and debug. C Compilers are available for almost all embedded devices in use today, and there is a large pool of experienced C programmers. Unlike assembly, C has advantage of processor-independence and is not specific to any particular microprocessor/ microcontroller or any system. This makes it convenient for a user to develop programs that can run on most of the systems. As C combines functionality of assembly language and features of high level languages, C is treated as a 'middle-level computer language' or 'high level assembly language'. It is fairly efficient. It supports access to I/O and provides ease of management of large embedded projects.

Many of these advantages are offered by other languages also, but what sets C apart from others like Pascal, FORTRAN, etc. is the fact that it is a middle level language; it provides direct hardware control without sacrificing benefits of high level languages. Compared to other high level languages, C offers more flexibility because C is relatively small, structured language; it supports low-level bit-wise data manipulation. Compared to assembly language, C Code written is more reliable and scalable, more portable between different platforms (with some changes). Moreover, programs developed in C are much easier to understand, maintain and debug. Also, as they can be developed more quickly, codes written in C offers better productivity. C is based on the philosophy 'programmers know what they are doing'; only the intentions are to be stated explicitly. It is easier to write good code in C & convert it to an efficient assembly code (using high quality compilers) rather than writing an efficient code in assembly itself. Benefits of assembly language programming over C are negligible when we compare the ease with which C programs are developed by programmers.

Objected oriented language, C++ is not apt for developing efficient programs in resource constrained environments like embedded devices. Virtual functions & exception handling of C++ are some specific features that are not efficient in terms of space and speed in embedded systems. Sometimes C++ is used only with very few features, very much as C. Ada, also an object-oriented language, is different than C++. Originally designed by the U.S. DOD, it didn't gain popularity despite being accepted as an international standard twice (Ada83 and Ada95). However, Ada language has many features that would simplify embedded software development.

## V.HARDWARE DESCRIPTION



**Fig.1. Hardware Setup**

### LEAD ACID BATTERY:

The lead–acid battery was developed in 1859 by French Physicist Gaston planet and is the most established kind of Rechargeable battery. In spite of having a low vitality to weight Proportion and a low vitality to-volume proportion, its capacity to supply high surge streams implies that the Cells have a moderately extensive energy to-weight Proportion. As they are cheap contrasted with more up to date advancements, lead– acid batteries are generally utilized notwithstanding when surge current is not vital and different plans could give higher vitality densities.

### MOTOR

A DC motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

### PLOUGH

A plough or plow is a farm tool for loosening or turning the soil before sowing seed or planting.<sup>[1]</sup> Ploughs were traditionally drawn by oxen and horses, but in modern farms are drawn by tractors. A plough may have a wooden, iron or steel frame, with a blade attached to cut and loosen the soil. It has been fundamental to farming for most of history.<sup>[2]</sup> The earliest ploughs had no wheels; such a plough was known to the Romans as an aratrum. Celtic peoples first came to use wheeled ploughs in the Roman era.

## VI.CONCLUSION

Now a day's every where a common technology will be used but in this type of agricultural research study it will be something different result provide by using this multifunctional robot. In this study has group out a vision of how aspects of crop generation could be automated one. Although exist manned operations can be sufficient over big area there is a potential for decreasing the scale of remedy with autonomous robots that may result in even higher capable & efficient. Factors such as timesaving, efficient input application, transportation of farm inputs and produce, and reducing drudgery also stimulate demand for farm machines. The development and mass production of multi-utility mechanized devices to suit the requirements of farmers important for the growth of mechanization in India. Power tiller is a prime mover in which direction of travel and its control for field operation is performed by the operator walking



behind it. Power tiller is preferred in small land holding farmer for all farm operations like puddling and preparatory tillage. The manufacturer process may be raising but the overall concept requires a paradigm shift in the way we think about mechanisation for crop production that is based more on plant needs and novel ways of encounter them rather than developed existing methodology & technology.

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