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Design and Development of Digital Seed Counter and Seed Blockage Detector in Mechanical Seed Planter

Prof. Angha Ekbote[1], Kalyani Deshpande[2], Jasmin Mulla[3]

Assistant Professor, Dept. of E&TC Engg, PCCOE, Pune, India[1]

Dept. of E&TC Engg, PCCOE, Pune, India [2, 3]

ABSTRACT: As we all know India is the nation of agriculture and farmers being the backbone of India are constantly in need of seeds for harvesting and cultivating. The existing type of seed measuring system involves the weighing the seeds approximately and packing them or processing them. So the focus of the project is on building a system which could tackle the problem of inaccurate seed measurement and counter the accurate number of seeds. For this purpose IR sensor based counting system which would operate the belt conveyor after certain number of grains/seeds falls in the box and the next box comes into the cycle. This circuit is configured using a microcontroller and a counter display LED for displaying the counts. The present review provides brief information about the various types of innovations done in seed sowing equipment's. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing, seed rate, seed to seed spacing and depth of seed placement vary from crop to crop and for different agro-climatic conditions to achieve optimum yields. Seed sowing devices plays a wide role in agriculture field.

KEYWORDS: AVR controller, Seed Counting, TSOP Sensor.

I.INTRODUCTION

India is an agricultural country; most of rural populations depend on agriculture to earn their livelihood. The farmers are in need of seeds for ploughing & cultivation. Our project deals with providing accurate seed measuring machine with affordable cost and high efficiency. It consists of different mechanisms for counting the seeds from the feeder and for transporting them. The complete process is controlled using a micro controller and performs all the operations in a sequence. It is actuated by motors, Rotational disc for seed flow, counter for counting specific amount of seeds and a timer for operating different operations accurately without harming the seeds. Aimed at increasing the productivity and reducing the labour involved. The operation starts when the seeds are poured into the feeder & the Rotational disc is activated, creating a clean flow of the seeds into the pipe without obstructions and then the seeds coming out are counted.

II.LITERATURE SURVEY

This paper [1] has described the accurate seed measuring machine with affordable cost and high efficiency. It consists of different mechanisms for separating & counting the seeds from the feeder and for transporting them. The complete process is controlled using a micro controller and performs all the operations in a sequence. It is actuated by motors, vibrato for seed flow, counter for counting specific amount of seeds and a timer for operating different operations accurately without harming the seeds. Aimed at increasing the productivity and reducing the labour involved, this device/machine is designed to execute the basic functions required to be carried out in the seed packaging industries. The operation starts when the seeds are poured into the feeder & the vibrator circuit is activated, creating a

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clean flow of the seeds into the pipe without obstructions and then the seeds coming out are counted & the for specific number of seeds the nozzle is blocked and the transport system is operated bring the next collecting box into the nozzle field. This project has advantage that sensing and counting the seed is accurate.

The system described in this paper [2] uses a photosensitive detector and a vacuum pickup to count individual seeds and gives a direct digital read-out. The count rate is limited only by how quickly the seeds can be fed through the counting tube without clogging it or having them touch each other. The instrument described in this paper counts seeds at a rate limited only by the capacity of the count tube and the necessity to have seeds spaced so that there is some distance between them as they travel through the tube. It eliminates operator error, reduces operator fatigue, and gives a direct digital readout. So, this system deals with analysing and controlling the number of seeds.

This seed delivery system [3] is used in a seeding or planting machine that removes the seed from a seed meter by capturing the seed there from. The delivery system then moves the seed down to a lower discharge point and accelerates the seed horizontally rearward to a speed approximately equal to the forward travel speed of the seeding machine such that the seed, when discharged has a low or zero horizontal velocity relative to the ground. Rolling of the seed in the trench is thus reduced. Furthermore, as the seed only has a short drop from the outlet to the bottom of the seed trench, the seed has little vertical speed to induce bounce. The delivery system uses a brush belt to capture, move and accelerate the seed. By capturing the seed and moving it from the meter to the discharge, the seed is held in place relative to other seeds and the planter row unit. As a result, the seeds are isolated from row unit dynamics thereby maintaining seed spacing. Thus, thisSeeding machine have a seed metering system and effective seed delivery system. This paper [4] describes the planter used in this research, was designed in agricultural machinery department at University of Tabriz. Its seed metering device is of vertical- roller type with 118 mm diameter. The planter was installed on the 11m long, 40 cm wide grease belt test ring. Results of their research indicated that an appropriate algorithm could be developed to detect seeds falling from seed planter using image processing.

III.PROPOSED METHODOLOGY

In this project all element interfaces with the controller. First step give the input to the controller through the button. Then controller scan button which button is pressed. Then IR sensor senses the rotation of the disc. Then display the count on the LCD. If it doesn't sense the disc rotation then buzzer is on.

3.1 Block Diagram:

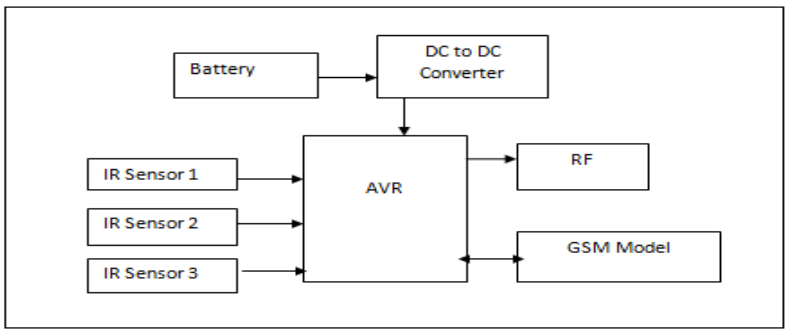

Fig 3.1.1 Block Diagram of Transmitter

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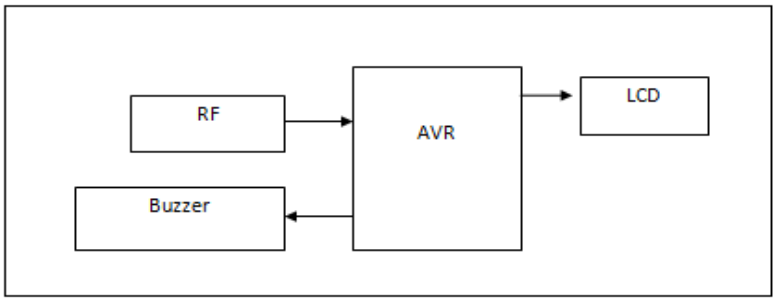

Fig 3.1.2 Block Diagram of Receiver

3.2Elements of Block Diagram:

1. ATmega328:-

The Atmel AVR core combines a rich instruction set with 32 general purpose working registers. All the32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

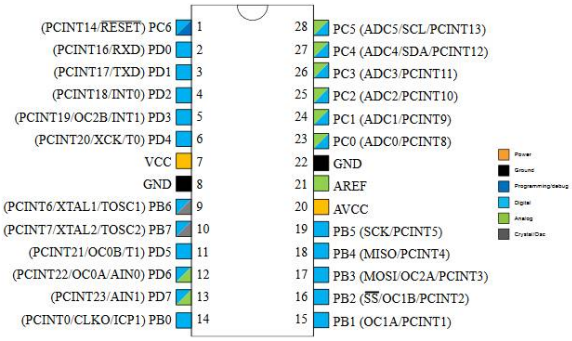

Fig 3.2.1:ATMega328

Features:

- High Performance, Low Power Atmel AVR 8-Bit Microcontroller Family.
- Advanced RISC Architecture 131 Powerful Instructions – Most Single Clock Cycle Execution.
- High Endurance Non-volatile Memory Segments 4KBytes of In-System Self-Programmable Flash program memory 1KBytes
- In-System Programming by On-chip Boot Program.
- True Read-While-Write Operation Programming Lock for Software Security
- Time Counter with Separate Oscillator Six PWM Channels 8 channel 10-bit ADC in TQFP and QFN/MLF package Temperature Measurement 6-channel 10-bit ADC in PDIP Package Temperature Measurement Programmable Serial USART Master/Slave SPI Serial Interface Byte-oriented 2-wire Serial Interface Programmable Watchdog Timer with Separate On-chip Oscillator On-chip Analogue Comparator Interrupt and Wake-up on
- Pin Change
- Special Microcontroller Features Power-on Reset and Programmable Brown-out Detection Internal Calibrated Oscillator External and Internal Interrupt Sources Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby

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- Operating Voltage: 1.8 - 5.5V.
- Temperature Range: -40 to 85 Deg C.
- Power Consumption at 1MHz, 1.8V, 25°C
  – Active Mode: 0.2mA
  – Power-down Mode: 0.1µA
  – Power-save Mode: 0.75µA (Including 32 kHz RTC

2. LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The LCD can work in two modes, 4-bit and 8-bit. Here, the 4-bit mode is used which uses only 4 data lines, thus saving pins of the microcontroller. So it is recommended to use LCD in four bits mode to save pins of microcontroller for other purpose. For this project, we have selected a 16×2 character, alphanumeric LCD.

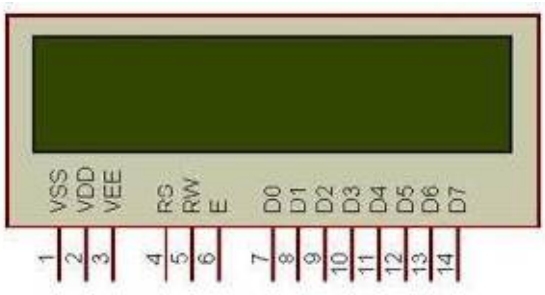

Fig 3.2.2: LCD

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controllingdisplay etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. It contains 2 rows of 16 characters.

Features:

- 16 character x 2 lines
- One controller LSI HD44780
- +5V single power supply

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3. Infrared Sensor:

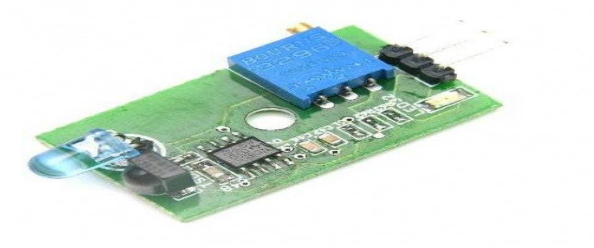

Fig 3.2.3: IR Sensor

TSOP 1738 is a member of IR remote control receiver series. This IR sensor module consists of a PIN diode and a pre amplifier which are embedded into a single package. The output of TSOP is active low and it gives +5V in off state. When IR waves, from a source, with a centre frequency of 38 kHz incident on it, its output goes low.

3. GSM Module:

GSM (Global System for Mobile communication) is a digital mobile telephony system. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA).

4. RF Module:

An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly.

IV. ADVANTAGES

This equipment can be used for sowing different types of seeds. It is helpful to give perfect counting of seed in hector. It is low cost system. It can be used in Mechanical seed planter, Seed Packaging as well as in Tablet counting.

V.CONCLUSION

Innovative Seed sowing equipment's has remarkable influence in agriculture. By using innovative seed sowing equipment's we can save more time required for seeding process. And also it reduces lot of laborer cost. It is very helpful for small scale formers. The seed counting device has been designed to carry out all the elementary functions in seed measuring and processing unit. It is expected that the system will operate effectively and dispensing accurate number of seeds. It is aimed at increasing the productivity and reducing the labor involved. The device performs the tasks like counting the seeds, dispensing them in the collector box, actuating the conveyor automatically in a sequence without human intervention. Thus an effort is made so that the device increases productivity and assists the seed packaging Industries. The design is accepted and unique compared to the existing measuring machine.

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