

## Applications of global positioning system (GPS) technology in precision farming and agriculture

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**Introduction:** GPS stands for global positioning system, gives us numerous data, which mainly consists of geographical latitude, longitude and altitude above mean sea level. The other peripheral observations could be object speed, no of satellites currently in the sky, time and date, etc. GPS is therefore mainly used for positioning some object on the earth with the help of satellites orbiting round the earth. The principle used in the GPS technology is the triangulation method and today the GPS modules available are very accurate and have a maximum error of 2 metres at any place on the earth. However, for more accurate measurements, the differential global positioning system (DGPS) can be used, where the existing GPS module is calibrated with the local station. Usually, there are approximately 20 satellites in the sky, of which only 3 satellites are needed for latitude and longitude values. In addition to the latitude and longitude, if a user wants the value of altitude, the minimum number of satellites needed increases to 4. Since, the no of satellites present are much

more than required, this technology becomes a feasible technology that can be used at all times. Also, it has an added advantage that there is no monthly or yearly fees for using the satellites. Above all, for getting the coordinates of any place or object with the help of GPS, all we need is a GPS module, that is available in the market at a very cheap price and a set of batteries to supply power to the module. No internet or any other external connection is required for operating the GPS module.

It has numerous applications across a wide range of industries. Now-a-days, it also has found an important place in precision farming and agriculture. It has great potential to solve agricultural related problems. Here, we will discuss the various GPS based applications in agriculture, due to the fact that this technology has not reached to the farmers at the expected ground level due to the lack of demonstration and awareness. It is used only up to research and academic level. Mean while, it has an ability to alter the way of performing various practices.

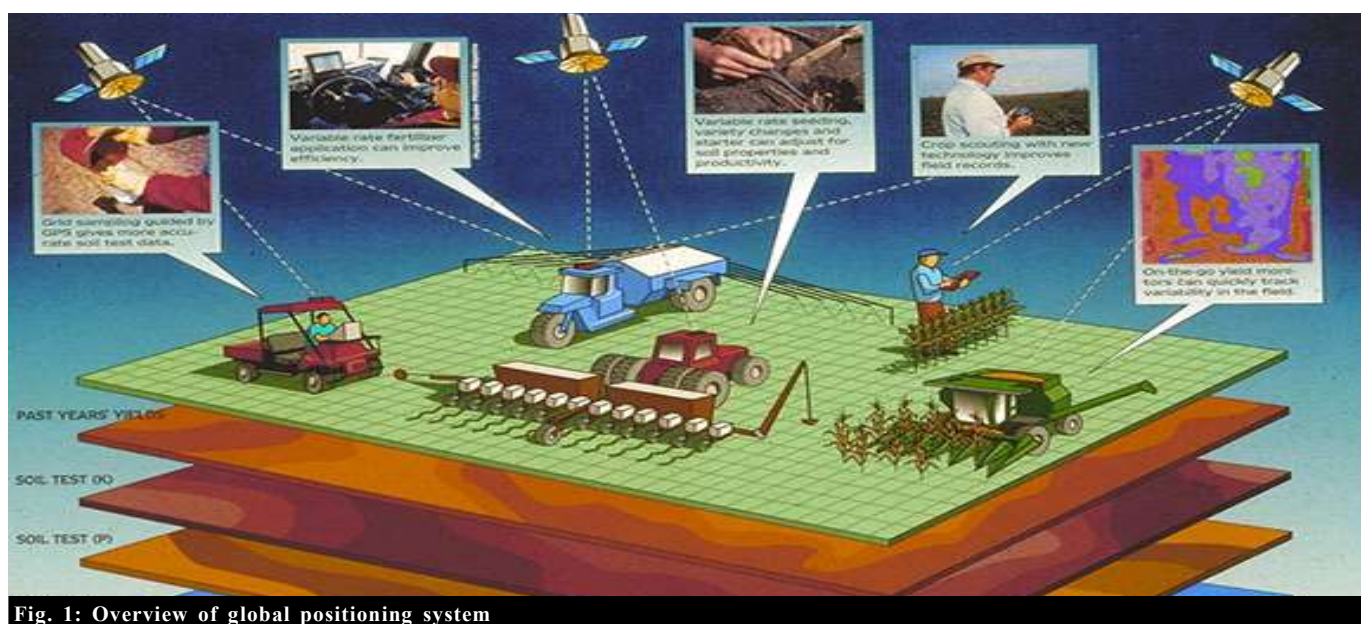


Fig. 1: Overview of global positioning system

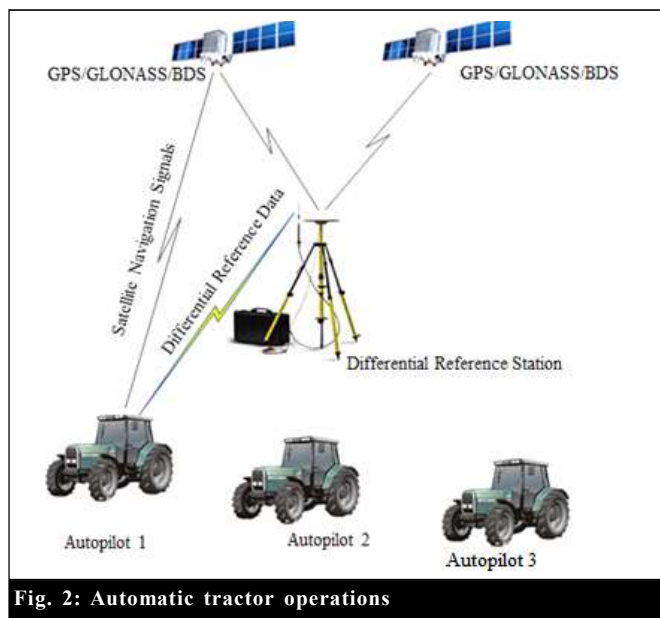


Fig. 2: Automatic tractor operations

**GPS applications in agriculture:**

*Identification of insect or disease infestation:* Insect pests don't attack uniformly across the entire field. Therefore, through the GPS system, farmer can be determine highly insect prone area or disease infected area in the field. Therefore, farmer can save their crop from the outbreak of insects or disease by treating only the infected area.

*Yield monitoring system:* The yield variations can be estimated across the field on the basis of the GPS technology. It will help the farmer to plan and decide the application rate of the fertilizer on the field for the next crop.

*Automatic tractor operations:* GPS technology allows farmers to set their tractors on auto-pilot mode through programming. Tractor will follow the same route through GPS system for field operations like for tillage, sowing, spraying, harvesting and fertilizer application. Therefore,

it will increase field capacity, efficiency and reduce the problem of overlapping. In this way, GPS based tractor will save money by decreasing the fuel consumption.

*Identification of weed location:* GPS can be used to recognize weed tracts in vast land area through linear sampling techniques. Hence, weed can be controlled timely, which generally restricts effective growth of a crop.

*Livestock tracking:* This technology allows tracing the location of valuable animals on a large farm through GPS transmitters to be attached with animal's collar. It would facilitate the farmers for the easy handling of the animals.

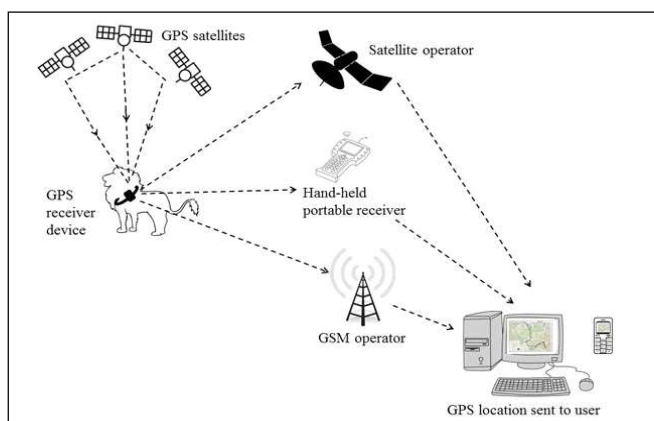


Fig. 3: Livestock tracking using GPS technology

*Soil property mapping:* GPS plays an important role in determining the soil property of a given soil to establish its variability and suitability for a given crop. It also helps researchers identify which area of a farmland contains what type of soil and what area is suitable for a given crop.

*Identification of areas suitable for cultivation:* GPS plays a key role in decision making regarding the crop selection on the basis of soil property of the field and weather forecasting pattern in the particular year.

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