MOTIVATION

To feed the upcoming population ,the present practices of crops production is not enough.
The UN Food and Agriculture Organization predicts that we need to boost worldwide food production by 70 percent over the next several decades in order to feed the anticipated population of 2050.
Many of the regions in India are hilly with sparse crop production but with proper planning even hills can be graded to better agricultural spots.
Terrace farming is prevalent in many parts og world like The Rice **Terraces** of the Philippine Cordilleras (hills and mountains) is a World Heritage Site. It dates back two thousand years.

Opportunities

Terrace wall and edges to grow cash crops and conservation farming

Terraces as sources of food, feed, and medicine.

Utilizing micro-climates for agricultural intensification and diversification

Making better use of natural slopes

Dry season opportunities

Tourism

But it has many **challenges** :

Technical/technological challenges

Narrow and limited land for agriculture

Increased labor/difficult to mechanize the farm operation

Poor access to agricultural inputs, markets and services

Socio-economic challenges

Poverty

Labor shortage (human capital)

Illiteracy/cultural barriers

And many**Environmental challenges.**

Hence, development of technology for terraces is an emerging need of today.

PRIOR WORK

In most systems the terrace is a low, flat ridge of earth built across the slope, with a channel for runoff water just above the ridge. Usually terraces are built on a slight grade so that the water caught in the channel moves slowly toward the terrace outlet.
Terrace cultivation has been practiced in China, Japan, the Philippines, and other areas of Oceania and Southeast Asia; around the Mediterranean; in parts of Africa; and in the Andes of South America for centuries.
It has been in use from the rice fields of Asia to the steep slopes of the Andes in South America.Perhaps the most well-known use of terrace farming are the rice paddies of Asia. The rice terraces of the Philippine Cordilleras are thought to be up to 2,000 years old, were named a UNESCO World Heritage Site in 1995, and are known as the eighth wonder of the world. Areas in the Mediterranean use terrace farming for vineyards and orchards of olive and cork.Tea farmers also take advantage of terrace farming.

Adoption of the **Taino cultivation system**(The Taino were a pre-Columbian farmer society in the Caribbean who developed a sustainable system of hillside agriculture by raising their crops in *conucos*, large mounds created on slopes containing complex intercrops including root crops such as squash, sweet potatoes, and yams, along with maize and other)

Integrated rice-fish system on terraces(Rice terraces can be integrated with fish farming to optimize resource utilization through the complementary use of water and land . This system uses conventional flooded water management practices to increase productivity, profitability and sustainability).

Due to the constraints of terrain , much of technology has not reached the hills appreciacbly.

HOW OUR SOLUTION DIFFERENT FROM PRIOR WORK

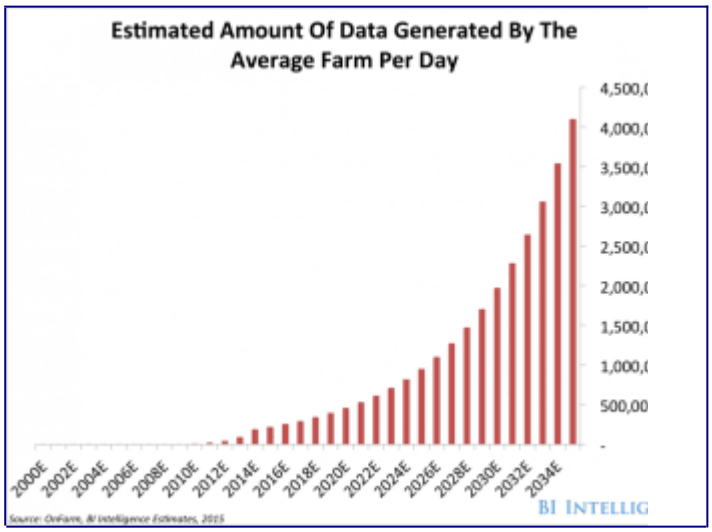
Smart farming and precision agriculture involve the integration of advanced technologies into existing farming practices in order to increase production efficiency and the quality of agricultural products. Most of the current and impending agricultural technologies fall into three categories that are expected to become the pillars of the smart farm: autonomous robots, drones or UAVs, and sensors and the Internet of Things (IoT).
Most aspects of farming are exceptionally labor-intensive, with much of that labor comprised of repetitive and standardized tasks—an ideal niche for robotics and automation.

The IoT has become a bit of a catch-all term for the idea of having computers, machines, equipment and devices of all types connected to each other, exchange data, and communicating in ways that enable them to operate as a so-called “smart” system. We’re already seeing IoT technologies in use in many ways, such as smart home devices and digital assistants, smart factories and smart medical devices.

Smart farms will have sensors embedded throughout every stage of the farming process, and on every piece of equipment. Sensors set up across the fields will collect data on light levels, soil conditions, irrigation, air quality and weather. That data will go back to the farmer, or directly to AgBots in the field. Teams of robots will traverse the fields and work autonomously to respond to the needs of crops, and perform weeding, watering, pruning and harvesting functions guided by their own collection of sensors, navigation and crop data. Drones will tour the sky, getting the bird’s eye view of plant health and soil conditions, or generating maps that will guide the robots,

and help the human farmers to plan for the farm's next steps. All of this will help create higher crop production, and an increased availability and quality of food.

BI Intelligence shared their predictions that IoT devices installed in agriculture will increase from 30 million in 2015 up to 75 million by 2020. Under this trend, connected farms are expected to generate as many as 4.1 million data points each day in 2050—up from a mere 190,000 in 2014.



This mountain of data and other information generated by farming technology, and the connectivity enabling it to be shared, will be the backbone of the future smart farm. Farmers will be able to "see" all aspects of their operation—which plants are healthy or need attention, where a field needs water, what the harvesters are doing—and make informed decisions.

BENEFITS

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The core concept of incorporating autonomous robotics into agriculture remains the goal of reducing reliance on manual labour, while increasing efficiency, product yield and quality**.**

COMPARISON

Major Issues	**Opportunities**
Limited land for intensive agriculture	High value crops and cropping systems on terraces; utilization of vertical slopes (i.e., wall), and edges
Narrow terrace design; difficult to mechanize farm operation	Introduction of light farm robots capable to deal with such terrains.
Increased labor and female drudgery in heavy works	Introduction of practices that reduce female drudgery in labour agriculture and increase in farm planning operations.
Erosion and soil loss	Cover crops, catch crops, mulching, living barriers
Poverty	Increase in production with easy monitored farming would eradicate poverty in some long range.
Labor shortage	No much worry for that introduction of farm robots.
Illiteracy/cultural barriers	best practices, technologies and tools use
Low yield and net income	Practices that enhance land productivity and resource use efficiency with advantages og IoT.

BENEFITS TO FARMER: Unlike their forebears, whose time was mostly taken up by heavy labor, the farmers of the future will spend their time performing tasks such as repairing machinery, debugging robot coding, analyzing data and planning farm operations.

Easy monitoring of farms through PCs from suitable places.

BENEFITS TO MARKET:

As an added benefit, they also improve the quality of life for farm workers by reducing heavy labor and tedious tasks.Just about every aspect of farming can benefit from technological advancements —from planting and watering to crop health and harvesting.
Incresed crop production. Increase of employment in manufacturing