IOT BASED INTELLIGENT FARMING CASE STUDY ON STRAWBERRY

Jayanthdwijesh H P[1], Amulya B R[2], Kavya H J[3], Madhushree D V[4], Mamatha K[5]
Assistant professor, Dept. of ECE, BGSIT, Mandya.[1]
Student, Dept. of ECE, BGSIT, Mandya.[2]
Student, Dept. of ECE, BGSIT, Mandya.[3]
Student, Dept. of ECE, BGSIT, Mandya.[4]
Student, Dept. of ECE, BGSIT, Mandya.[5]

Abstract **-** The use of innovative tools based on digital technologies in farming is expected to bring a number of benefits, such as increased productivity, increased profitability, and reduced environmental footprint, just to name a few. The use of digital technologies facilitating a higher productivity is recommended by the Food and Agricultural Organization of the UN (FAO), as the associated increase in productivity can help reduce the food security risk faced in some regions of the world. If we focus on the Indian case, where food security is a major concern, digital technologies have the potential of helping Indian farmers face other important challenges that are more specific to nation, such as profitability, environmental footprint and sustainability of their exploitations and businesses. By smart farming we understand the application of data gathering (edge intelligence), data processing, data analysis, Smart Irrigation and automation technologies on the overall value chain, that jointly orchestrated allow operation and management improvement (analytics) of a farm with respect to standard operations (near real time) and re-use of these data (animal-plant-soil) in improved chain transparency (food safety) and chain optimization (smart data). Such capabilities will be necessarily supported by Internet of Things (IOT) technologies using Raspberry Pi with web based smart App.

Keywords: sensors, motor, drip irrigation, raspberry pi.

I. INTRODUCTION

From the farmer's point of view, smart farming should provide the farmer with added value in the form of better decision making or more efficient exploitation operations and management. In this sense, smart farming is strongly related, but not limited, to the concepts of Precision Agriculture and Precision Livestock Farming.

Farming modalities may include the production of vegetables, cattle (including dairy production) and others. Smart farming applications do not target only large, conventional farming exploitations, but could also be new levers to boost other common or growing trends in agricultural exploitations, such as family farming (small or complex spaces, specific Cultures and/or cattle, preservation of high quality or peculiar varieties…), organic farming, and Enhance a very respectful and transparent farming accordingly to European consumer, society and market consciousness. Smart farming can also provide great benefits in terms of environmental issues, for example, through more efficient use of water, or optimization of treatments. The term food safety refers to the awareness, prevention and risk-based measures of food borne illnesses, from food production to consumption. Consumer's demands are currently the main drivers encouraging food industries to produce healthier and safe food products that being at their highest possible quality specifications.

The challenge is that transparency of food safety should become data-driven and near real time so that new applications and chain cooperation can lead to a more dynamic and responsive food production network. This terminology includes: - "Food loss", which refers to food that spills, spoils, incurs an abnormal reduction in quality such as bruising or wilting, or otherwise gets lost before reaching the consumer. Food loss typically occurs at the production, storage, processing and distribution stages of the food value chain, and is the unintended result of agricultural processes or technical limitations in storage, infrastructure, packaging and/or marketing. "Food waste", which refers to food that is of good quality and fit for consumption, but does not get consumed because it is discarded – either before or after it spoils.

Food waste typically, but not exclusively, occurs at the retail and consumption stages in the food value chain, and is the result of negligence or a conscious decision to throw food away. The scope of IOT covers the research, development, testing and implementation of IOT-based technologies, applications and services with high (commercial) added value to the domains of smart farming and food safety. IOT will also contribute to spread awareness of the benefits facilitated to farmers. Conventional farming exploitations, but could also be new levers to boost other common or growing trends in agricultural.

Functional block diagram

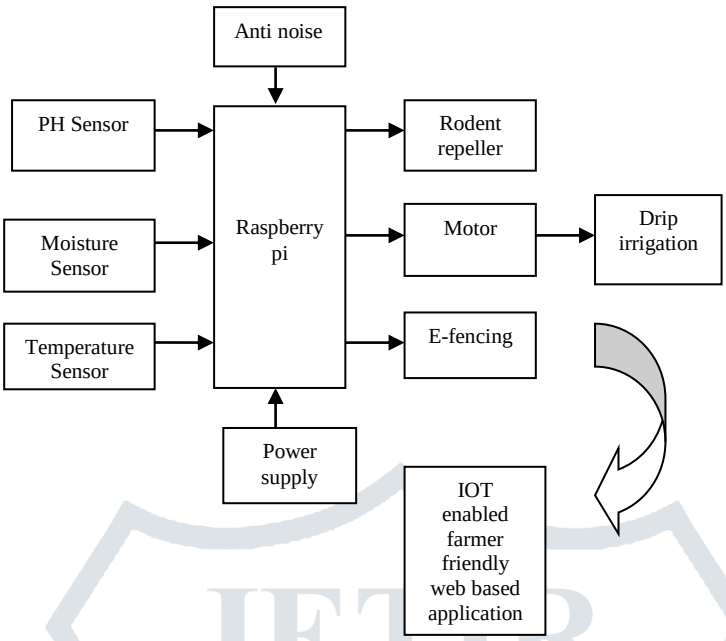

Fig1: Functional block

Working:-

Basically the project is basically having two units one is the agricultural land having advanced processor Raspberry Pi interfaced with different
Sensors like soil moisture sensor for measuring the
Water content in the soil, a phase detector circuit for analyzing the three phase availability, a motor and valve for supplying the water on demand, an electronic fencing to avoid animals entering inside an agricultural land and IOT for linking the information of the farm to farmer.

Another is the web based IOT enabled smart farmer friendly app with which farmer can control his agricultural land any time and even he can access any data at any time sitting at one place. The web app not only limited for controlling and accessing the data regarding farm but also allows the farmer to get connected with the world of farmers market so that he can get any information like market price of the crops, the best technologies to improvise the yield, the best fertilizers available, how to avoid middle man and so on.

Also he can market his product or yield online. The system allows automatic irrigation system with phase detection system to provide better yields. Wireless sensor networks sense accurately the needed water quantity and supply precisely allowing saving the water. The web app on longer only constrained for controlling. Permits the framer to get related with the world of framer market so that he can get any records like market rate of the crop,

II. STRAWBERRY FARMING LITTLE ABOUT STRAWBERRY FARMING

In the past decades, the business of growing strawberries or strawberry farming commercial is being increased more and more because of too big profit in this business plan. Strawberry is also one of the important fruit crops that is being cultivated in numbers of countries in the tropical, subtropical and surrounding region. This crop requires easy propagation method and with early maturity, this crop can give you higher yield or production.

Strawberries have great market potential because of these fruits are an excellent source of Minerals, vitamin‘C’and antioxidants. Strawberries are mainly used in preparing numbers of edible products such as fruit juice, preserves, milkshakes, Jams, chocolates, pies, fruit juice, and many of ice creams. Strawberry fruits are mainly asked for its excellent juicy texture, bright red colour, aroma, and also for excellent sugar content.

One can grow Strawberries in the poly house, greenhouse, containers, and pots. You can also grow these fruits in balconies and terrace. If you have some extra space in your backyard, then you can utilize it for growing strawberries and can earn some extra income. Strawberry fruits are Native to the temperate regions, but you can grow them in sub-tropical regions with suitable climate conditions. Strawberries fruits are mostly cultivated in Canada, USA, Europe, India, and South America. But, when it comes to production, United States tops the list of production list all over the world.

III. HEALTH BENEFITS OF STRAWBERRY

1. Strawberry contains Antioxidants like the Phenolic phytochemicals, Flavonoids, and ellagic acid. All these are helpful in keeping the good eye health.
2. Strawberry is also helpful in boosting the immune system.
3. Strawberries are also useful in treating gout and arthritis.
4. Strawberries are also helpful in preventing some cancer.
5. Consuming Strawberries regularly can boost your brain function.
6. Strawberries are also used for reducing the problem of hypertension. Strawberries are and function.
7. strawberry is also helpful for good weight management.
8. This fruit also contains folic acid, which is helpful in preventing the birth defect problem.
9. Apart from this, Strawberries are also rich in vitamin C and minerals.

IV. IRRIGATION IN STRAWBERRY FARMING

Always try to maintain the good moisture content in the soil and manage a well. The first irrigation should be given just after the implantation of tubers, After then, given frequent irrigation to your crop for well vegetative growth and better setting of roots, in the hot season, irrigation your crop, at least twice a week whereas in winter this should be once after the good settlement of crop.

For commercial strawberry farming, go for the drip irrigation system since it has many advantages over the traditional method and well utilizations of water. Always avoid excessive irrigation since it can cause rotting result as death can invite pest and disease to crop.

V. MATERIALS AND METHODS

Strawberry material- 'SJ8976-1' is a new hardy strawberry selection with large life. The pale fruit colours of 'SJ8976-1' in combination with firmness. Resistance to fruit rot and long shelf life makes it a good candidate for fresh marker and transportations.

VI. EXPERIMENTAL DESIGN

A complete randomized design with two replicates was used, and the strawberry selections SJ8976-1' was grown under three productions systems. Matted row system (MRS),

Plastic mulch (PM) and plastic mulch with row covers (PMRC). Twenty-six plants of 'SJ8976-1' were planted in a double row 30cm 30 cm apart in 4m long plots, supplied with drip irrigations down the centre of each row in 2008 at agriculture and Agri-food,

Canada, L'Acadie experimental farm (longitude: 73'35°W; latitude: 45'32°N), in L'Acadie, Quebec, Canada. For the PM and PMRC system, runners were removed as the runners could not root and grow into a planted. But for the MRS, runners were kept and placed to complete the row as recommended by Ministere de l'Agriculture, des Pecheries et de l'Alimentation du Quebec (MAPAQ). White row cover over the bed was
applied under PMRC and taken away until the fruits were formed. The mean temperature from strawberry flowering to harvest was 19.32°C in 2009 and 18.95°C in 2010, respectively.

Sample extractions procedure-ten grams of fresh frozen fruits from different productions system was pestled for 2 min with 50 Ml of 50% methanol at 25°C using a Polytron blender (Brinkmann Instruments, Westbury, NY, USA). The mixture was filtered firstly through Whatman no. 1 filter paper and then through a 0.45-µm Acrodisc syringe filters (Gelman Sciences, Ann Arbor, MI, USA). The filtrate was finally kept at −20°C, and the extracts resulting from this step were used in the TPC and TAC analysis.

VII. RESULT

Developed by Acorn Computers back in the late 1980s, the ARM architecture is a relatively uncommon sight in the desktop world. Where it excels, however, is in mobile devices: the phone in your pocket almost certainly has at least one ARM-based processing core hidden away inside. Its combination of a simple reduced instruction set (RISC) architecture and low power draw make it the perfect choice over desktop chips with high power demands and complex instruction set (CISC) architectures.

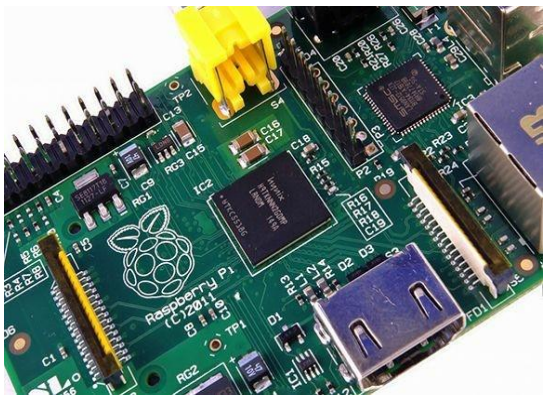

Fig 2: The BCM2835 SOC, located beneath memory chip

The ARM-based BCM2835 is the secret of how the Raspberry Pi is able to operate on just the 5V 1A power supply provided by the onboard micro-USB port. It's also the reason why you won't find any heat-sinks on the device: the chip's low power draw directly translates into very little waste heat, even during complicated processing tasks. It does, however, mean that the Raspberry Pi isn't compatible with traditional PC software.

VIII. CONCLUSION

By implementing the proposed system there are various benefits for the government and the farmers. For the government a solution for energy crisis is proposed. By using the automatic irrigation and smart farming system it optimizes the usage of water by reducing wastage and reduces the human intervention for farmers. Proposed system is easy to implement and environment friendly solution for irrigating fields. Even though there is a high capital investment required for this system to be implemented, the overall benefits are high and in long run this system is economical. Since most of the Indians involve in Farming with this we can take the farming to the next higher version since higher technologies have been introduced in this project leading in economy growth, increase of productivity, many people adopting the smart farming and in turn leads for more earnings.

IX. REFERENCES

[1][Online].Available:http://reports.weforum.org/enabling-trade-from-valuation taction/wpcontent/blogs.dir/38/mp/files/pages/files/2-enabling-trade-from-farm-to-fork.pdf.
[2][Online]. Available: http://www.unep.org/wed/2013/quickfacts/.
[3][Online].Available: http://www.nature.com/news/one-third-of-our-greenhouse-gas emissionscome-from-agriculture-1.11708.
[4][Online].Available:http://ec.europa.eu/eurostat/documents/3930297/5968754/KSFK-13-001EN.PDF/ef39caf7-60b9-4ab3-b9dc-3175b15feaa6.
[5][Online].Available:http://ec.europa.eu/eurostat/statisticsexplained/index.php/Agriultural_production_-_animals.
[6][Online]. Available: http://ec.europa.eu/eurostat/web/agriculture/data/main-tables.
[7][Online].Available:http://ec.europa.eu/eurostat/statisticsexplained/index.php/Agriulture_statistics_-_the_evolution_of_farm_holdings.
[8][Online].Available:http://ec.europa.eu/agriculture/markets-and-prices/more reports/pdf/organic2013_en.pdf.
[9][Online].Available:http://ec.europa.eu/research/bioeconomy/pdf/ki3211999enc_02.pdf.
[10][Online].Available:http://www.magrama.gob.es/imagenes/es/Estrategia%20Apo o%20Producci%C3%B3n%20Ecol %C3%B3gica_tcm7-319074.pdf..