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FPGA BASED SMART POULTRY FARM MANAGEMENT SYSTEM

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ABSTRACT

The most recent programmable FPGA innovation is combined with device and the IEEE1451.2 keen sensor detail standard. The execution of the proposed framework is checked and great outcomes are gotten in the down to earth utilization of the IoT. Environmental parameters, for example, temperature, humidity, gas control, and so forth. The person in charge can obtain the internal environmental situation of the poultry. The system will automatically initiate the action to verify the environmental parameters in case of sudden climatic changes. In addition, the control of the water level and the food control mechanism are controlled and controlled with the help of the sensor. All sensors are connected to the FPGA that can monitor and monitor all data. The detailed record of the rearing of birds with environmental conditions is shown later on a web page. Therefore, the design of the system provides an efficient automated system for monitoring poultry farms to monitor the healthy atmosphere of chickens in poultry farming without human interference. FPGA having high speed of operation and processing time is less as compare to another controller. Then memory has no limit.

Keywords: FPGA (Field Programmable Gate Array), Health of bird, IoT (Internet of Things), Poultry Environment Monitor and Control, Sensors.

I. INTRODUCTION

This system is used to monitor and control the environmental conditions is critical and requires a decent level of research in fields running from changing climatic conditions in horticulture. This examination centers around the wireless sensor and the GPRS coordinate with a notable sensor joining stage that utilizations programmed recognition. The Smart Sensing stage is utilized to screen natural parameters in poultry ranches. This will make the job easier and more efficient in the management of poultry farms. In the climate of chicken farms, the health of chickens is totally dependent. If the weather conditions are not up to par, there may be a risk of digestive, respiratory and behavioral disturbances in chickens. Healthy chicken takes more food and grows quickly. The poultry houses are designed in such a way that the climate can be altered by ventilation, cooling and insulation of the ceiling, walls and floor. The birds are directly surrounded by the microclimate. The microclimate is the most important for the health of birds. The track climate may be good, but may not be suitable for the bird environment. Take for example that CO2 is a heavy gas and the level is higher near the ground near the microclimate of the bird.

Chickens usually have a long-lived animal that accepts stimulation with light to continue the laying process. The direct effects of light on the chickens stimulate the endocrine organs to delay or increase maturity during the incubation period. The important part of raising chickens is nutrition. Feeding fresh, nutritious and high quality food always guarantees good health, adequate growth and high production. Therefore, it is important to feed chickens a healthy and nutritious diet. It is necessary to add vitamins and minerals necessary for your diet. Different kinds of sustenance for poultry are accessible in the market. You can without much of a stretch bolster your flying creatures. Notwithstanding bolstering your feathered creatures with high caliber and nutritious nourishment, dependably supply an adequate measure of new and clean water as per your demand. Nutrient intake of birds can vary from place to place depending on the season and climate change.. A normal egg hen requires ¼ pound of sustain every day, contingent upon variables, for example, chicken size, climatic conditions and level of profitability.

Today modern technologies exceed the traditional method that is very suitable for the growth of chickens. The utilization of the remote sensor arranges and the DC engine framework has planned a nourishment control modem for the chicken. Therefore, food should not be wasted and man's power has been reduced. Water administration for poultry tasks is the subject of much discussion between veterinarians and live generation work force. The use of water acidification as prevention or treatment of chicken diseases or to improve the performance of chickens is probably one of the least known areas of poultry. If the environmental parameters are changed in poultry farms, our system will be automatically executed and this information will be updated on the website. We should monitor and monitor all these parameters.

II. RELATED WORK

From last few years, the chicken production in the world has been increasing gradually because of standardized farming management and good manufacturing practices. According to world's agricultural produce survey, chicken is the most favorite produce, since it is a nutrient rich food providing high protein, low fat and low cholesterol, and lower energy than other kinds of poultries. From last few days around the world, there has been an increased level of awareness regarding the safety of food products like chickens and there has been a high demand for good quality chicken food. This paper is highlighted the technology based solution for low cost, asset saving, quality oriented and productive management of chicken framing. This study intended to explore utilizing an Intelligent System which used an Embedded Framework and Smart Phone for monitoring chicken farm to control environmental parameters using smart devices and technologies [1].

They have expounded the propelled method of remote sensor system and portable system to control n naturally screen ecological parameters of poultry. Person can able to monitor environmental parameters by sending SMS back to the system. Parameters like temperature and humidity. If system doesn't receive command from register mobile number, then it will automatically perform its action. Hence by using this modern technique system can provide a modern technique for farm automation [2]. They have designed a wise framework on the embedded framework and an advanced cell for the administration of poultry. To take care of the issue, the creator utilized Raspberry Pi and Arduino Uno. This framework must monitor the parameters of the poultry condition, including humidity, temperature, atmosphere quality, channel fan switches. This framework is exceptionally

straightforward and helpful for coaches, as they can viably control poultry rearing whenever and from anyplace [8].

They have established a system to enhance the efficiency of a chicken ranch utilizing present day remote sensor arrange innovation. Here the author has divided poultry farming into two types such as egg production and meat production. Using the wireless sensor network application, the quality of the henhouse improves and, ultimately, improves human health. In this article, the author states that the portable wireless sensor can detect infected chickens. The system can improve production, quality and the economy in general [9]. They studied the difference between traditional poultry breeding and modern poultry farming. It is noted that the modern culture of chickens is easier and more useful than the traditional culture of chickens. With the assistance of current innovation it is additionally conceivable to control environmental conditions, for example, humidity and temperature. For finish chicken care, it is essential to monitor and control the poultry condition for better development of chickens. Poultry sheds can be controlled 24 hours a day through automation. Helps to provide optimal performance by reducing human strength in poultry [3].

2.1 Contributions

Everyday automation technologies generate new and innovative ideas. This research focused on modern poultry breeding technologies to control all environmental parameters, such as temperature, humidity and ammonia gas that affect the growth of chickens. On the off chance that natural conditions are not decent, there might be harm to stomach related, respiratory and behavioral changes in chickens. If the chickens are able to have an adequate atmosphere and a proper diet, then they could grow rapidly and the health of the chickens will be good, which will increase the weight of the chickens. Therefore, we use the FPGA to monitor and monitor the poultry environment. In this way, all this information is automatically updated on the website.

2.2 Organization

The paper is prepared as follows: Section III and IV focus the system overview and design elements in the system. Section V explains software design including system operation and system model. Section VI gives the conclusion.

III. SYSTEM OVERVIEW

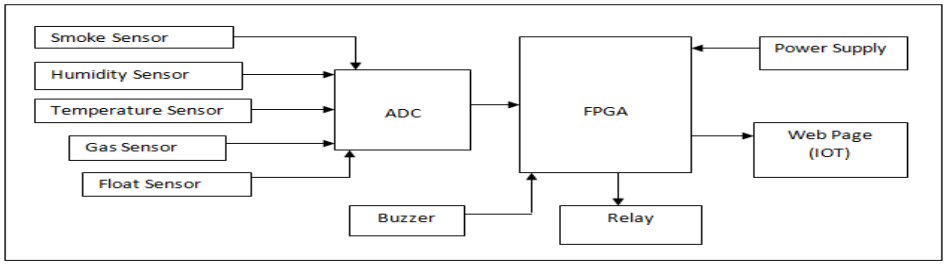

Fig. 3.1 Block Diagram of Proposed System

The system can monitor in real time the monitoring of data of environmental parameters such as maximum or minimum temperature, humidity, quality of the surrounding farm climate, water level, percentage of ammonia gas, etc. Supply and control of water supply and monitoring using advanced wireless sensor technology without human interference. The daily record of the poultry has been kept on a web page. The sensors were read environmental data in the poultry farm and the details of the environmental parameters, such as temperature, humidity, ammonia gas and the current water level are displayed on the LCD screen. A container has been filled with food, every time an order is received for the system, the food should be placed on the chicken dish according to the requirements. If the food is already present in the container and although the system receives the command to drop food, the system will perceive the current amount of food that is already on a plate, if it is sufficient, then the container will not drop the food and if it is lower, only the required amount of food will fall on the plate.

IV. SYSTEM DESIGN

4.1 FPGA (SPARTAN 6)

The Spartan®-6 families provides leading system integration capabilities with the lowest total cost for high-volume applications. The group of thirteen individuals offers extended densities going from 3,840 to 147,443 intelligent cells, with a large portion of the vitality utilization of past Spartan families and a speedier and more entire network.

• Designed for a minimal effort
• Low static and dynamic power
• Low-cost PCI® innovation bolster perfect with the 33 MHz, 32 and 64-bit details.
• Efficient Slices DSP48A1
• High-execution arithmetic and signal processing operations
• Integrated memory controller blocks

4.2 smoke sensor (MQ2)

A smoke identifier is a gadget that distinguishes smoke, typically as a fire indicator. Business security gadgets discharge a flag to a fire caution focus as a major aspect of a fire alert framework, while residential smoke locators, otherwise called smoke detectors (finders), more often than not emit a local visual or acoustic alarm. Smoke identifiers are housed in plastic boxes, for the most part plate formed; around 150 millimeters (6 inches) in breadth and 25 millimeters (1 inch) thick, but the shape and size vary.

4.3 Gas sensor

MQ-6 is a gas sensor used for alcohol detection. It can recognize different number of gases like CO2, CH4, CO, NH3; it is highly sensitive for propane, butane, LPG. MQ-6 having great affectability to Combustible gas in wide range. MQ-6 has long life and straightforward drive circuit. The cost of MQ135 is low.

4.4 Temperature sensor

The LM35 arrangement comprises of accuracy incorporated circuit gadgets with a yield voltage relative to the centigrade temperature. The LM35 gadget has leeway over Kelvin-adjusted straight temperature sensors, since

the client isn't required to subtract a huge consistent voltage from the yield to accomplish an advantageous new centigrade size.

4.5 Buzzer

For alarm purposes a lot of electric bells, alarms and buzzers are available in the market that has got different prices and uses. The buzzer being used in this project is a 5-12 V buzzer.

4.6Float Switch

A float switch is a gadget used to distinguish the level of fluid inside a tank. The switch can be utilized as a part of a pump, pointer, caution or different gadgets. Float changes shift from little to substantial and can be as straightforward as a mercury switch inside an explained glide or as intricate as a progression of optical sensors or conductance that create discrete yields while the fluid achieves a wide range of levels inside the tank.

4.7 Humidity Sensor

DHT11 is a 4-pin temperature and humidity sensor. One is voltage, the other is ground and the third is a data pin that is used to transmit data from the sensor to the FPGA and the last pin is not connected called the NC pin.

4.8 Relay

A relay is act as switch. Numerous transfers utilize an electromagnet to mechanically drive a switch, yet included working standards likewise are utilized, for example, solid-state relays. Relays are employed where it is essential to switch a circuit through an independent low power signal.

V. SOFTWARE DESIGN

5.1 System Operation

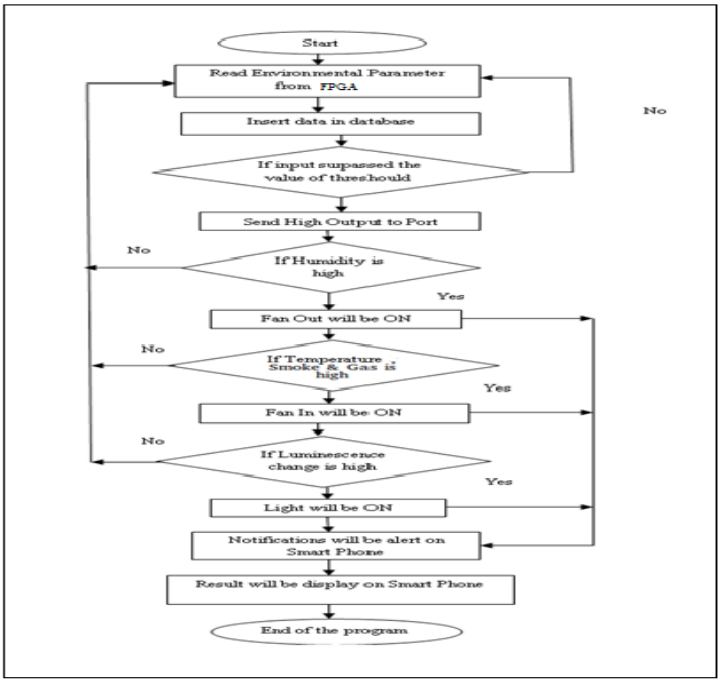

Fig. 5.1Flow chart of proposed System

5.2 System Model

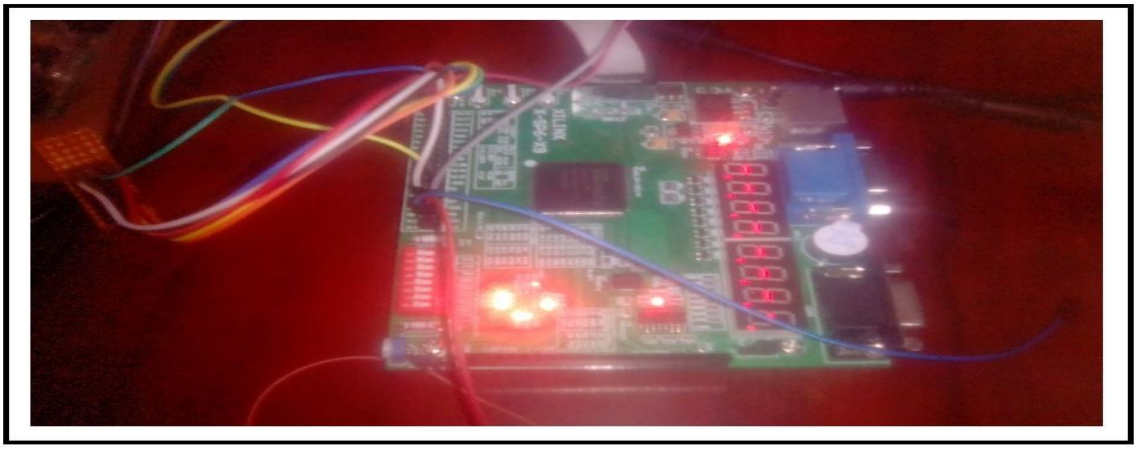

Fig. 5.2 System Model

VI. CONCLUSION

The incorporated framework is inventive for raising chickens, which makes a conventional homestead an "intelligent farm" or "smart farm". In addition, the system could work on the application of the smart phones helping the owner to monitor real time environmental contexts such as temperature, humidity, ammonia gas, water level. In this system describes an Integrated Solution for Smart Poultry Monitoring Using WSN (wireless Sensor Network) and GPRS Network Checking environmental parameters in an area progressively is essential. Various environmental parameters for effective growth of chickens have been identified and defined. It additionally clarifies the strategy for the water level control system and the sustenance control instrument for poultry cultivate. Threshold values of temperature, humidity, ammonia gas and water level are monitor and controlled by the microcontroller. As well as remote monitoring is done and with the help of this facility, the person in-charge can observe the situation of internal structure of poultry by sitting in a one room as data will be display on a web portal. The intelligent system can reduce cost, time, and labor is highly user friendly to the farmers. In that way our system required less processing time and has no memory limit as compare to another processing module or any controller.

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