IoT Solutions for Crop Protection against Wild Animal Attacks

**Abstract**

Technology plays a central role in our everyday life. There has been a surge in the demand of Internet of Things (IoT) in many sectors, which has drawn significant research attention from both the academia and the industry. In the agriculture sector alone, the deployment of IoT has led to smart farming, precision agriculture, just to mention a few. This paper presents the development of Internet of Things application for crop protection to prevent animal intrusions in the crop field. A repelling and a monitoring system are provided to prevent potential damages in Agriculture, both from wild animal attacks and weather conditions.

**INTRODUCTION**

Crop damage caused by animal attacks is one of the major threats in reducing the crop yield. Due to the expansion of cultivated land into previous wildlife habitat, crop raiding is becoming one of the most conflicts antagonizing human wild life relationships According to [2], [3] annual production, which amounts to the range of 8,962,250 – 13,036,000 rupees, with an annual cost to the government stimated around 2.5billion rupees per year. In addition to crop damages, up to 1000 road accidents are also caused by these wild animals annually. Moreover, in agriculture and especially in wine production, very small changes in the micro climate can impact the quality of the product. It is vital for agronomists to have a clear view of the meteorological conditions in a very small area of the entire territory usually characterized by very different soil characteristics. Diseases such as Bunch-rot ”Botrytis cinerea” and Peronospora in vineyards [6] can be prevented by an hourly monitoring of the plant and by providing timely based required treatment to the plant.

**EXISTING SYSTEM**

The current methods used to counter this problem include the use of electrified welded mesh fences (usually 30cm in the ground), chemicals or organic substances and gas cannons. Other traditional methods applied by farmers include the use of Hellikites, Ballons, Shot/Gas guns, String & stone, etc. These solutions are often cruel and ineffective. They also require a vast amount of installation and maintenance cost and some of the methods have environmental pollution effect on both humans and animals [4]. On the other hand, the chemical products used to prevent these animal attacks have an application cost per hectare and their effectiveness is dependent on weather condition, as rain may cause a dilution effect. Technology assistance at various stages of agricultural processes can significantly enhance the crop yield. Sensor networks express a substantial improvement over traditional invasive methods of monitoring [5]. Our proposed method is based on an animal friendly ultrasounds generator, which does not produce physical or biological harm to the animals nor sounds audible to humans.

**EXISTING SYSTEM DISADVANTGE**

* It is not cost effective.
* It may leads to loss of life.
* It is not a productive way to prevent from the animals.
* Always precaution is better than cure. It’s not done here.

**PROPOSED SYSTEM**

In this work, we present the coordination among heterogeneous sensors and actuators interacting with the cloud to provide an enabling platform for new services in this domain. In particular in the peripheral part, we adopted wireless technologies such as 6LoWPAN, WiFi, Zigbee etc., cooperating with the data center by an advanced IoT gateway. Another important feature that we had to consider is the lifespan of the devices before deployment. As a result, we selected low energy consuming motes equipped with batteries and solar panels for energy harvesting in order to achieve this goal. The monitoring system provides a real-time and historic data regarding the weather conditions on their territory to the farmers. Our weather monitoring system consists of two parts, the device and the back-end. The device is a solar powered Ardunio based board connected to various sensors, like temperature and humidity sensors and PIR etc.

**PROPOSED SYSTEM ADVANTGE**

* It is monitor the temperature and humidity level in the field crop.
* In this PIR sensor used to alter if animal in the crop
* So we can call forest officer move the animal from the crop.
* It is very cost effective.
* It will prevent losses of life both animal and human.

**BLOCK DIAGRAM**

**POWER SUPPLY**

**INDICATOR LED**

**PIR**

**BUZZER**

**GSM/GPRS**

**TEMPERATURE SENSOR**

**HUMIDITY SENSOR**

**ARDUINO UNO**

HARDWARE REQUIREMENT

* ARDUINO UNO
* Temperature sensor
* Humidity sensor
* PIR
* GSM/GPRS
* Buzzer
* LED

SOFTWARE REQUIREMENT

* ARDIUNO