THE BIG FOOT ALERT

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ABSTRACT

The Internet of things (IoT) is the network of physical devices, vehicles, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data.

Internet of things is an idea from computer science which connects ordinary things like lights and doors to a computer network to make them "intelligent". An embedded system or a computer connects each thing together in a network and to the internet.

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

There are many cautions and alert systems available online and being used in many projects. For example, Fire alarm. These products common and are used in many places because they are easy to install and easy to use.

The proposed project which I have named as "The Big Foot Alert" is a new idea which can be helpful in minimizing Human-Wildlife Conflict. This alert system provides early warning to people living on the fringes of forests and the forest officials through sensors and alarms.

This will decrease the Human-Wildlife Conflict and also secure the crops from damaging. This system will reduce loss occurred due to the elephants on farming and the crops.

Keyword:-*Load sensor, Arduino ,IOT*

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1. INTRODUCTION

1.1 INTRODUCTION TO THE PROJECT:

In our densely populated subcontinent, elephants and people have had to increasingly share land and resources, leading to frequent and often fatal conflict. How can the government resolve this problem?

A few facts about elephants in India:

- Only 22 per cent of elephant habitat is found within our protected area network – the remaining elephant range lies outside, in places now overrun by people.
- The estimated 28,000 wild elephants in India are distributed over about 3% of the country's geographical area.

- Averages of 350 people have been killed annually over the last five years (2006–10) in the conflict with elephants.
- Elephants damaged an average of 330 sq km of crops annually for the last three years (2008–10).
- The Central and State Governments together spend 10 to 15 crore rupees every year on controlling elephant depredation and paying ex-gratia to affected people.
- 40 – 50 elephants are killed annually while crop-raiding.

Losses are heavy on both sides. Forests are destroyed by villagers in the belief that it will prevent the animals from using the area, leaving the elephants caught in the pincer grip of habitat fragmentation and retaliation. The conflicts tend to marginalize an already impoverished group -farmers with small holdings cannot withstand the risks posed by the conflict, and in some extreme cases they have even been forced to abandon their farms.

To avoid such a situation, we planned to come out with an instrument, which helps any Forest Officials and the Villagers to immediately get alarmed about the elephants entering the farm or the village. This will help in warning the villagers from direct conflict of the elephants and the forest officials can take actions accordingly.

Conflict mitigation cannot be solved by the Forest Department alone; it requires multidisciplinary collaborations between the Department of Agriculture, insurance companies, land-use planners, biologists and the Forest Department. The implementation of these methods requires a long timeframe as well as, very importantly, political will.

1.2 PURPOSE OF THE PROJECT:

There is a need for a clear policy and strategic planning. The current approach to dealing with conflict is largely ad hoc, and predisposed to failure because of inappropriate application of methods, lack of involvement of local people, lack of monitoring of conflict and conflict mitigation measures, and inadequate understanding of elephant ecology in deploying mitigation strategies. In the absence of policy, there is an inordinate focus on the symptoms rather than the causes of the problem. No single solution is effective and different approaches need to be integrated to address the problem proactively.

There are heavy losses in various villages all over the country and the world. This system can help both elephants and the humans living in the village

1.3 PROBLEM IN THE EXISTING SYSTEM

Till today there are various systems similar to the one proposed by us but we don't think they are actually been useful on both the ways. There are many systems which might hurt the elephants.

In many of the existing systems there are no alarm systems which might be helpful in alarming the villagers through messages and alarms.

1.4 SOLUTION TO THESE PROBLEMS

Using the project the whole village will be alarmed which will help all the farmers to take actions accordingly to protect their farms and the people can protect themselves by finding a proper shelter. And the forest officials can take necessary actions to protect the people and their farms and avoid the human-elephant conflicts.

2. SYSTEM ANALYSIS

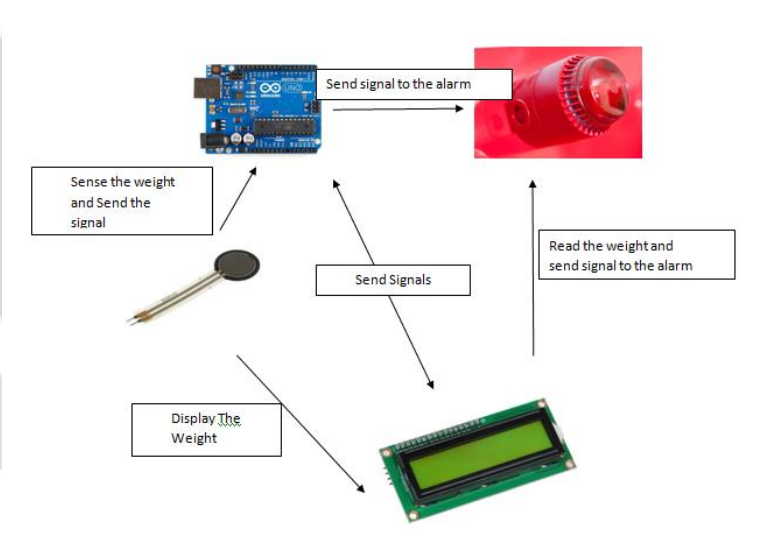
2.1 STUDY OF THE SYSTEM:

This device can be installed around the borders of the village in the forest area which will be connected to a LED display which will be monitored by the forest officials and when the weight detected is increased in a high level the LED displays the weight and the alarm will start immediately in both the villages and the forest Department, which will help the villagers to get warned and the forest officials to take charge accordingly to avoid human-elephant conflict.

2.2 PROPOSED SYSTEM

Using this IOT project, we can avoid the human-elephant conflict in various places across the world. This system will automatically sense the weight of an elephant and display on the LED screen located at the Forest Department and make a warning alarm in both the forest department and the village, which will be helpful for the villagers to stay cautioned and protect their farm and themselves. The forest officials can take necessary actions accordingly and avoid the conflict between the humans and the elephants, and avoid the loss faced by the farmers.

2.3 SYSTEM ARCHITECTURE:



The Big Foot Alert Device is developed to avoid elephant-human conflicts in various parts of the world. The final version comes with the message notification to the people nad the forest officials. Also, distributing and implementing the device was managed very effectively so that there are less conflicts and regressions in this System.

Rather than proposing a system with high expense and lots of disadvantages, this system is fully functioning one compared to a costly version with less features and functions. The project involved the use of Arduino and the suitable programming.

The Cisco Packet Tracer 7.0 is used to check the working of the system as it consists of very common IOT sensors and devices. Buzzer alarms are used to warn the villagers and the forest officials regarding the conflict. The below is the description of how the modules and the other parts that were used in the system interact to produce the desired result.

The force sensor is used to sense the weight of an elephant and then its weight is monitored by the forest officials using a LED display. When the weight increases randomly i.e. a weight of an elephant then the force sensor detects the weight and warns the villagers and the forest officials which will help in avoiding the human-elephant conflict.

3. FEASIBILITY STUDY

3.1 TECHNICAL FEASIABLITY :

This assessment is based on IOT Sensor system requirements, to determine whether the company has the technical expertise to handle completion of the project. When writing a feasibility report, the following should be taken to consideration:

- A brief description of the business to assess more possible factors which could affect the study
- The part of the business being examined
- The human and economic factor
- The possible solutions to the problem

At this level, the concern is whether the proposal is both *technically* and *legally* feasible (assuming moderate cost).

The technical feasibility assessment is focused on gaining an understanding of the present technical resources of the organization and their applicability to the expected needs of the proposed system. It is an evaluation of the hardware and software and how it meets the need of the proposed system

Method of Production

The selection among a number of methods to produce the same commodity should be undertaken first. Factors that make one method being preferred to other method in agricultural projects are the following:

- Availability of inputs or raw materials and their quality and prices.
- Availability of markets for outputs of each method and the expected prices for these outputs.
- Various efficiency factors such as the expected increase in one additional unit of fertilizer or productivity of a specified crop per one durum.

Production Technique

After we determine the appropriate method of production of a commodity, it is necessary to look for the optimal technique to produce this commodity.

Project Requirements

Once the method of production and its technique are determined, technical people have to determine the projects' requirements during the investment and operating periods. These include:

- Determination of tools and equipment needed for the project such as drinkers and feeders or pumps or pipes …etc.
- Determination of projects' requirements of constructions such as buildings, storage, and roads …etc. in addition to internal designs for these requirements.
- Determination of projects' requirements of skilled and unskilled labor and managerial and financial labor.

- Determination of construction period concerning the costs of designs and consultations and the costs of constructions and other tools.

- Determination of minimum storage of inputs, cash money to cope with operating and contingency costs.

Project Location

The most important factors that determine the selection of project location are the following:

- Availability of land (proper acreage and reasonable costs).

- The impact of the project on the environment and the approval of the concerned institutions for license.

- The costs of transporting inputs and outputs to the project's location (i.e., the distance from the markets).

- Availability of various services related to the project such as availability of extension services or veterinary or water or electricity or good roads …etc.

3.2 OPERATIONAL FEASIBILITY

Operational feasibility is the measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development

The operational feasibility assessment focuses on the degree to which the proposed development project fits in with the existing business environment and objectives with regard to development schedule, delivery date, corporate culture and existing business processes.

To ensure success, desired operational outcomes must be imparted during design and development. These include such design-dependent parameters as reliability, maintainability, supportability, usability, productibility, disposability, sustainability, affordability and others. These parameters are required to be considered at the early stages of design if desired operational behaviours are to be realised. A system design and development requires appropriate and timely application of engineering and management efforts to meet the previously mentioned parameters. A system may serve its intended purpose most effectively when its technical and operating characteristics are engineered into the design. Therefore, operational feasibility is a critical aspect of systems engineering that needs to be an integral part of the early design phases.

3.3 ECONOMIC FEASIBILITY

Economic feasibility analysis is the most commonly used method for determining the efficiency of a new project. It is also known as cost analysis. It helps in identifying profit against investment expected from a project. Cost and time are the most essential factors involved in this field of study.

The study is based on cost and time. Under the cost based study we evaluate the development cost and the operating cost. We also calculate an approximate time frame to receive returns against investment keeping in mind the future value of the project. During the process of economic feasibility study we follow certain best practices to get the desired result. We do certain assumptions on the basis of which we give you solid plan of investment. These include

- Economic feasibility cash flow.
- Estimated total project cost.
- Estimated total earnings.
- Risk factors.
- Cost benefits.

4. SYSTEM DESIGN

4.1 INTRODUCTION

4.1.1 Architectural design

The architectural design of a system emphasizes the design of the system architecture that describes the structure, behavior and more views of that system and analysis.

4.1.2 Logical design

The logical design of a system pertains to an abstract representation of the data flows, inputs and outputs of the system. This is often conducted via modeling, using an over-abstract (and sometimes graphical) model of the actual system. In the context of systems, designs are included. Logical design includes entity-relationship diagrams (ER diagrams).

4.1.3 Physical design

The physical design relates to the actual input and output processes of the system. This is explained in terms of how data is input into a system, how it is verified/authenticated, how it is processed, and how it is displayed. In physical design, the following requirements about the system are decided.

1. Input requirement,
2. Output requirements,
3. Storage requirements,
4. Processing requirements,
5. System control and backup or recovery.

Put another way, the physical portion of system design can generally be broken down into three sub-tasks:

1. User Interface Design
2. Data Design
3. Process Design

User Interface Design is concerned with how users add information to the system and with how the system presents information back to them. Data Design is concerned with how the data is represented and stored within the system. Finally, Process Design is concerned with how data moves through the system, and with how and where it is validated, secured and/or transformed as it flows into, through and out of the system. At the end of the system design phase, documentation describing the three sub-tasks is produced and made available for use in the next phase.

Physical design, in this context, does not refer to the tangible physical design of an information system. To use an analogy, a personal computer's physical design involves input via a keyboard, processing within the CPU, and output via a monitor, printer, etc. It would not concern the actual layout of the tangible hardware, which for a PC would be a monitor, CPU, motherboard, hard drive, modems, video/graphics cards, USB slots, etc. It involves a detailed design of a user and a product database structure processor and a control processor. The H/S personal specification is developed for the proposed system.

The physical object which is able to detect events and changes in various parameters such as environment, temperature, humidity, and so on are termed as sensors. Based on the (events or) changes detected the sensors are capable of generating appropriate output. There are different types of sensors classified based on different criteria such as sound, automotive, electrical, and chemical and so on. Most frequently used sensors can be listed as pressure, force, proximity, light, heat, temperature, position, etc.

4.1.4 Sensor Technology

Various types of Sensors

The application of sensors in real time electrical and electronic circuits for developing various innovative projects is rapidly increasing. For instance, consider an automatic door opening system frequently used in shopping malls, offices, banks, and other places which will work based on proximity sensor. Similarly, application of sensor technology in various fields like embedded systems, robotics, etc., is rapidly increasing. Here, in this article let us discuss about force sensing resistor.

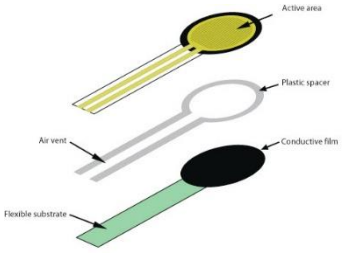
4.1.5 Force Sensing Resistor

Resistor is one of the most typically used passive components in electrical and electronics circuits. Resistor can be defined as a circuit element used for reducing current flow and also lower voltage levels in circuits. There are different types of resistors classified based on various criteria such as fixed value resistors, variable resistors, wire wound resistors, metal film resistors and special resistors. The special purpose resistors can be listed as pencil resistors, light dependent resistors, force sensing resistors and so on.

Force Sensing

Force sensing resistor can be defined as a special type of resistor whose resistance can be varied by varying the force or pressure applied to it. The FSR sensor technology was invented & patented by Franklin Event off in 1977. The FSR sensors are made of conductive polymer which has a property of changing its resistance based on the force applied to its surface. Hence, these are termed as FSR sensors; force sensing resistor is a combination of resistor and sensor technology.

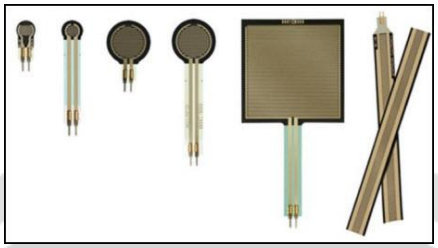
The force sensing resistor is generally supplied as a polymer sheet or ink which is applied as screen printing. Both the electrically conducting and non-conducting particles are present on this sensing film. These particles are generally sub-micrometer sizes which are formulated for reducing the temperature dependence and also for improving mechanical properties, increasing surface durability.



Force Sensing Resistor Layers

If force is applied to a surface of sensing film, then the particles touches the conducting electrodes and thus resistance of the film changes. There are several resistive based sensors but force sensing resistors operate satisfactorily in difficult environments and also require a simple interface compared to other resistive based sensors.

Even though there various types of force sensors, the force sensing resistors are having several advantages such as thin size (less than 0.5mm), very low cost and also good shock resistance. The only disadvantage of FSR sensors is low precision; there will be approximately 10% or more difference in measurement results.



Force Sensing

Force sensing resistors are called as (PTF) polymer thick film devices. The resistance of FSR sensors decreases with increase in pressure applied to its surface.

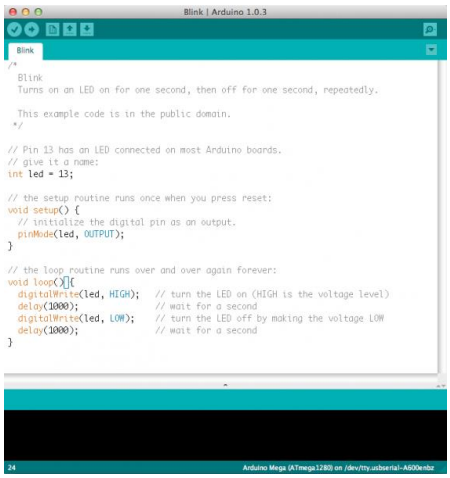
4.1.6 ARDUINO

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

Arduino Uno

The Uno is one of the more popular boards in the Arduino family and a great choice for beginners.



Arduino is a great tool for people of all skill levels. However, you will have a much better time learning alongside your Arduino if you understand some basic fundamental electronics beforehand.

4.1.7 Single Channel Relay

A relay is an electrically operated device. It has a control system and (also called input circuit or input contactor) and controlled system (also called output circuit or output cont actor). It is frequently used in automatic control circuit. To put it simply, it is an automatic switch to controlling a high-current circuit with a low-current signal.

The advantages of a relay lie in its lower inertia of the moving, stability, long-term reliability and small volume. It is widely adopted in devices of power protection, automation technology, sport, remote control, reconnaissance and communication, as well as in devices of electro mechanics and power electronics. Generally speaking, a relay contains an induction part which can reflect input variable like current, voltage, power, resistance, frequency, temperature, pressure, speed and light etc. It also contains an actuator module (output) which can energize or de-energize the connection of controlled circuit. There is an intermediary part between input part and output part that is used to coupling and isolate input current, as well as actuate the output. When the rated value of input (voltage, current and temperature etc.) is above the critical value, the controlled output circuit of relay will be energized or de-energized.

NB: input into a relay can be divided into two categories: electrical quantities (including current, voltage, frequency, power etc.) and non- electrical quantities (including temperature, pressure, speed, etc.)

Features

The features of 1-Channel Relay module are as follow:

1) Good in safety. In power system and high voltage system, the lower current can control the higher one.

2) 1-channel high voltage system output, meeting the needs of single channel control

3) Wide range of controllable voltage.

4) Being able to control high load current, which can reach 240V, 10A

5) With a normally-open (NO) contact and a normally-closed (NC) contacts

4.1.5 LCD DISPLAY

Liquid crystal displays (LCDs) are a commonly used to display data in devices such as calculators, microwave ovens, and many other electronic devices..

In this tutorial, I will show you how to use a 16x2 LCD with an Arduino. The 16x2 LCD used in this experiment has a total of 16 pins. As shown in the table below, eight of the pins are data lines (pins 7-14), two are for power and ground (pins 1 and 16), three are used to control the operation of LCD (pins 4-6), and one is used to adjust the LCD screen brightness (pin 3). The remaining two pins (15 and 16) power the backlight. The details of the LCD terminals are as follows:

Terminal 1	GND
Terminal 2	+5V
Terminal 3	Mid terminal of potentiometer (for brightness control)
Terminal 4	Register Select (RS)
Terminal 5	Read/Write (RW)
Terminal 6	Enable (EN)
Terminal 7	DB0
Terminal 8	DB1
Terminal 9	DB2
Terminal 10	DB3
Terminal 11	DB4
Terminal 12	DB5
Terminal 13	DB6
Terminal 14	DB7
Terminal 15	+4.2-5V
Terminal 16	GND

5. Conclusion

IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system.

IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment. They enhance data collection, automation, operations, and much more through smart devices and powerful enabling technology.

The following features were successfully implemented:

- The alarm and the GSM was tested successfully
- The Force Sensors are in fully working condition
- The code was implemented

Performance Metrics-

- Security and safety measures included
- Business financial impact
- Business performance measure impact

The module works and some more features can be added later which will improve it further. The project accomplishes what the objective of the project.

6. ACKNOWLEDGEMENT

I have taken efforts in the project. However, it would not have been possible without the support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.

I would like to thank my internal guide Ms. M Vinodhini and the project coordinator Mr. P Vinoth Kumar for their continuous encouragement and also my HOD Dr.T.K Thivakaran for providing procedural information. I would extend my sincere thanks and gratitude to the members of my team for their kind co-operation and encouragement which helped me in completion of the project.

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