

Prevention of Bird Strikes on Flying Machine

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Abstract— This project aims to prevent the airplanes from the damages caused by the winged birds during the take-off and landing. The rate of the fledgling of winged creatures hitting on the airship is called winged creature strike. Normally the Bird strikes happen during take-off or landing, or during low altitude flight. Yet, the bird strikes have also been stated at high elevations up to 9,000 m (30,000 feet) above the ground level. According to the International Civil Aviation Organization (ICAO) report, 90% of bird collisions occur near or on airports. Often, accidents are occurring during a collision of bird (or birds) with a windscreen or a bird (or birds) is sucked into the engines of mechanical airplane. Thus, it is critical to distinguish any proximity of the flying creatures nearby the aircraft. An attempt is made to sense the flying birds near by the airplane using IR sensors. A stream of water is sprayed and divert the birds away from the aircraft. Thereby, it reduces the accidents caused by collision of birds. It safeguards the passengers' life and propellers in the aircraft.

Key words: IR Sensor, Water Stream Jet, Pulse Transformer, Stepper Motor

I. INTRODUCTION

A bird shall cause serious damages to airplane during take-off and landing. By the way of hitting the airplane or getting struck inside the motor. This problem cause huge maintenance and repair cost. Also, causes instability that result in plane crash. To prevent this kind of strikes in future. It is not easy to observe distinguish and distinct any nearness of flying birds inside the range. During the take-off time, birds can be identified and it should be diverted. By doing this bird cannot come into the run way of an airplane. Water steam shall be used to divert flying bird. Since it is an innocuous approach to divert the birds. The tiny birds that get struck inside the engine could cause huge damage to airplane. This bird could cause issues during take-off and landing. Here we propose a system that can detect the presence of a bird in the range. By using IR sensor it will calculate the objects of relative position with the airplane. Once the coordinates are found, the water steam jet instrument will be instructed to pump water to that coordinates.

In this method the bird can be diverted from its original path and the accident can be avoided, and for the water stream jet the sea water shall be used for diverting the bird path. And life of both the birds and human can be prevented.

II. METHODOLOGY

The proposed system consists of an IR (Infrared) sensor which is used to sense the bird in a particular range. After the detection of bird, the detecting system (Sensor) will send a signal to the control unit (Micro-controller). Once the signal is received from the sensor, the water jet is sprayed to divert the bird, causing it to fly away from the flying machine.

The detection system should scan a specified range and it will send a signal if any object is found around a specific range. The detector system will raise an alert in the form of signal. Once the signal is arrived from the detector system, the location finder should estimate the position of the airplane. Then the water steam jet can be turned ON to reach the location of the bird and divert it away.

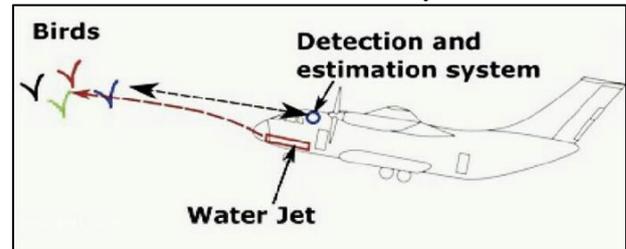


Fig. 1:

III. HARDWARE DESCRIPTION

A. IR Sensor

An infrared sensor is an electronic device that emits infrared ray and receives in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object and also detects the motion. Infrared sensor measures only infrared radiation. Usually in the infrared spectrum, all the objects radiate thermal radiations. These types of radiations are invisible to eyes, which can be detected by an infrared sensor. The emitter is simply an IR LED (Infrared Light Emitting Diode) and the detector is simply an IR (Infrared) photodiode which is sensitive to IR light of the same wavelength as that emitted by an IR LED. When IR light falls on the photodiode, the resistances and these output voltages, changes in proportion to the magnitude of the IR (Infrared) light received.



Fig. 2: IR Sensor

B. RADAR

RADAR stands for Radio Detection and Ranging System. RADAR is basically an electromagnetic system used to detect the Position and distance of an object from the point where the RADAR is placed. The principle of RADAR is Sound-wave Reflection, It works by radiating energy into space and monitoring the reflected signal from the objects. It operates in the UHF (Ultra High Frequency) and microwave range.

The RADAR system generally consists of a transmitter and receiver. The transmitter which produces electromagnetic signal which is radiated into space by an antenna. When this signal strikes any object, it gets reflected in many directions. This reflected signal is received by the Receiver antenna which delivers it to the receiver, by using the received signal the geographical statistics of the object is determined. The range is determined by the calculating the time taken by the signal to travel from the RADAR transmitter to the target and received back to the receiver. The objects location is measured in angle, from the direction of maximum amplitude echo signal, the antenna point. Doppler Effect is used to measure range and position of moving objects.

RADAR consists of six major parts which aids in the operation. They are listed below,

1) *Transmitter*

It can be a power amplifier like a Travelling Wave Tube or a power Oscillator like a Magnetron. The signal is generated using a waveform generator and then amplified in the power amplifier.

2) *Waveguides*

The waveguides are transmission lines for transmission of the RADAR signals.

3) *Antenna*

The antenna used can be a parabolic reflector, planar arrays or electronically steered phased arrays.

4) *Duplexer*

A duplexer allows the antenna to be used as a transmitter or a receiver. It can be a gaseous device that would produce a short circuit at the input to the receiver when transmitter is working.

5) *Receiver*

It can be super heterodyne receiver or any other receiver which consists of a processor to process the signal and detect it.

6) *Threshold Decision*

The output of the receiver is compared with a threshold to detect the presence of any object. If the output is below any threshold, the presence of noise is assumed.

7) *Microcontroller*

The 8051 Microcontroller is one of the basic type of microcontroller, designed by Intel in 1980's. This microcontroller was based on Harvard Architecture and developed primarily for use in embedded systems technology. Normally, this microcontroller was developed using NMOS technology, which requires more power to operate. Therefore, Intel redesigned Microcontroller 8051 using CMOS technology and their updated versions came with a letter C in their name, for instance an 80C51 it is an 8 bit microcontroller. These latest Microcontrollers requires less power to operate as compared to their previous versions. The 8051 Microcontroller has two buses and two memory spaces of 64K X 8 size for program and data units. It has an 8 bit processing unit and 8 bit accumulator units.

8) *Central Processor Unit (CPU)*

The CPU is the brain of any processing device of the microcontroller. It monitors and controls all operations that are performed on the Microcontroller units. The User has no control over the work of the CPU directly . It reads program

written in ROM memory and executes them and do the expected task of that application.

9) *Interrupts*

Interrupt is a subroutine call that interrupts of the microcontrollers main operations or work and causes it to execute any other program, which is more important at the time of operation. The feature of Interrupt is very useful as it helps in case of emergency operations. An Interrupts gives us a mechanism to put on hold the ongoing operations, execute a subroutine and then again resumes to another type of operations.

There are five interrupt sources in 8051. They are listed below,

- 1) INTO
- 2) TFO
- 3) INT1
- 4) TF1
- 5) R1/T1

Out of these, $(INT0)^-$ and $(INT1)^-$ are external interrupts that could be negative edge triggered or low level triggered. When All these interrupts are activated, set the corresponding flogs except for serial interrupt,.The interrupt flags are cleared when the processor branches to the interrupt service routine (ISR).

The external interrupt flags are cleared when the processor branches to the interrupt service routine, provides the interrupt is a negative edge triggered whereas the timers and serial port interrupts two of them are external interrupts, two of them are timer interrupts and one serial port interrupt terminal in general.

10) *Memory*

Microcontroller requires a program which is a collection of instructions. This program tells microcontroller to do specific tasks. These programs require a memory on which these can be saved and read by Microcontroller to perform specific operations of a particular task. The memory which is used to store the program of the microcontroller is known as code memory or Program memory of applications. It is known as ROM memory of microcontroller also requires a memory to store data or operands temporarily of the micro controller. The data memory of the 8051 is used to store data temporarily for operation is known RAM memory. 8051 microcontroller has 4K of code memory or program memory,that has 4KB ROM and also 128 bytes of data memory of RAM.

11) *Bus*

Basically Bus is a collection of wires which work as a communication channel or medium for transfer of Data. These buses consists of 8, 16 or more wires of the microcontroller. Thus, these can carry 8 bits,16 bits simultaneously. Hire two types of buses that are shown in below

- Address Bus
- Data Bus

12) *Address Bus*

Microcontroller 8051 has a 16 bit address bus for transferring the data. It is used to address memory locations and to transfer the address from CPU to Memory of the microcontroller. It has four addressing modes that are

- 1) Immediate addressing modes.
- 2) Bank address (or) Register addressing mode.

- 3) Direct Addressing mode.
- 4) Register indirect addressing mode.

13) *Data Bus*

Microcontroller 8051 has 8 bits of the data bus, which is used to carry data of particular applications.

14) *Oscillator*

Generally, we know that the microcontroller is a device, therefore it requires clock pulses for its operation of microcontroller applications. For this purpose, microcontroller 8051 has an on-chip oscillator which works as a clock source for Central Processing Unit of the microcontroller. The output pulses of oscillator are stable. Therefore, it enables synchronized work of all parts of the 8051 Microcontroller.

15) *Input/Output Port*

Normally microcontroller is used in embedded systems to control the operation of machines in the microcontroller. Therefore, to connect it to other machines, devices or peripherals we require I/O interfacing ports in the microcontroller interface. For this purpose microcontroller 8051 has 4 input, output ports to connect it to the other peripherals

16) *Timers/Counters*

8051 microcontroller has two 16 bit timers and counters. These counters are again divided into a 8 bit register. The timers are used for measurement of intervals to determine the pulse width of pulses.

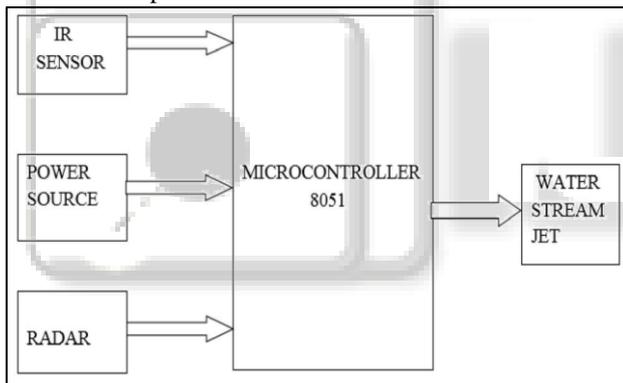


Fig. 3:

IV. CONCLUSION

The Bird detection and diversion using this proposed system is a real time detection for monitoring, control the activities of Birds and it will divert the direction of birds. The present proposal are a model is to minimize the Bird strikes. Using this system, one can save Human life, bird and aero plane. From this the aircraft accidents are avoided.

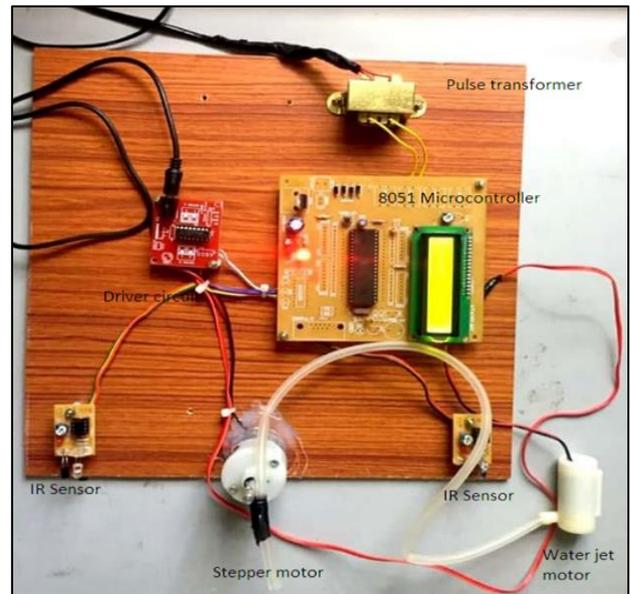


Fig. 4:

From above figure shows the hardware model of bird deflection system. The IR sensor used for obstacle detection. The pulse transformer is used to given the pulse proportional to the microcontroller. If the obstacle are interfered the sense the IR sensor and given to the signal from the micro controller. And to activates the water jet motor.