PROTECTION OF CROP FIELDS FROM GRAZING ANIMALS BY USING LASER BEAM TECHNOLOGY

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Abstract: India is an Agro based country which is the main source of lively hood for many farmers. Most of the farmers in India were facing the problem of protecting the crop fields against intruding animals. Approximately 90 percent of crops were destroyed by grazing animals affecting crop yield thereby causing huge financial loss to farm land owners. Special challenges faced by farmers include serious damage to crops such as trampling over the crops by animals, running over them and crop eating. Due to illiteracy and lack of scientific knowledge, many farmers are still reliant on traditional methods in protecting crops. Monitoring animal activity by conventional mechanical or chemical protectants is suggested only for high-value crops as they are expensive. Hence an alternative modern way for protecting crops by laser beam technology is possible by interdepartmental exchange of knowledge which is highly appreciable for wide-range analyzation.

Key words: laser, security, protection.

Introduction:

World's largest industry is agriculture. Which provide habitat for many plant species. Population growth had an impact on crop production by demanding agricultural yield which changes by many cultural and mechanical agricultural operational barriers. Managing human - wildlife interactions are often challenging due to many technical problems (Borgerhoff Mulder and Coppolillo, 2011; Allen and Garmestani, 2015). Attempt to control wild life helps in decreasing many conflicts. But lack of clarity in managing wildlife problems cause failure in overall system(Dickman 2010; Redpath *et al.*, 2015). Sufferings of farmers vary depending on various consequences such as type of crop, seasons, areas over a time period and several management strategies have been implemented at different levels at different success levels (Patterson *et al.*, 1989).Many hurdles such as lack of capital, abundant labor wages, resistance from farmers, high machinery cost and lack of skills, overall contributed to the automation procedures for wide implementation. So basing on their needs, farmers should take personal initiative in protecting their crop rather than collaborative action for efficient crop management. Model setup for crop protection using laser beam technology and explanation was exemplified in Fig. 1.

Present study is undertaken for welfare of farmers in protecting crops by scaring the animals through alarm sound that is obtained through laser beam interruption caused by intruding animals.

Experimental setup:

https://drive.google.com/file/d/16O7KExJKQEXcsqsdn8GdxwviHq2zOlof/view?usp=sharing

Fig. 1 Model setup for crop protection using laser beam technology and explanation

Circuit design:

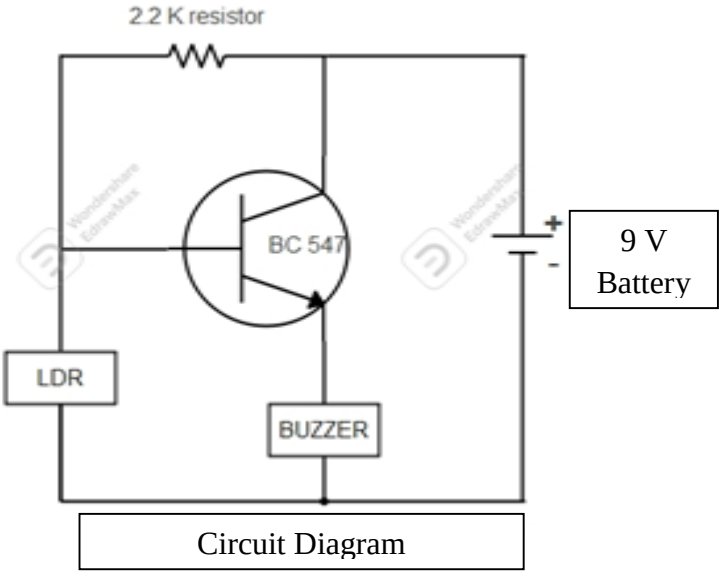


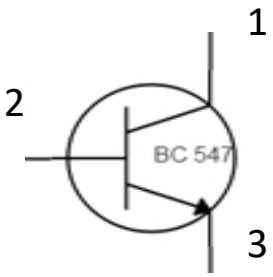
Fig. 2 Circuit diagram for representing laser security system

The equipment used here consists of:

1. **BC 547 transistor:**
   The key role of NPN transistor is to amplify the current from low resistance circuit to high resistance circuit. A small current transmitted from the base terminal of transistor helps in controlling the enormous current emitted from emitter and base terminals.

   The following diagram shows pin diagram of BC 547 transistor

   1. Pin 1 : Collector
   2. Pin 2 : Base
   3. Pin 3 : Emitter



2. **LDR (Light Depending Resistor):**

   The intensity of the light from the laser source is detected by the LDR sensor module. It is a Photo sensitive resistor whose resistance fluctuates depending on the intensity of the light falling on its surface.

3. **2.2 KΩ Resistor**
4. **Buzzer :**
   It is sensitive to circuit connections, which gives a warning alarm signal when there is any disturbance. So, uninterrupted action will create a sharp sound signal.
5. **LASER Light :**
   It is a continuous light from the Laser diode which acts as source to fall on LDR.
   Here red light having wave length from **630 nm-670 nm** is emitted.
6. **9 V Battery**
   This is a DC power source connected to transistor between Collector and Emitter of the transistor.
7. **9 V Battery connector**
8. **Connecting wires**
9.

Working principle for Laser security system:

In present world, security system is playing a key role by using technological advances. Present study uses a laser light as it can travel lengthy distance without scattering effect. Laser beam is used to cover a large area between source and destination points. Circuit diagram for representing laser security system is represented in Fig. 2.

This system set up involves the usage of Light dependent resistor (LDR) which is sensitive to light, buzzer, OHM resister, transistor, laser beam source. When any intruding animal causes interruption to laser beam, automatically alarm sound rings. As Laser is a concentrated light source which goes in straight line, if it gets interrupted, it can't reach LDR. This change can be sensed by circuit due to voltage output changes there by ringing warning bell by buzzer activation.

Investigation on their potential applications:

Security plays a key role in daily life and has become one of the most essential needs for every person. It helps in giving peace mentally and gives us a safe feeling. Now days, criminals are using much advanced technology and there is a need for us to update our knowledge in protecting ourselves. Usage of laser sense technology gives an excellent solution at low cost which can be utilized in prominent places where security is highly needed starting from pilot level to a high level with wide range of applications. Laser application categories were represented in Fig. 3. In modern age, this technology can be used in several operations for securing our homes, valuables, banks etc.

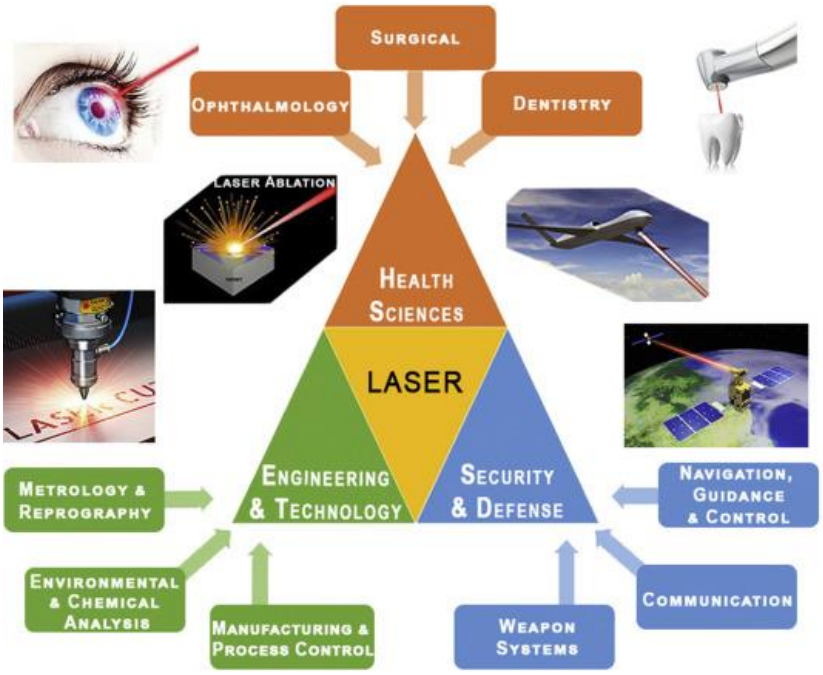


Fig. 3. Categories of LASER applications (Affan Ahmed *et al.*, 2021).

Conclusion:

Losses caused by wild animals provoke many financial problems to farmers and requires a very cautious approach for protecting crops. The most successful crop protection measure is to monitor their field whenever possible. But this is a difficult task which is not possible always so frequently. So, researchers are now focusing on advanced technologies and novel strategies such as electronic security systems to be available to farmers for protecting their crops. Laser beam security system is the more cost effective and affordable security strategy that can be used easily. It is a source of safe security system by minimizing man power needs and it is

one of the best options for no electricity wastage. Several systems should further be developed for giving best opportunity to farmers thereby giving a helping hand in raising their financial standards and in indirectly serving the nation.

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