To
The DoAA,
Thapar Institute of Engineering and Technology
Patiala, Punjab (147004)

June 10, 2025

Through: HCSED

Subject: Request to reimburse registration fee for the 12th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO'2025) from September 18-19, 2025

Respected Sir,

I am pleased to inform you that a research paper has been accepted in the **12th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO'2025).** It will be organized in hybrid mode on September 18-19, 2025 at Amity University, Noida, India. The conference provided an opportunity to network with industry professionals, gain valuable insights into emerging trends and technologies, and share best practices with peers. Details of the conference are given below:

Name of Conference: International Conference on Reliability, Infocom Technologies and Optimization (ICRITO'2025)
Date: September 18-19, 2025
Paper Title: Weed Detection in Potato Fields Using YOLO-Based Deep Learning Models
Authors: Divyansh Singh Manhas, Gautam Garg, Harsh Tyagi, Ayush Panwar, Gurshan Singh Cheema, Sushma Jain, and Mansi Sharma
Registration Fee: Rs. 6000+GST = Rs 7080 (Seven thousand and Eighty)

I, request you to reimburse the conference fee.

Thank you

Sincerely

Student, VII Sem
Department of CSE

Paper Acceptance Proof:

---------- Forwarded message ---------
From: **Microsoft CMT** <noreply@msr-cmt.org>
Date: Fri, May 30, 2025 at 11:50 PM
Subject: Notification for Paper Id " 287 " in ICRITO 2025
To: Mansi Sharma <mansisharmaiitd@gmail.com>

Dear Mansi Sharma

Greetings from Team ICRITO'2025 !!

We are glad to inform you that your paper titled " Weed Detection in Potato Fields Using YOLO-Based Deep Learning Models " with "ICRITO(2025)- 287" has been ACCEPTED with minor revision for ICRITO'2025.

Please find some details about next step:

1. Kindly go through the reviewer's comments by visiting your CMT account through which you have submitted the paper.

After incorporating reviewer's comments, revised version (doc file) of your paper is to be submitted (maximum 6 pages) in the email icrito@amity.edu as per IEEE 2 column format (Attached) by 1st June 2025.

2. Register for the conference by clicking the following payment link by 10th June 2025 (Using different payment mode including Debit, Credit card, Net banking etc.):

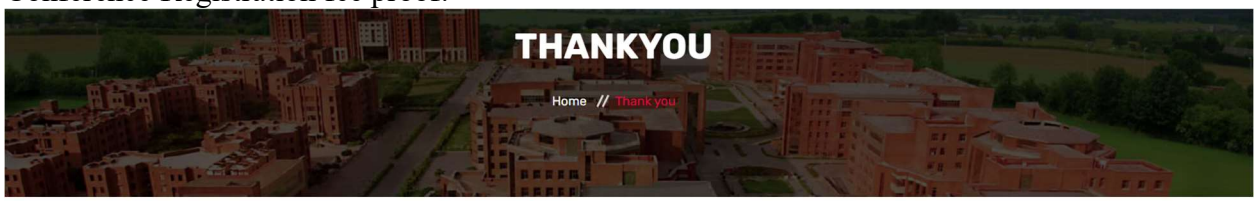
https://www.amity.edu/NSPG/ICRITO2025/

3. Subject of the mail should be ICRITO'2025 Paper with Id "your paper id". For e.g., ICRITO'2025 with Paper Id 100.

Best wishes,

Technical Team ICRITO'2025

Conference Registration fee proof:



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Front page of accepted paper:-

Weed Detection in Potato Fields Using YOLO-Based Deep Learning Models

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***Abstract*—Weed infestation seriously threatens potato crop yields by competing for essential resources, especially during the early stages of growth. Manual weed control methods are often labor-intensive, inconsistent, and less reliable for large-scale farming. This study proposes an efficient method for precision weed detection using deep learning models to address these challenges. We evaluated YOLOv8n, YOLOv8m, YOLOv7, and standard CNN architectures on the PotatoBot dataset. Transformer-based modules were also integrated into CNN models to enhance detection performance. Assessments were performed based on precision, recall, F1-score, and inference speed. The results show that YOLOv8n achieved accuracy of 92. 9% and real-time applicability, outperforming other models in both speed and robustness. This work highlights YOLO-based architectures, promising solutions for real-time, sustainable weed management in potato cultivation.**

***Index Terms*—Weed detection, YOLO, deep learning, convolutional neural network**

I. Introduction

Weed encroachment poses a severe threat to agricultural productivity by limiting crop access to essential nutrients, water, and light. In potato (*Solanum tuberosum* L.) production, the early growth stages are particularly vulnerable as incomplete canopy formation leaves the soil exposed, facilitating weed invasion. Traditionally, potato farmers have relied on widespread applications of synthetic herbicides for effective weed control due to their rapid action and low cost [1]. However, concerns regarding the environment and public health, along with the rising prevalence of herbicide-resistant weeds, have led to the implementation of more stringent regulations, particularly in areas such as the European Union, where numerous synthetic alternatives are now subject to restrictions or outright bans [2], [3].

In response to these challenges, there is an escalating interest in non-chemical, precision weed management strategies. Alternative practices such as mechanical weeding, thermal treatments, and the application of bio-herbicides (e.g., acetic and pelargonic acids) have been explored. But such approaches frequently fall short in terms of selectivity and scalability for large-scale crop operations [4], [5]. Recent advances in robotics and artificial intelligence (AI) offer promising pathways for site-specific weed management. Central to these innovations is the development of reliable weed detection systems using computer vision and deep learning (DL) techniques [6].

Early attempts at weed detection employ classical image processing and machine learning methods that extract handcrafted features such as shape, texture, and color, to differentiate between crops and weeds [6]–[8]. Although these techniques yielded initial success, their performance was often hindered by varying field conditions including changes in lighting, intricate backgrounds, and overlapping plant structures. The advent of deep convolutional neural networks (DCNNs) marked a significant turning point by automating feature extraction and achieving robust performance in challenging visual environments [9], [10]. Despite the high accuracy offered by more complex two-stage detectors like R-CNN variants, their computational demands can limit practicality in real-time field applications.

In contrast, single-stage detectors, such as the YOLO (You Only Look Once) family, streamline the detection process by integrating region proposal and classification into a single forward pass [11]. This simplicity leads to faster inference speeds - an essential factor for deployment on edge devices in field conditions. While YOLO-based techniques have received considerable attention in various agricultural contexts [12], their application in potato cropping systems has not been extensively evaluated.

The current study aims to address this gap by comparing the efficacy of several state-of-the-art models for real-time weed detection in potato fields. Precisely, we assess two variants of YOLOv8 (namely, YOLOv8n and YOLOv8m) alongside YOLOv7 to evaluate improvements in precision and speed. To further benchmark these methods against traditional approaches, we also implement a baseline conventional CNN and an enhanced CNN model that incorporates transformer modules for feature enrichment. By analyzing key performance metrics - including precision, recall, F1 score, and inference speed - this research seeks to identify the most effective deep learning strategy for supporting precision weed management. The outcomes are expected to contribute significantly to sustainable agricultural practices by reducing chemical dependency and improving crop health in potato production.