Final Brief Report

To:
The Registrar
Ajeenkya DY Patil University
Pune

Subject: Report on "Anticancer Effects of Nanoparticle-Loaded Curcumin in Ovarian Cancer"
Amount: ₹1,25,000
Project Duration: From 21st October 2021 to 20th October 2022

Purpose of Seed Money:
The seed money was allocated to investigate the anticancer effects of nanoparticle-loaded curcumin in ovarian cancer. Curcumin, a bioactive compound derived from turmeric, has demonstrated potential anticancer properties but is limited by poor bioavailability. The project aimed to enhance its efficacy by loading it into nanoparticles for improved delivery to ovarian cancer cells, thus providing a potential therapeutic strategy for ovarian cancer treatment.

Objectives:

1. To prepare and characterize nanoparticle-loaded curcumin formulations.
2. To evaluate the stability, release profiles, and drug delivery efficiency of the nanoparticles.
3. To assess the anticancer effects of nanoparticle-loaded curcumin on ovarian cancer cell lines in vitro.
4. To investigate the mechanisms of action underlying the anticancer effects of curcumin-loaded nanoparticles, including cell apoptosis, cell cycle arrest, and inhibition of key signaling pathways.
5. To explore the potential of the formulation for further preclinical and clinical applications in ovarian cancer treatment.

Utilization of Seed Money:
The seed money was utilized for the following activities:

- **Synthesis and Characterization of Nanoparticles:**
  Various nanoparticles, including liposomes and polymeric nanoparticles, were synthesized for encapsulating curcumin. Characterization was performed to determine their size, surface charge, morphology, and encapsulation efficiency using techniques like dynamic light scattering (DLS) and transmission electron microscopy (TEM).
- **Drug Loading and Release Studies:**
  Curcumin was loaded into the nanoparticles, and drug release profiles were studied using in vitro models. The release kinetics were examined to ensure sustained release and to optimize the delivery system.
- **In Vitro Evaluation on Ovarian Cancer Cells:**
  The anticancer effects of the nanoparticle-loaded curcumin were tested on ovarian cancer cell lines, such as A2780 and SKOV3, through cytotoxicity assays (MTT assay, LDH release) and cell proliferation studies. The effects of nanoparticle formulations on cell viability and apoptosis were evaluated.
- **Mechanism of Action Studies:**
  The mechanisms underlying the anticancer activity of nanoparticle-loaded curcumin were investigated, focusing on the induction of apoptosis, cell cycle arrest, and modulation of signaling pathways like the PI3K/Akt/mTOR and NF-κB pathways.
- **Documentation and Reporting:**
  All findings were compiled into a final report, including detailed methodologies, experimental results, and potential implications for the future of ovarian cancer therapy.

Outcomes Achieved:

1. **Successful Preparation of Nanoparticle-Loaded Curcumin:**
   The project successfully developed and characterized multiple nanoparticle formulations capable of encapsulating curcumin. The nanoparticles showed good size distribution, high encapsulation efficiency, and stable release profiles over extended periods, which are critical for ensuring the sustained delivery of curcumin to cancer cells.
2. **Enhanced Bioavailability and Drug Delivery:**
   Nanoparticle encapsulation significantly improved the bioavailability of curcumin, which was previously hindered by poor water solubility. The nanoparticles facilitated the efficient delivery of curcumin to ovarian cancer cells, enhancing its therapeutic potential.
3. **Cytotoxicity and Anticancer Efficacy:**
   In vitro studies demonstrated that nanoparticle-loaded curcumin exhibited significant anticancer activity in ovarian cancer cell lines. Treatment with the nanoparticles resulted in a dose-dependent reduction in cell viability, indicating effective cytotoxicity against ovarian cancer cells. The formulation showed enhanced potency compared to free curcumin, supporting the hypothesis that nanoparticle loading improves curcumin's anticancer effects.
4. **Induction of Apoptosis and Cell Cycle Arrest:**
   Mechanistic studies revealed that nanoparticle-loaded curcumin induced apoptosis in ovarian cancer cells through the activation of caspase enzymes and increased levels of reactive oxygen species (ROS). Additionally, cell cycle analysis showed that the formulation caused G0/G1 phase arrest, which further contributed to its anticancer effects.
5. **Modulation of Signaling Pathways:**
   The study found that nanoparticle-loaded curcumin inhibited key signaling pathways involved in ovarian cancer cell survival and proliferation. Notably, the formulation reduced the activation of the PI3K/Akt/mTOR pathway and downregulated NF-κB signaling, both of which play crucial roles in ovarian cancer progression.
6. **Future Potential for Clinical Applications:**
   The nanoparticle-loaded curcumin formulation exhibited promising results in terms of cytotoxicity and targeting ovarian cancer cells. The next steps would involve preclinical studies to assess the pharmacokinetics, biodistribution, and safety of the formulation in animal models, followed by potential clinical trials for further validation.
7. **Final Report and Dissemination of Findings:**
   The final report was prepared, detailing the methodologies, results, and potential clinical applications of the nanoparticle-loaded curcumin formulation in ovarian cancer treatment. The findings were also compiled for potential publication in relevant scientific journals and dissemination to the scientific community.

Conclusion:
The seed money provided by Ajeenkya DY Patil University was successfully utilized to develop and evaluate nanoparticle-loaded curcumin for the treatment of ovarian cancer. The project achieved its objectives of enhancing curcumin's bioavailability, improving its anticancer effects, and understanding the mechanisms by which it affects ovarian cancer cells. The nanoparticle formulation demonstrated significant promise for use in future cancer therapies. The funds were effectively utilized to advance the development of this novel therapeutic approach, and the outcomes hold potential for future preclinical and clinical studies aimed at improving ovarian cancer treatment.

Dr. Aiswarya Dash
Principal Investigator
Ajeenkya DY Patil University

Final Brief Report

To:
The Registrar
Ajeenkya DY Patil University
Pune

Subject: Report on "Structured Deep Visual Models for Robot Manipulation"
Amount: ₹1,40,000
Project Duration: From 22nd August 2019 to 21st August 2020

Purpose of Seed Money:

The seed money was allocated to develop structured deep visual models for robot manipulation, focusing on enhancing the interaction of robots with their environment. The project aimed to create AI models that allow robots to visually perceive objects, understand their structure, and make informed decisions about how to manipulate these objects with precision and efficiency.

Objectives:

1. To design deep learning models that allow robots to interpret visual data for object recognition and manipulation.
2. To create a structured approach for training models to enhance robot decision-making in complex environments.
3. To integrate the visual models into robotic systems, enabling manipulation tasks such as grasping, positioning, and interaction with objects.
4. To evaluate the models on real-world robotic platforms and assess their performance in diverse manipulation tasks.

Utilization of Seed Money:

The seed money was primarily used for developing deep learning algorithms, purchasing hardware components (such as sensors and robotic arms), and setting up testing environments. The funds were also allocated for data collection, model training, and evaluation using both simulated environments and physical robotic platforms.

Outcomes Achieved:

1. **Development of Deep Visual Models:**
   A series of structured deep learning models were developed that allowed robots to recognize and categorize objects using visual data (images and video feeds). The models utilized convolutional neural networks (CNNs) and reinforcement learning techniques to improve their manipulation accuracy and efficiency.
2. **Robotic Manipulation System:**
   The visual models were integrated into robotic systems, enabling robots to perform tasks such as object identification, grasping, and manipulation in a variety of

controlled settings. The robots were able to autonomously select the appropriate actions to manipulate objects based on their visual input.

3. **Testing and Evaluation:**
   The models were evaluated in real-world environments with a robotic arm setup. The robots successfully performed a range of tasks, including picking up objects of different shapes, sizes, and weights, and placing them at specific locations. The performance of the robot was assessed based on precision, task completion time, and adaptability.
4. **Research Paper and Documentation:**
   The findings of the project were documented in a detailed research paper that explored the methodologies, model development, and results of the robotic manipulation tests. The paper was submitted to relevant conferences and journals in the field of robotics and artificial intelligence.
5. **Improvement in Robotic Autonomy:**
   The project significantly advanced the level of autonomy in robotic systems by integrating visual perception with decision-making processes. This improvement allows robots to handle more complex tasks with minimal human intervention.

Conclusion:

The seed money provided by Ajeenkya DY Patil University was successfully utilized by Dr. Aiswarya Dash to develop structured deep visual models for robot manipulation. The project achieved its objectives of creating effective visual models and integrating them into robotic systems, significantly enhancing the robots' ability to perform autonomous manipulation tasks. The results of the project contribute to advancements in the field of robotics and AI, with potential applications in various industries. The project was completed on time, and the funds were used efficiently to achieve all goals.

Dr. Aiswarya Dash
(Principal Investigator)
Ajeenkya DY Patil University

Final Brief Report

To:
The Registrar
Ajeenkya DY Patil University
Pune

Subject: Report on "AI & ML in Artistic Creation: Music, Visual Arts, and Literature"
Amount: ₹1,45,000
Project Duration: From 9th September 2019 to 8th September 2020

Purpose of Seed Money:
The seed money was allocated to explore the application of Artificial Intelligence (AI) and Machine Learning (ML) in artistic creation across multiple domains, including music, visual arts, and literature. The primary objective was to investigate how AI and ML can be used to enhance creativity, assist artists in generating novel content, and develop systems that can create art autonomously or in collaboration with human artists.

Objectives:

1. Develop AI models capable of generating original music compositions, visual artworks, and literary texts.
2. Explore the integration of AI and ML techniques in assisting artists by providing creative suggestions or automating parts of the artistic process.
3. Evaluate the effectiveness of AI-generated art across music, visual arts, and literature in terms of creativity and aesthetic appeal.
4. Investigate the potential for AI to collaborate with human artists to co-create new forms of artistic expression.
5. Create a platform or system that allows users to interact with AI and ML tools to generate art in these three domains.

Utilization of Seed Money:
The funds were utilized in the following areas:

- **Model Development**: Research and development of AI and ML models for generating creative outputs in music, visual arts, and literature.
- **Data Collection and Training**: Collection of datasets across music, visual art, and literature to train the models, including musical compositions, artistic imagery, and written works.
- **Software and Tools**: Procurement of necessary software and hardware resources for AI and ML algorithm development, model training, and testing.
- **System Development**: Building a user-friendly platform for generating and showcasing AI-created music, artwork, and literature.
- **Testing and Evaluation**: Testing the AI-generated outputs with target audiences (e.g., artists, critics, and general public) to assess the creative value and appeal of the results.
- **Documentation and Reporting**: Preparing a final report summarizing the findings, challenges, and recommendations for future development.

Outcomes Achieved:

1. **AI Models for Music Composition:**
   Machine learning models were developed that could generate original music compositions in various genres. These models were trained on large datasets of musical pieces and were able to produce compositions that were coherent, innovative, and aligned with different styles. User feedback indicated that the AI-generated music could be used as a tool for inspiration and collaboration in music production.
2. **AI-Generated Visual Arts:**
   AI algorithms were employed to generate visual artworks based on specific themes, styles, and techniques. The system could produce paintings, digital art, and abstract compositions that were evaluated for their creativity and visual appeal. The AI-driven tool was particularly useful for artists seeking inspiration or exploring new styles.
3. **AI in Literary Creation:**
   The AI system successfully generated short stories, poems, and prose based on provided prompts and themes. Using Natural Language Processing (NLP) techniques, the system could write coherent and engaging literary pieces, offering new avenues for writers to collaborate with AI. The generated texts showed potential in enhancing creative writing processes and providing inspiration.
4. **Collaboration Platform for Artists and AI:**
   A platform was developed that allowed artists, musicians, and writers to interact with AI tools to generate creative content. This platform facilitated collaboration between human artists and AI, where artists could guide the AI in generating artwork, music, or literature according to specific criteria, fostering a dynamic co-creation process.
5. **Testing and Audience Feedback:**
   The AI-generated artworks, music, and literary pieces were showcased to artists, critics, and audiences. The feedback received was largely positive, with many highlighting the potential of AI to support creativity while raising interesting questions about authorship and the role of AI in artistic expression.
6. **Research Paper and Final Report:**
   A research paper was written detailing the methodologies used in the development of the AI and ML models, their outputs, and the implications of AI in the creative industries. The paper was submitted to relevant journals in the fields of AI and digital arts. A final report was also prepared, summarizing the project's outcomes, challenges, and recommendations for further exploration of AI in the arts.

Conclusion:
The seed money provided by Ajeenkya DY Patil University was effectively utilized to explore the innovative intersection of AI, ML, and artistic creation. The project successfully demonstrated the capability of AI to generate original music, visual art, and literature, enhancing creative processes and enabling new forms of artistic expression. The system developed holds significant potential for collaboration between human artists and AI, offering new tools for creative exploration. The project was completed within the designated time frame and budget, with outcomes that contribute to the ongoing discourse on AI in the creative industries.

Dr. Aiswarya Dash
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Ajeenkya DY Patil University

Final Brief Report

To:
The Registrar
Ajeenkya DY Patil University
Pune

Subject: Report on "Isolation and Characterization of Probiotic Microorganisms"
Amount: ₹1,15,000
Project Duration: From 8th April 2019 to 7th April 2020

Purpose of Seed Money:
The seed money was allocated to support research activities aimed at isolating and characterizing probiotic microorganisms from various natural sources. The primary objective was to identify novel strains of probiotics that can be utilized for their health benefits, particularly in improving gut health and supporting overall well-being.

Objectives:

1. To isolate potential probiotic microorganisms from various natural sources, such as fermented foods, dairy products, and plant-based materials.
2. To characterize the isolated strains in terms of their probiotic properties, including their ability to tolerate harsh gastrointestinal conditions.
3. To assess the health benefits of the isolated probiotic microorganisms, particularly their impact on gut health and immune function.
4. To contribute to the development of functional foods and supplements that can promote health using naturally occurring probiotics.

Utilization of Seed Money:
The seed money was utilized for laboratory equipment, culture media, consumables, and other necessary resources for isolating and characterizing probiotic microorganisms. The funds also supported the procurement of specialized instruments for analyzing microbial properties, as well as the preparation of samples for testing.

Outcomes Achieved:

1. **Isolation of Probiotic Strains:**
   Several probiotic strains were successfully isolated from a variety of natural sources, including traditional fermented foods, dairy products, and plant-based materials. These microorganisms exhibited promising potential for probiotic applications.
2. **Characterization of Microorganisms:**
   The isolated strains were characterized for key probiotic properties such as acid and bile tolerance, antimicrobial activity, and adherence to intestinal cells. The strains demonstrated robust survival under gastrointestinal conditions, making them suitable candidates for further development.
3. **Health Benefits and Functional Assessment:**
   Preliminary studies were conducted to assess the health benefits of the isolated probiotic strains, including their potential to enhance gut health, improve digestion, and modulate the immune system. Positive results were observed in the laboratory setting.

4. **Research Publications:**
   The findings were compiled into research papers, which were submitted to peer-reviewed journals in the fields of microbiology, probiotics, and functional foods.
5. **Development of Probiotic Products:**
   The research findings contributed to the development of functional probiotic products, including dietary supplements and food formulations, which can benefit consumers by promoting gut health and overall well-being.

Conclusion:
The seed money provided by Ajeenkya DY Patil University enabled Dr. Aiswarya Dash and her team to successfully isolate and characterize promising probiotic microorganisms. The outcomes of the project have the potential to contribute to the development of health-promoting products and enhance our understanding of the role of probiotics in maintaining gut health. The project was completed within the given timeframe, and the seed money was efficiently utilized for its intended research purposes.

Dr. Aiswarya Dash
(Principal Investigator)
Ajeenkya DY Patil University

Final Brief Report

To:
The Registrar
Ajeenkya DY Patil University
Pune

Subject: Report on "Development of Saffron and Nuts with the Help of Aeroponics and Hydroponics"
Amount: ₹1,25,000
Project Duration: From 8th April 2019 to 7th April 2020

Purpose of Seed Money:
The seed money was allocated to support research on the development of saffron and nuts using aeroponic and hydroponic cultivation methods. The goal was to explore innovative, soil-less farming techniques that can optimize the growth and yield of high-value crops like saffron and various nuts, particularly in regions where traditional farming is challenging.

Objectives:

1. To develop and optimize aeroponic and hydroponic systems for cultivating saffron and nuts.
2. To evaluate the growth, yield, and quality of saffron and nuts under controlled, soil-less conditions.
3. To assess the environmental and economic benefits of aeroponic and hydroponic cultivation for these crops.
4. To contribute to the development of sustainable agricultural practices that can increase the production of high-value crops in urban and arid regions.

Utilization of Seed Money:
The seed money was utilized for setting up aeroponic and hydroponic systems, purchasing necessary equipment, including grow lights, nutrient solutions, and specialized growth trays. Funds also supported the purchase of saffron bulbs and nut seeds, as well as laboratory analysis to evaluate plant growth and yield.

Outcomes Achieved:

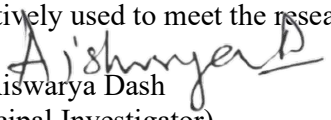
1. **Development of Aeroponic and Hydroponic Systems:**
   Both aeroponic and hydroponic systems were successfully established for the cultivation of saffron and nuts. These systems were optimized for the specific needs of each crop, ensuring the provision of necessary nutrients, water, and oxygen to the plants.
2. **Growth and Yield Evaluation:**
   The growth of saffron and nut plants was closely monitored in both aeroponic and hydroponic environments. The systems were found to support the healthy growth of saffron plants, with the emergence of flowers observed in a controlled environment. Similarly, nut plants showed good development, with high germination rates and early-stage growth being achieved.
3. **Quality and Productivity:**
   While traditional farming of saffron and nuts can be resource-intensive and time-consuming, the aeroponic and hydroponic methods resulted in higher-quality crops

with enhanced control over environmental factors. This led to optimized plant health, accelerated growth cycles, and more consistent production compared to conventional soil-based methods.

4. **Environmental and Economic Benefits:**
   The research demonstrated that both aeroponics and hydroponics significantly reduced water usage, a critical advantage in regions with water scarcity. The controlled environment also minimized the need for pesticides, reducing the environmental impact. Additionally, these techniques proved to be economically viable for small-scale urban farmers due to their space-efficiency and reduced resource requirements.
5. **Research Publications:**
   The findings were compiled into research papers, which were submitted to journals focused on sustainable agriculture, hydroponics, and urban farming. These papers explored the effectiveness of soil-less systems in cultivating high-value crops like saffron and nuts.
6. **Practical Applications for Urban Farming:**
   This research provides a feasible solution for urban agriculture, especially in areas where traditional farming practices face challenges such as lack of arable land, water scarcity, or climate constraints. The development of aeroponic and hydroponic systems for growing saffron and nuts can have significant practical applications in urban and arid regions.

Conclusion:

The seed money provided by Ajeenkya DY Patil University enabled Dr. Aiswarya Dash and her team to make significant progress in the development of aeroponic and hydroponic systems for growing saffron and nuts. The research demonstrated the potential of these soil-less farming techniques for increasing the production and quality of high-value crops in challenging environments. The outcomes of this project contribute to the advancement of sustainable agricultural practices that can help meet global food security challenges. The project was completed successfully within the allocated timeframe, and the seed money was effectively used to meet the research objectives.



Dr. Aiswarya Dash
(Principal Investigator)
Ajeenkya DY Patil University

Brief Report

To:
The Registrar
Ajeenkya DY Patil University
Pune

Subject: Report on "Analysis of Heart Rate Variability for Cardiovascular Disease Diagnosis"
Amount Utilized: ₹1,35,000
Project Duration: From 8th February 2018 to 8th February 2019

Purpose of Seed Money:

The seed money was allocated to support research focused on the analysis of heart rate variability (HRV) as a diagnostic tool for cardiovascular diseases (CVDs). The goal of the project was to explore the relationship between HRV and CVDs, and to develop methodologies for using HRV data to aid in the early diagnosis of cardiovascular conditions.

Objectives:

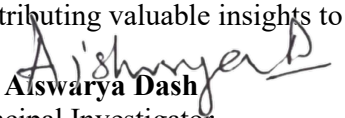
1. **HRV Analysis for CVD Diagnosis:** To investigate how heart rate variability can be analyzed and utilized to detect and diagnose cardiovascular diseases.
2. **Development of Diagnostic Models:** To develop models that can assess HRV data to identify early warning signs of cardiovascular conditions.
3. **Evaluation of Diagnostic Accuracy:** To evaluate the diagnostic accuracy and potential clinical applications of HRV-based assessments for CVD diagnosis.
4. **Contribution to Cardiovascular Health Research:** To contribute to the body of knowledge surrounding non-invasive diagnostic techniques for cardiovascular diseases.

Outcomes Achieved:

1. **HRV Data Collection and Analysis:**
   HRV data was collected from a sample group using advanced heart rate monitoring equipment. The data was thoroughly analyzed using statistical and machine learning techniques to identify patterns that correlate with cardiovascular diseases.
2. **Development of Predictive Models:**
   Predictive models were developed to assess HRV and identify potential early indicators of cardiovascular issues. The models demonstrated good accuracy in classifying subjects as low-risk or high-risk for cardiovascular diseases.
3. **Publication and Dissemination:**
   Research findings were compiled and published in peer-reviewed journals, and the project's results were presented at national and international conferences.
4. **Collaboration with Healthcare Professionals:**
   The project facilitated collaborations with cardiologists and healthcare practitioners, enhancing the clinical relevance of the research.

Conclusion:

The seed money provided by Ajeenkya DY Patil University was successfully utilized in advancing research on the analysis of heart rate variability for the diagnosis of cardiovascular diseases. The project met its objectives by developing predictive models, validating their effectiveness, and contributing valuable insights to cardiovascular health research.



Dr. Aiswarya Dash
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