PRESS RELEASE
IITH researchers develop dataset and AI-based technique to detect usage of mobile phones

HYDERABAD, 24ᵗʰ September 2020: Indian Institute of Technology Hyderabad Researchers are using artificial intelligence (AI) based algorithms to detect mobile phone usage. As mobile phones' capabilities have increased, addiction to mobile phones and the potential of their harmful use have also increased tremendously. Their research provides a tool to monitor and automatically detect usage of mobile-phone usage.

Modern smartphones have many capabilities, such as audio, image and video recording, computation, and storage. Further, through an internet connection, any other capability can be realized by accessing the cloud. These capabilities, combined with its small form-factor, low price, and wide-availability, make the smartphone a powerful instrument for executing malicious purposes. The distraction caused due to the usage of mobile phones during driving is one of the major factors behind the increasing number of road accidents. These factors have motivated the design of techniques for automatic detection of mobile-phones.

Dr. Sparsh Mittal led this research with his research scholars Ms. Poonam Rajput and Mr. Subhrajit Nag. Dr. Sparsh was with the CSE Department, IIT Hyderabad, for most of the duration of this research-study and has recently has joined IIT Roorkee. The results of this work have been accepted in the peer-reviewed conference "International Conference on Smart Objects and Technologies for Social Good 2020", held at Belgium 2020.

Speaking about the importance of this research, Dr. Sparsh Mittal said, "*Mobile phones have deeply penetrated people's lives. Mobile-phone addiction has become a great concern for many parents, lawmakers, and the authorities at educational institutes and offices. It is impossible to manually detect the mobile-phone at large-scale. Hence, there is a need to develop automated techniques for this purpose. We believe that our technique has immense potential. It can help improve productivity by preventing excess or untimely usage of the mobile phone. It can help in avoiding accidents due to distraction during driving. Also, mobile phones are prohibited in many places such as petrol pumps, exam-halls, embassies, military bases, and courts of law. Our technique can be used to find whether the mobile phone is being used in such areas. Finally, many financial transactions now happen on mobile phones, and hence, the loss of mobile phones can have severe consequences. By allowing tracking of mobile-phone, our technique can help in detecting loss or theft of the mobile phone.*"

Elaborating on this research, Ms. Poonam Rajput, research scholar at IITH, said, "*Mobile phone is a relatively small object when seen in photos or videos using*

surveillance or CCTV cameras. As a result, many existing object detection algorithms fail to detect it properly. Further, mobile-phones come in different sizes and shapes, such as feature phones and smartphones. These factors make the detection a challenge. We have used algorithms based on deep-learning to detect mobile-phone usage. Our fastest algorithm runs at nearly 27 frames-per-second on a high-end GPU, which means it can process a video in real-time. Our algorithms achieve nearly 99% accuracy on the Kaggle Driver dataset and 96% accuracy on the IITH-DMU dataset. Our work is the first to detect mobile phones' usage in both indoor and outdoor environments with a lot of clutter and other background objects."
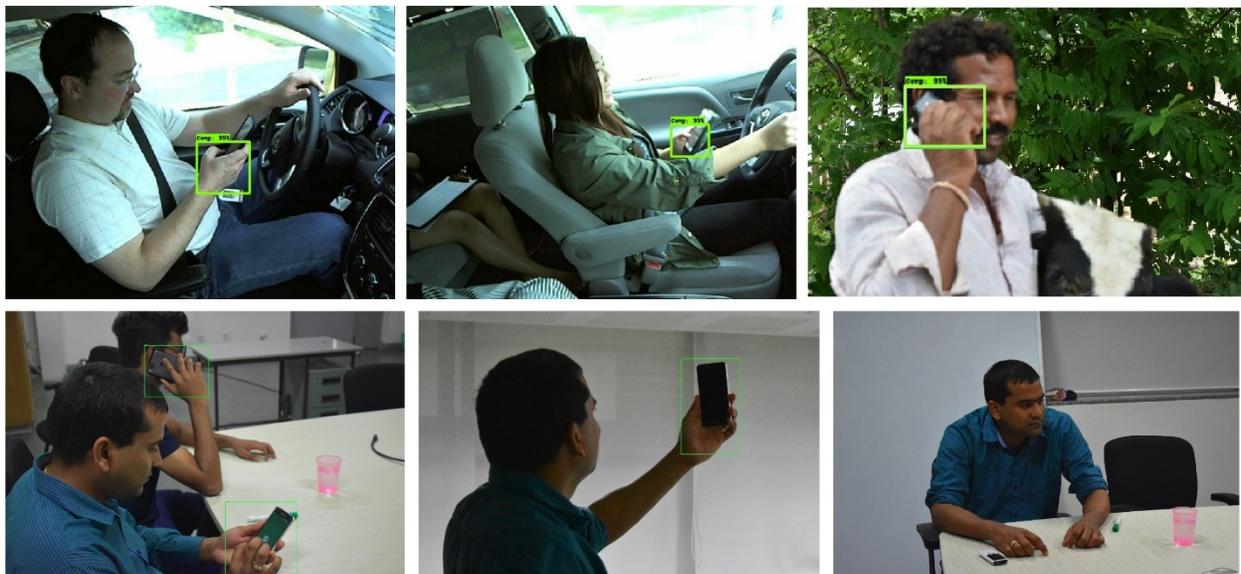
Mr. Subhrajit Nag shared his insights on the dataset-collection, "A crucial challenge we faced was that deep-learning algorithms require a massive amount of training data to make robust predictions. However, we observed that there was no publicly available and annotated dataset with a sufficient number of images of people using mobile phones. Hence, we collected one dataset, termed IITH-DMU (IITH dataset on mobile usage). It has images of people using phones in different backgrounds, lighting conditions, and angles. IITH-DMU has pictures of people in the office environment, market, or on hectic streets. These variations allow deep-learning models to learn more effectively. The second dataset, called KaggleDriver dataset, is a carefully selected subset of an existing dataset. This dataset is focused on evaluating mobile-phone usage during driving."

About IIT Hyderabad

Indian Institute of Technology Hyderabad (IITH) is one of the six new Indian Institutes of Technology established by the Government of India in 2008. In a short span of **12** years, the institute built on an imposing **570**-acre campus and has been ranked among the top ten institutes for four consecutive years in the National

Institute Ranking Framework (NIRF) released by the Ministry of Human Resource Development (MHRD), Government of India. The Institute was also ranked under Top **#20** in the recent edition of Atal Ranking of Institutions on Innovation Achievements (ARIIA) introduced this year by MHRD to systematically rank all major higher educational institutions and universities in India on indicators related to 'Innovation and Entrepreneurship Development' among students and faculties.

IIT Hyderabad has close to **221** full-time faculty, **2,855** students of whom **20** per cent are women, nearly **200** state-of-the-art laboratories and five research and entrepreneurship centres. The Institute has a strong research focus with more than Rs. **500** crore of sanctioned research funding while PhD scholars account for about **30** per cent of total student strength. IITH students and faculty are at the forefront of innovation with more than **1,500** research publications and patent disclosures, **300** sponsored/ consultancy projects and more than **70** industry collaborations. IITH has MoUs with more than **60** universities in the U.S., Japan, Australia, Taiwan and Europe. IITH has been a pioneering change in pedagogy with fractal academic programmes that atomizes course modules, encourage interdisciplinary learning, spanning innovative technology, fundamental science, liberal arts and creative arts like photography, theatre and painting.

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