Memorandum of Understanding
Between
Personal Air Quality Systems
And
KAMMAVARI SANGHAM INSTITUTE OF TECHNOLOGY
for
Collaborative R&D in the area of Personal Health and Wellbeing

1. **Purpose, Objectives and Goals:**

1.1. **Purpose:** This Memorandum of Understanding (MoU) which establishes the framework for collaborative Research and Development in the area of Health IoT (hereafter called "Collaboration") entered on this date the 29th of October 2021 between **Personal Air Quality Systems,** a Startup company developing solutions for environmental issues that impact health and wellbeing, situated at A 308, 2nd Floor, Block II, KSSIDC Building Electronics City, Bangalore 560100. INDIA (hereafter called "PAQS"), represented by its CEO, A. Vaidhyanahan and The Kammavari Sangham Institute of Technology No. 14, Raghuvanahalli, Kanakapura Road, Bangalore-560109, Karnataka (hereafter called "KSIT"), an institute of higher education represented by Its Principal and Director, Dr. Dilip Kumar K, states as follows:

Collaborations under this MoU are focused on; R&D in Data Gathering, Data Analysis and Processing, Developing Machine Learning models in the area of impact of air pollution on Health and wellbeing of humans; visiting faculty or R&D assignments, B.E. / M.Tech. / Ph.D. programs, short-term training, and short-term courses. This MoU is intended to expedite research and development of new methods and technologies that can be implemented in support of PAQS and KSIT's mission to support and participate in National Clean Air Programme (NCAP). It is also aimed at enhancing the quality of research and education at PAQS and KSIT.

Both PAQS and KSIT, believe that this Collaboration will contribute to more efficient resource utilization and accelerate methods and technology advancement in mutually agreeable areas of research. The two organizations further believe that successful collaboration will leverage beneficial results via method and technology transfer, education, and training.

1.2. **Objectives:** PAQS and KSIT will work collaboratively to expedite development of methods and technologies that are needed to address the scientific issues in the fields of interest of both the institutions.

1.3. **Goals:**

i. Identify and formulate research and development projects that address issues in respect of fields of scientific interest and establish arrangements that describe how personnel and resources of PAQS and KSIT will be effectively utilized to perform research and development projects addressing the said issues.

ii. Perform collaborative research and development projects in an expeditious manner.

iii. Provide products from the research and development projects in a form and format that can be easily used and understood by the target group.

iv. Collaborate in setting up Center of Excellence in IoT (Internet of Things) and education and training programs at PAQS or KSIT with resource persons from KSIT as well as PAQS. These may involve B.E. / M.Tech. / Ph.D. programs with guides and co-guides from the two organizations, continuing education for KSIT and other industry employees, short-term assignments at KSIT for PAQS (or at PAQS for KSIT) faculty or staff, etc.

2. **Background and Program Scope:**

2.1. **Background:** Air pollution is caused by a number of pollutants, which include both solid and liquid particles suspended in the air (particulate matter (PM)), and various gases such as ozone (O3), nitrogen oxides (NO2 or NOx), volatile organic compounds (VOCs), and carbon monoxide (CO) etc. PM10 Particulate Matter), is a priority pollutant internationally due to their adverse effects on public health as well as its negative effects on sensitive ecosystems, materials, and climate. PM2.5 is responsible for a variety of health effects including effects on the respiratory and cardiovascular systems, asthma, and premature death. NO_2 can affect the respiratory system causing inflammation of the airways. People with asthma or respiratory diseases are particularly sensitive and can show effects at low concentrations. SO_2 causes constriction of the airways leading to breathing difficulties, particularly in those suffering from asthma and chronic lung disease. The main threat to human health from CO is the formation of carboxyhemoglobin in the blood, which substantially reduces the uptake and transport of oxygen in the body. VOCs can have a variety of health effects. Some species are directly toxic to humans and some produce offensive odors at very low concentrations.

NCAP has acted as a great impetus for the development of country's high technology industry that can be utilized to meet the health sector needs. However, acute shortage of skilled engineers, lack of relevant academic and research programs beyond the critical mass in the universities, and poor university-industry collaboration are hampering such development. Hence there is a pressing need for collaborative R&D in Air Pollution and clean air technologies among the Industry and Academia.

The PAQS is an Electronic Systems Design and Manufacturing company providing end-to-end, real-time, and actionable solutions to enabie healthy living for every individual, community, and city. PAQS leverages a combination of technologies to provide Context Aware Solutions. The PAQS Engine is an inclusive IoT platform consisting of integrating outdoor, indoor, and personal devices, analytics, and a front-end mobile and web App, and employs IoT + LI + ML(Internet of Things, Location Intelligence & Machine Learning) for analytics and hyper-local data.

KSIT presently has oriented its research in the areas of Networking, IoT, Security, Image processing and Analytics in conjunction with Machine Learning algorithms. Among its faculties, It has a critical mass of world class researchers with unique capabilities and expertise in the above mentioned areas.

The KSIT CoE-IOT seeks collaborations with PAQS to achieve the following;

- Carrying research and developing algorithms enable calibrating general commodity class sensors to provide acceptable range of Air Quality parameters.
- Conduct a study on academic performance and identify its relationship and dependency on both indoor and outdoor air quality.
- Design and Develop prototypes catering to personal health especially for those impacted by poor air quality leading to breading problems.

The center hence intends to foster a collaborative and cross disciplinary research in vigorous fashion in years to come.

2.2. Program Scope: Under this MoU the two organizations; PAQS and KSIT will identify areas of research and development, Prototyping, and patents in the fields of interest as indicated above, that can be efficiently addressed through a collaborative approach. R&D programs and the education and training programs will be carried out in PAQS, Bangalore and at KSIT Center for Excellence in IoT, KSIT Campus, Bangalore. The MoU is expected to lead the collaborative R&D efforts at either organization, through entrepreneurial incubation cells.

3. Responsibilities:

3.1. PAQS agrees to

i. Exchange information consistent with the objectives and mandate of PQS, and identify areas of collaboration. Develop, formulate, and submit proposals of interest singly or jointly with KSIT to DBT, DIT, DST, national laboratories (such as R&D projects, technology assessment, testing, calibration and consultancy), and carry out such sponsored projects, describe specific R&D projects, education activities and training programs jointly pursued by PAQS and KSIT.

ii. Facilitate Ph.D. programs: Guide / Major Advisor shall be from PAQS or KSIT as required for the project and Co-guide shall be the other organization from PAQS for each such program.

iii. Facilitate its Center for Research (laboratories, library, office support, fields, etc.) for conducting such research work.

iv. Formulate and carry out continuing education programs / short-term courses for industry employees within PAQS domains of expertise.

v. Make provisions for KSIT faculty as deputed / Visiting Faculty or Adjunct Professors, for research, training and teaching at KSIT for short durations.

vi. Participate in joint technical activities (e.g., inspections, workgroups, scientific or engineering panels) with representatives from KSIT and other organizations which may be established to provide technical advice and guidance on issues related to the fields of interest of both the organizations.

vii. Assign a Contact Point and Technical Lead for interactions with KSIT.

viii. Jointly prepare annual summary report on the progress made under this MoU for each of the collaborations, or other cooperative activities, that are agreed as part of this agreement (MoU).

ix. Record, produce and maintain minutes of meeting as described in this MoU in respect of meetings held at PAQS.

3.2. KSIT agrees to;

i. Exchange information consistent with the objectives and mandate of KSIT and identify areas of collaboration. Develop, formulate, and submit proposals of interest singly or jointly with PAQS to DBT, DIT, DST, National Laboratories (such as R&D projects, technology assessment, testing, calibration and consultancy), and carry out such sponsored projects, describe specific R&D projects, education activities and training programs that will be jointly pursued by PAQS and KSIT.

ii. Facilitate research training at KSIT for PAQS Staff / students in areas of interest to KSIT and relevant to the M.Tech. programs pursued by the students and make provisions (Center laboratories, library, workshop, office support, etc.) for such training.

iii. Formulate and carry out continuing education programs / short-term courses for industry employees within KSIT domains of expertise. 50% concession in fees for such programs for PAQS employees shall be provided.

iv. Take PAQS faculty on deputation to work in KSIT on-going projects so that the faculty member may gain further experience.

v. Participate in joint technical activities (e.g., inspections, workgroups, scientific or engineering panels) with representatives from PAQS, to provide technical advice and guidance on-issues related to the fields of interest of both the organizations.

vi. Assign a Contact Point and Technical Lead for interactions with the PAQS.

vii. Jointly prepare annual summary report on the progress made under this MoU for each of the collaborations, or other cooperative activities, that are agreed as part of this agreement (MoU).

viii. Record, produce and maintain minutes of meeting as described in this MoU in respect of meetings held at KSIT.

4. **Memorandum of Understanding (MoU) Administration:**

4.1. **Reports:** The status of work performed under this MoU will be reviewed on an annual basis. The KSIT Contact Point will take the lead and be responsible for organizing meetings, developing agenda and recording results of the meetings. Minutes of the meetings will be produced by KSIT and be distributed to meeting participants as well as to the CEO of PAQS, and Principal of KSIT. A central file (retained by KSIT) will be maintained.

4.2. **Information Releases:** Principal KSIT and CEO PAQS will jointly review and approve information regarding MoU activities (meetings, new developments, etc.) prior to public release. Reports prepared under this agreement will stipulate specific procedures for the coordination, handling and public disclosure of information. All information disclosures concerning activities under this MoU or subsequent reports will comply with the guidelines of both the organizations governing the release of information. Where particular information protocols apply to a particular laboratory, or network of laboratories, those protocols will be followed by both parties to this MoU.

4.3. **Security Classification:** The highest security classification applied by both the parties will govern the handling of information and reports under this MoU, as appropriate. The security classification and procedures will be stipulated in each report.

4.4. **Facility Security, Health, Safety, and Environmental Compliance**: The host facility's security, health, safety, and environmental compliance programs will be followed by personnel when engaged in work activities as outlined in this MoU. Workers Injury Claims shall be covered by the employee's agency.

4.5. **Reimbursement Policy**: Each party to this agreement will handle and expend its own funds, except as otherwise noted in this MoU. The responsibilities assumed by each party are contingent upon funds being available from which expenditures legally may be met.

4.6. **Annual Management Meetings:** PAQS and KSIT will meet annually to plan and coordinate Collaboration under this MoU. Such meetings will be held at a mutually agreed upon location and on a date that is compatible with the planning and budgeting cycle of each organization. At this meeting, recommendations for adjustments to current activities, projects, and budget priorities will be proposed and agreed upon by the Contact Point for submission to the PAQS Director and Joint Registrar, KSIT for further action.

4.7. **Semi-Annual Technical Discussions:** PAQS and KSIT will meet at least twice a year to discuss technical progress under each project or activity. These reviews will require technical information exchange by PAQS and KSIT Technical Leads. These meetings may include individuals from outside of PAQS and KSIT as mutually agreed to by the respective Points of Contact.

4.8. **Technical Lead Responsibilities:** Technical Leads for each project or activity will strive to engage in:

- Providing technical information exchange consistent with agency regulations governing the exchange or release of information
- Delivering written or verbal technical evaluations of progress
- Conducting visit to sites where research is underway
- Organizing and participating in technical workshops and scientist-to-scientist meetings
- Reporting on any exceptional accomplishments from, or impediments to, successful program or project execution
- Recommending improvements for the MoU activities

4.9. **Approvals:** All plans and activities designed to carry out this MoU must be agreed to and approved by PAQS and KSIT prior to commencement of any technical work.

4.10. **Disclosure and use of Proprietary Information:** Both PAQS and KSIT recognize that successful Collaboration depends on full and prompt exchange of Proprietary information (Information not generated in the performance of this MoU and is proprietary to the disclosing party) necessary for carrying out this MoU. The nature and amount of Proprietary Information to be acquired by either party will be consistent with the objectives stated in Section 1.2 (Objective), Section 1.3 (Goals) of this MoU.

Disclosure: Each party, upon request, will disclose to the other party any relevant Proprietary Information provided that:

a) Such Proprietary Information is necessary to or useful in the R&D purposes under this MoU and will be considered as confidential information and shall not be disclosed to any third party without the disclosing party's consent;

b) Such Proprietary Information may be made available without incurring liability to holders of proprietary rights; and

c) Disclosure is consistent with the rules and regulations of the disclosing party and other may use the Proprietary Information however, the disclosing party will retain all its rights with respect to such Proprietary Information.

4.11. **Inventions and Licensing:** Activities conducted under this MoU and any project or other extramural arrangements may result in products or processes that are patentable. The organization whose work results in the invention shall disclose the invention to the other organization and then prepare, file, and prosecute patent applications. If protection is granted, the inventing organization will manage the invention in accordance with its rules and regulations. To be clear, title to all inventions and discoveries made by PAQS resulting from the research performed hereunder shall reside in PAQS; title to all inventions and discoveries made by KSIT resulting from the research performed hereunder shall reside in KSIT; title to all inventions and discoveries made jointly by PAQS and KSIT resulting from the research performed hereunder shall reside jointly in PAQS and KSIT.

Both parties agree to grant to the other party an option to negotiate an exclusive, royalty-bearing license to make, use or sell any invention or discovery owned wholly or partly by PAQS or KSIT and made or conceived and reduced to practice during the term of this MoU which have directly resulted from the performance of the research hereunder. PAQS or KSIT shall notify the other party of its desire to enter into such a license agreement, and a license agreement shall be negotiated in good faith between the parties.

5. **Period of Agreement:**

5.1. This MoU shall be effective for 5 (Five) years from the date of the last signature unless cancelled in writing by either of the participating organization with 90 days' notice.

5.2. This MoU will be reviewed annually by the Contact Point to determine if any changes or amendments should be incorporated. Such changes or amendments will be formally incorporated in the MoU within 90 days of the annual review.

5.3. Within 30 days of its expiry, this MoU may be renewed on same terms as on the date of expiry upon a signed agreement of renewal between the respective CEO PAQS and Principal KSIT.

6. **Governing Law:** Except as specifically provided for herein, all questions, disputes or differences arising under, out of or in connection with this MoU shall be settled in accordance with laws of India (both procedural and substantive) from time to time in force.

7. **Patent / Copyright Indemnification:** Either party will defend any suit against the other party arising out of any actual or alleged patent or copyright infringement of a valid Indian patent or copyright, to the extent based on the Proprietary Information disclosed by disclosing party to the aggrieved party, and indemnify for any final judgment assessed against aggrieved party resulting from the suit provided that aggrieved party notifies the disclosing party at the time it is apprised of the third-party claim.

8. **Names and Addresses of Parties:**

For PAQS
A. Vaidhyanathan
CEO, Personal Air Quality Systems
A 308, 2nd Floor, Block II
KSSIDC Building Electronics City
Bangalore 560100

For KSIT
Dr. Dilip Kumar K
Principal and Director
KS Institute of Technology
#14, Raghuvanahalli,
Kanakapura Road, Bangalore-560109

General Provisions:

8.1. Nothing in this MoU supersedes any other MoU held by either party.

8.2. This MoU in no way restricts the parties from participating in similar activities or arrangements with other public or private agencies, organizations, or individuals.

8.3. This MoU describes in general terms, the basis upon which the parties intend to cooperate. It does not create binding, enforceable obligations against any party.

Approved and accepted for PAQS

Approved and accepted for KSIT