FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

&

The Patent Rules, 2003

COMPLETE SPECIFICATION

(See section 10 and rule 13)

TITLE OF THE INVENTION

"CHILD GROWTH MONITOR USING ARTIFICIAL INTELLIGENCE"

Applicant(s)

NAME	**NATIONALITY**	**ADDRESS**
1. Mr.M.Veera Brahmam	Indian	Assistant Professor, Department of Cyber Security and Data Science, Bapatla Engineering College, Bapatla, Andhra Pradesh-522102
2. Dr. Vedavalli.Perigisetty	Indian	Assistant Professor, Department of Electronics & Communication Engineering, Bharat Institute of Engineering and Technology, Mangalpally, Ibrahimpatnam, Telangana- 501510
3. Mr. Panthagani Vijaya Babu	Indian	Assistant Professor, Department of Computer Science & Engineering, Vignan's Foundation for Science Technology and Research, Vadlamudi, Guntur, Andhrapradesh-522213
4. Mr.K. John Bunyan	Indian	Assistant Professor, Department of Cyber Security and Data Science, Bapatla Engineering College, Bapatla, Andhra Pradesh -522102

5. Mr. R Leela Phani Kumar	Indian	Senior Assistant Professor, Department of AI & ML, Sri Vasavi Engineering College, Tadepalligudem, Andhra Pradesh-534101
6. Mrs. G. Bhargavi	Indian	Assistant Professor, Department of Computing Technologies, School of Computing, SRMIST, Katankulattur, Chennai - Tamilnadu
7. Mr. Samvad Gour	Indian	Senior Software Engineer, Sony India Software Center, 2nd Tower, 2 Hibiscus Outer Ring Road, Devarabesenahalli Embassy Tech Village SEZ South Wing, Bengaluru, Karnataka – 560103, India
8. Ms. Oneza Tehreem Khan	Indian	Associate Software Engineer, GSN Games, Global Technology Park - Block A Ground Floor, Marathahalli - Sarjapur Outer Ring Rd, Bengaluru, Karnataka 560103, India
9. Dr. A.Saranya	Indian	Assistant Professor (CSE), Department of Computer Science and Engineering, Amity School of Engineering Technology, Amity University, Mumbai - India
10. Mrs.M.Mageshwari	Indian	Research Scholar, Department of Computer Science and Engineering, SRM Institute of Science and Technology, Kattankulathur, Chennai -603203, Tamil Nadu, India

The following specification particularly describes the nature of the invention and the manner in which it is performed:

FIELD OF THE INVENTION

This invention proposes a Gadget for **CHILD GROWTH MONITOR USING ARTIFICIAL INTELLIGENCE.** It helps parents monitor their children's physical development

BACKGROUND OF THE INVENTION

US6054926A - A baby monitor that uses infant positioning blocks with a battery-operated audio pickup and a low-power FM transmitter to keep an eye on a baby while maintaining them in a safe sleeping posture. We commonly refer to infant positioning blocks as "baby wedges."

US10621733B2- Improved display of a baby's breathing or another monitored subject's heartbeat. A video feed of a subject in a sleep environment may be obtained through a video camera. The subject's motion in the video feed may then be identified by analyzing the video feed. Finally, a mobile device may be programmed to display an exaggerated version of the subject's motion as a representation of their physical characteristics.

CN207768361U- The utility model is associated with a type of child sleep training system.The utility model's example implementation is set up to gather and/or communicate pertinent data about children's sleep and recognizes that youngsters automatically soothe their crying babies by following a sequence of steps that ends with them feeling calm before alerting a caregiver. For instance, a system that may be set up to measure consoles and produce effects like vibration, rock, white noise, or soft music.Additional or alternative configurations of other example utility model embodiments include gathering and/or transmitting data pertaining to children's cognitive growth and/or physical development. For instance, the system can be set up to provide caregivers with comments regarding measurement data or to display relevant various indices of children's development.

US20150109126A1- A child surveillance device designed to assist parents in keeping an eye on their kids. A parental unit that resembles a watch is part of the

system; ideally, it has a band with a housing on it. The system also consists of one or more kid units, which should have a bracelet-like design. A microprocessor, wireless transceiver, vibration motor, alarm, speaker, microphone, and display are all part of the parental unit. The child unit has a GPS chip, a speaker, a microphone, a camera, a transceiver, and a CPU. The purpose of pairing the parental and child units is to enable the parental unit to show the child unit's position as determined by its GPS chip. Moreover, communication between the parental and kid units is possible. There can be a lock on the child units that can only be opened or locked with the parental unit.

US10299718B2- In order to evaluate the functional significance of the various sucking components—that is, the flexibility of infant sucking skills in relation to their oral feeding performance—at a given developmental stage and/or during preventive or therapeutic intervention programs, the present invention relates to a system device and method for monitoring infant oral motor kinetics (OMK). It's a special method and tool that allows researchers to examine babies' nonnutritive and/or nutritive sucking abilities, or the Suction and/or Expression aspects of sucking, in their natural environment—during a typical feeding session. Miniature pressure transducers, also known as pressure sensitive pads, are attached to the nipple to measure intraoral pressure pulses during suction and compression/stripping pressure pulses during expression. Another type of OMK sensor is a miniature flow sensor, which measures fluid flow rate and can be integrated over time to determine the volume of milk removed (bolus) per suck. All of these sensors are tracked in real-time by the monitoring systemIn an OMK monitoring system, additional signals, including as respiration, swallowing, temperature, optical, and acoustic signals, can be recorded and compared with the instrumented-nipple signals.

CN101011518A- The invention discloses a Chinese medicament for treating children's infantile malnutrition which is prepared from the following raw materials (by weight portion): cockroach 10-30 parts, pseudostellaria root 10-25 parts, Chinese yam 10-30 parts, chicken's gizzard-skin 10-30 parts, picrorhiza rhizome 8-15 parts, gentian root 5-15 parts, biond magnolia flower 10-20 parts, finger citron 5-15 parts, licorice 5-10 parts. The medicament can be prepared into granules, oral liquids, pills, tablets and capsules.

CN105873515B- Systems, devices and methods are described for assessing the risk of developmental, cognitive, social or psychological competence or disability in very young patients (e.g., within the first 2-6 months of life). Typically, a decline in visual fixation of a subject over time with respect to a certain dynamic stimulus provides an indication of the subject's possible abilities or disabilities (e.g., ASD). Visual fixations of subjects are identified, monitored and tracked over time by repeated eye tracking sessions, and data relating to the visual fixations are then analyzed to determine a likely increased risk of such diseases in the subject. Changes in visual fixation compared to similar visual fixation data for a generally developing subject or to previous visual fixation data for the subject itself provide an indication of developmental, cognitive or psychological competence or disability.

PRIOR ART SEARCH

AU2014334870B2- Methods for assessing infant and child development via eye tracking: 2019-06-13

EP1219243A1- Non-invasive brain function examination: 2002-07-03.

US6755527B1- Techniques for analyzing eye movements: 2004-06-29.

US20150109126A1-Child Monitoring System: 2015-04-23

US20140192135A1-Child-monitoring system:2014-07-10

CN105427528A-Monitoring method and system: 2016-03-23

US9747770B1-Child tracking device: 2017-08-29

US9928714B1-Programmable child positioning and tracking device: 2018-03-27

US20200098247A1-Wearable bracelet tracking system: 2020-03-26

US11257343B2-Child monitoring system and method for real-time monitoring of a child: 2022-02-22

US11308744B1-Wrist-wearable tracking and monitoring device: 2022-04-19.

US11727779B1-Charge and guardian safety system: 2023-08-15

CN104077276B -Portable intelligent infant nursing device: 2017-04-26

US6054926A-Baby monitor: 2000-04-25

US7151444B1- Children's monitor for monitoring multiple children and method: 2006-12-19

US8878679B2- Baby monitor light: 2014-11-04.

CN207768361U-sleep training system for children: 2018-08-28.

US10621733B2- Enhanced visualization of breathing or heartbeat of an infant or other monitored subject: 2020-04-14

US10299718B2-Systems for monitoring infant oral motor kinetics during nutritive and non-nutritive feeding: 2019-05-28

US10709335B2- Infant monitoring system with observation-based system control and feedback loops: 2020-07-14.

US10921763B1- Baby monitoring using a home monitoring system: 2021-02-16.

WO2017120033A1-Compositions and method for treating and preventing malnutrition: 2017-07-13.

CN101011518A-Medicament for treating children's infantile malnutrition symptom: 2009-08-19.

CN104800515A-Chinese medicinal formula for treating infantile malnutrition: 2015-07-29.

CN105148165A-Traditional Chinese medicine composition for treating infantile malnutrition and preparation method thereof: 2015-12-16.

CN101658613B-Drug for treating infantile chronic indigestion: 2011-06-15.

CN105873515B-Method for assessing infant and child development via eye tracking: 2020-11-20.

REFERENCES:

1. Lisa Reinhart, Anne C. Bischops, Janna-Lina Kerth, Maurus Hagemeister, Bert Heinrichs, Simon Eickhoff, Juergen Dukart, Kerstin Konrad, Ertan Mayatepek, Thomas Meissner, Artificial intelligence in child development monitoring: A systematic review on usage, outcomes and acceptance, Intelligence-Based Medicine, 2024, 100134, ISSN 2666-5212, https://doi.org/10.1016/j.ibmed.2024.100134.
2. J. Jeong, E.E. Franchett, C.V. Ramos de Oliveira, K. Rehmani, A.K. Yousafzai Parenting interventions to promote early child development in the first three years of life: a global systematic review and meta-analysis Epub 20210510 PLoS Med, 18 (5) (2021), Article e1003602, 10.1371/journal.pmed.1003602 PubMed PMID: 33970913; PubMed Central PMCID: PMCPMC8109838.
3. S. Bhavnani, D. Mukherjee, S. Bhopal, K.K. Sharma, J. Dasgupta, G. Divan, et al. The association of a novel digital tool for assessment of early childhood cognitive development, 'DEvelopmental assessment on an E-Platform (DEEP)', with growth in rural India: a proof of concept study Epub 20210618 EClinicalMedicine, 37 (2021), Article 100964, 10.1016/j.eclinm.2021.100964 PubMed PMID: 34195580; PubMed Central PMCID: PMCPMC8225699.
4. F.P. Glascoe Early detection of developmental and behavioral problems quiz 80 Pediatr Rev, 21 (8) (2000), pp. 272-279, 10.1542/pir.21-8-272 PubMed PMID: 10922024.
5. N. Sand, M. Silverstein, F.P. Glascoe, V.B. Gupta, T.P. Tonniges, K.G. O'Connor Pediatricians' reported practices regarding developmental screening: do guidelines work? Do they help? Pediatrics, 116 (1) (2005), pp. 174-179, 10.1542/peds.2004-1809 PubMed PMID: 15995049.
6. K.D. Ellingson, M.J. Briggs-Gowan, A.S. Carter, S.M. Horwitz Parent identification of early emerging child behavior problems: predictors of sharing parental concern with health providers Arch Pediatr Adolesc Med, 158 (8) (2004), pp. 766-772, 10.1001/archpedi.158.8.766 PubMed PMID: 15289249.
7. P.Y. Collins, B. Pringle, C. Alexander, G.L. Darmstadt, J. Heymann, G. Huebner, et al. Global services and support for children with developmental delays and disabilities: bridging research and policy gaps Epub 20170918 PLoS Med, 14 (9) (2017), Article e1002393, 10.1371/journal.pmed.1002393 PubMed PMID: 28922419; PubMed Central PMCID: PMCPMC5603146.

8. Z. Hoodbhoy, S. Masroor Jeelani, A. Aziz, M.I. Habib, B. Iqbal, W. Akmal, et al. Machine learning for child and adolescent health: a systematic review Epub 20201215 Pediatrics, 147 (1) (2021), 10.1542/peds.2020-011833 PubMed PMID: 33323492.
9. D.Y. Song, S.Y. Kim, G. Bong, J.M. Kim, H.J. Yoo The use of artificial intelligence in screening and diagnosis of autism spectrum disorder: a literature review Soa Chongsonyon Chongsin Uihak, 30 (4) (2019), pp. 145-152, 10.5765/jkacap.190027 PubMed PMID: 32595335; PubMed Central PMCID: PMCPMC7298904.
10. A. Chen, F. Wijnen, C. Koster, H. Schnack Individualized early prediction of familial risk of dyslexia: a study of infant vocabulary development Front Psychol, 8 (2017), 10.3389/fpsyg.2017.00156.

OBJECTIVES OF THE INVENTION

- To identify kids or populations that aren't developing normally the criteria measure children's body weight and height.
- It provides insight into a child's nutritional state, the presence of any endocrine problems, and the frequency of long-term systemic illnesses.
- To observe shifts in development in response to significant life events, such as the birth of a sibling.
- Measuring a child's height, weight, and length and comparing the results to growth guidelines.

SUMMARY OF THE INVENTION

In terms of ending hunger and malnutrition, the world is regressing. The group most susceptible to malnutrition is young children. Their bodies are more reliant on vitamins and minerals, and other nutrients, and are more vulnerable to the negative effects of deficiency. Detecting malnutrition by accurate measurement and monitoring is a major treatment bottleneck. Conventional methods of measuring child growth have the potential to be fatally inaccurate. Child growth will be impacted by this

malnourishment. This invention suggests an artificial intelligence-based malnutrition monitoring device. Child development describes the changes that children go through as they get older. Along with their physical development, children also undergo behavioral, cognitive, and skill changes. Being conscious of your child's changing growth and development milestones is an essential part of being a parent. Apart from the physical transformations that occur during childhood and adolescence, growth and development also includes some of the emotional, behavioral, and cognitive changes that children go through as they begin to understand and interact with the world around them. A child's development is impacted by multiple elements. Among these are the social, intellectual, spiritual, physical, and economic. Child care facilities, parenting styles, and family structure are three crucial facets of child development. Malnutrition is one of the main obstacles to children's growth. This invention suggests an artificial intelligence-based malnutrition monitoring device. This gadget was linked to the CGM (Child Growth Monitor) mobile app. It will scan kids and identify malnutrition in kids right away. The apparatus, which has an infrared sensor, measures the child's height, weight, and body volume in three dimensions. An AI system can be used to analyze the gathered data, providing guardians with fast access to information about malnutrition in children. Children's growth will be enhanced by this because of the immediate monitoring. Additionally, this innovation shortens the time needed for malnourished youngsters to receive therapy.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1: Flow Diagram for **CHILD GROWTH MONITOR USING ARTIFICIAL INTELLIGENCE.**

Figure 2: Architecture Diagram for **CHILD GROWTH MONITOR USING ARTIFICIAL INTELLIGENCE.**

BRIEF DESCRIPTION OF THE INVENTION

It is believed that a child's early years are "the golden age," when they are most likely to form the habits of the future. A baby's health problems that begin in infancy

will typically persist for the rest of their lives [3]. As a result, it is important to track an infant's growth in order to identify and correct any deviations from the recommended growth standard. Specific physical changes and increases in a child's dimensions, such as height, weight, head circumference, and body mass index, are referred to as growth. Nutrition is the most significant component since it gives the body the energy it needs for various tasks and protects against illness.

The state of children's and newborns' health has become more important than ever nowadays. The primary method for evaluating the state of health is child development monitoring. Child development is described as "the process of change in which a child comes to master more and more complex levels of physical activity, thinking, feeling, communicating, and interactions with people and objects." Child growth is defined as "the change in weight, height, and circumference of head. Physical, cognitive, emotional, and social development are some ways to describe this. Thus, whereas "development" refers to a child's progress across multiple domains, "growth" refers to changes that occur on a physical level. The Child Growth Monitor (CGM) mobile app was connected to this device. It will immediately detect malnutrition in children through scanning. The device measures the child's height, weight, and body volume in three dimensions using an infrared sensor. The collected data can be analyzed by an AI system to give parents quick access to information about childhood malnutrition. This will promote children's growth due of the instantaneous monitoring. This invention also reduces the amount of time malnourished children must wait for therapy.

INFRARED SENSOR

In addition to measuring an object's heat, an infrared sensor may detect movement. Although infrared radiation is undetectable to human vision, it can be detected by the infrared sensor. A photodiode that can detect infrared light is an infrared sensor. The R sensor's capacity to gauge and identify variations in light that are invisible to the unaided eye. In order to accomplish this, infrared light from nearby objects is either detected or emitted by IR sensors. Since heat energy is released as radiation by all objects with a temperature higher than absolute zero, the capacity of these sensors to detect and quantify heat is their primary feature.

CHILD GROWTH MONITOR (CGM) MOBILE APP

An app that uses the ICDS Growth Monitoring Chart to determine a child's nutritional status based on weight for height (wasting), weight for age (underweight),

ARTIFICIAL INTELLIGENCE FOR GROWTH MONITORING

Based on a child's present growth trends, AI can forecast the likelihood that they will become obese or experience other health problems. With the use of this knowledge, parents may encourage a healthier lifestyle for their children by making educated decisions regarding their nutrition and exercise routine. In order to help kids realize their full potential, early intervention and assistance are made possible by AI's ability to detect children who may be at risk for developmental problems.

WE CLAIMS:

1. A gadget which connected to GCM APP and composed of IR Sensor with AI technology.
2. According to Claim 1, GCM APP used to determine a child's nutritional status based on weight for height (wasting), weight for age (underweight),
3. According to Claim 1, IR sensor used to detect malnutrition in children through scanning with input data.
4. According to Claim 1, AI can forecast the likelihood that they will become obese or experience other health problems based on a child's present growth.

Dated this 14th day of February 2024

Signature: 

Applicant(s)

Mr.M.Veera Brahmam et. al.

ABSTRACT

CHILD GROWTH MONITOR USING ARTIFICIAL INTELLIGENCE

Child development describes the changes that children go through as they get older. Along with their physical development, children also undergo behavioral, cognitive, and skill changes. Being conscious of your child's changing growth and development milestones is an essential part of being a parent. Apart from the physical transformations that occur during childhood and adolescence, growth and development also includes some of the emotional, behavioral, and cognitive changes that children go through as they begin to understand and interact with the world around them. A child's development is impacted by multiple elements. Among these are the social, intellectual, spiritual, physical, and economic. Child care facilities, parenting styles, and family structure are three crucial facets of child development. Malnutrition is one of the main obstacles to children's growth. This invention suggests an artificial intelligence-based malnutrition monitoring device. This gadget was linked to the CGM (Child Growth Monitor) mobile app. It will scan kids and identify malnutrition in kids right away. The apparatus, which has an infrared sensor, measures the child's height, weight, and body volume in three dimensions. An AI system can be used to analyze the gathered data, providing guardians with fast access to information about malnutrition in children. Children's growth will be enhanced by this because of the immediate monitoring. Additionally, this innovation shortens the time needed for malnourished youngsters to receive therapy.

Dated this 14th day of February 2024

Signature: 

Applicant(s)

Mr.M.Veera Brahmam et. al.